INTERNATIONAL MEETING FOR AUTISM RESEARCH

6th Annual Meeting
May 3 - 5, 2007
Seattle, Washington
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<th>Friday, May 4</th>
<th>Saturday, May 5</th>
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<td>7:30-8:15</td>
<td>Breakfast</td>
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<td>8:00</td>
<td>Opening Comments: Geraldine Dawson</td>
<td>Grand Ballroom Foyer</td>
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<td>8:10</td>
<td>ADVOCACY GROUP INTRODUCTION</td>
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<td></td>
<td>Autism Society of America: Cathy Pratt</td>
<td>Autism Speaks: Peter Bell and Mark Roithmayr</td>
<td>Cure Autism Now: Jonathan Shestack and Portia Iversen</td>
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<td>Introduction: Geraldine Dawson</td>
<td>Introduction: Elizabeth Aylward</td>
<td>Introduction: Susan Bookheimer</td>
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<td>Keynote Address: Anthony Bailey</td>
<td>Keynote Address: Patricia Kuhl</td>
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<td>Grand Ballroom ABC</td>
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<td>8:30-9:30</td>
<td>Coffee Break</td>
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<td>10:45</td>
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<td>Infants with autism: New approaches to early detection &amp; treatment</td>
<td>Medical aspects of Autism Spectrum Disorders</td>
<td>New approaches for neuroimaging in autism. Declan Murphy, Tom Conturo</td>
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<td></td>
<td>Geraldine Dawson</td>
<td>Margaret Bauman</td>
<td>Adolescent and adult interventions and outcomes</td>
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<td>Can animal models lead to treatments for social deficits in ASD?</td>
<td>Genetic approaches to autism: Complex methods for a complex disorder</td>
<td>A world view of autism epidemiology</td>
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<td></td>
<td>Manny Dicco-Bloom</td>
<td>Gerald Schellenberg, John Constantino</td>
<td>Marshaly Holness, Yeargin-Allsopp</td>
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<td>Sponsor: Autism Speaks</td>
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<td>Posters 1, 3 Grand Ballroom D</td>
<td>Posters 3 Grand Ballroom D</td>
<td>Posters 5 Grand Ballroom D</td>
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<td>11:45-1:00</td>
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<td>Oral Sessions 1, 2, 3</td>
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<td>Oral Sessions 1, 2, 3</td>
<td>Functional imaging</td>
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<td>Brain structure Joe Piven</td>
<td>Nancy Minshew</td>
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<td>Cognition Dermot Bowler</td>
<td>Autism epidemiology Rita Cantor</td>
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<td>Treatment and outcome Lonnie Zwaigenbaum</td>
<td>Autism phenotypes Annette Estes</td>
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<td>Posters 2 Grand Ballroom D</td>
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<td>1:45-1:55</td>
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<td>Oral Sessions 10, 11, 12</td>
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<td>Genetics Jim Sutcliffe</td>
<td>Emotions &amp; social interactions</td>
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<td>Neurophysiology &amp; neuro-psychology Sara Webb</td>
<td>Sensory motor systems and repetitive behavior</td>
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<td>Stewart Mostofsky</td>
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<td>Neurophysiology &amp; neuro-psychology Sara Webb</td>
<td>Models of autism Mirella Dapretto</td>
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<td>Diagnosis &amp; screening Wendy Stone</td>
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<td>David Mandell</td>
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<td>5:15-6:15</td>
<td>Poster session 2 Grand Ballroom D</td>
<td>Poster Session 6</td>
<td>4:30 IMFAR 2008 Announcements: Tony Charman</td>
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<td>6:45-7:45 Business Meeting</td>
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<td>Grand Ballroom ABC</td>
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<td>5:15-6:45</td>
<td>Reception - Sponsored by INSAR</td>
<td>Reception - Sponsored by Autism Speaks</td>
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REGISTRATION WILL BE LOCATED IN THE GRAND BALLROOM FOYER. REGISTRATION OPEN WEDNESDAY 5-8 PM AND STARTING 7 AM THURSDAY.
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IMFAR Welcome

Welcome to the Sixth Annual International Meeting for Autism Research!

It is a pleasure to welcome you to Seattle for the 6th annual International Meeting for Autism Research. IMFAR is rapidly becoming the leading meeting for autism research worldwide. Both the number and quality of abstract submissions are strong, reflecting the outstanding work that is being conducted in the field of autism. As new funding and technologies infuse the field, we are beginning to witness exciting new findings which are bringing new perspectives and hope to the field of autism, and more importantly, to individuals with autism and their families.

You will notice this year a strong emphasis on international participation with speakers and participants coming from Africa, Australia, Canada, Europe, Hong Kong, India, Israel, Japan, Singapore, Taiwan, Turkey, Venezuela, and the United States. A symposium featuring new findings on international epidemiology of autism will highlight the efforts being made to track prevalence and understand service delivery systems for persons with autism worldwide. We congratulate our first keynote speaker, Anthony Bailey, for being chosen as the new editor of the first journal sponsored by IMFAR, a historic moment in the society’s history. Other invited symposia and keynote speakers will describe recent findings in the areas of genetics and brain models of autism; these presentations will demonstrate how neuroscience and genetic research can translate into new approaches to early recognition and treatment of autism. Three additional invited symposia will describe novel directions in clinical practice. Two of these focus on different ends of the age spectrum – one on infants and the other on adolescents and adults. The third symposium will illustrate how medical conditions impact individuals with autism, and discuss how to detect and treat such medical conditions, with a goal of improving the quality of lives of individuals with autism and their families. In addition to these exciting invited presentations, numerous posters and oral presentations will be offered. Toward the end of the first two days, we have special presentations, one by Thomas Insel, Director, National Institutes of Mental Health, and the second by Allan Jones, Chief Scientific Officer, Allen Institute for Brain Sciences. Following each of these talks, we invite you to participate in a reception that will offer an opportunity to renew relationships and build new ones. Last, but not least, the ceremony announcing the Dissertation Award, Young Investigator Award, and Lifetime Achievement Award will be held on Saturday afternoon. Please come congratulate Uta Frith on her amazing lifetime contributions to the field.

We wish to thank the many contributors who made IMFAR 2007 possible. We would like to express our gratitude to the INSAR Board and the Scientific Program Committee for their hard work. We especially wish to thank Sally Rogers for serving as President of INSAR this past year. IMFAR would not have been possible without the financial support from the Autism Society of America, Autism Speaks/Cure Autism Now, and NICHD, NIDCD, NINDS, and NIMH. Special thanks are extended to Teresa Brown and Beatrice Marx who handled with grace the many details and logistics of this event. Finally, we want to thank each one of you for being part of this extraordinary effort, and for coming from all over the world to attend IMFAR.

We hope you will enjoy the meeting and that you will find time to enjoy beautiful Seattle.

Geraldine Dawson
Conference Co-Chair

Elizabeth Aylward
Conference Co-Chair

Susan Bookheimer
Program Chair
Welcome from Retiring President of the International Society for Autism Research

Dear INSAR members and IMFAR attendees,

I am delighted to welcome so many of you to our sixth IMFAR meeting. It has been very satisfying to watch IMFAR grow from a small group of autism researchers, assembling to share their findings and their passion for understanding autism, to the large, annual, international group of scientists, students, parents, and clinicians who are attending IMFAR today. The vision that the founders of IMFAR had has certainly been realized. Thanks to the support of the U.S. National Institute of Mental Health, the corresponding Canadian group, and INSAR itself, IMFAR brings together many attendees who might otherwise not be able to join in the collaborative learning that is the core of the meeting. These special funding sources support student and postdoctoral researchers, young investigators, scientists from groups that have traditionally been underrepresented in science, and scientists from countries with significant economic needs. We are greatly enriched by the breadth of knowledge, experiences and viewpoints that our group contains.

In addition to a wonderful meeting, IMFAR fostered the development of an international society focused on autism research. I have had the privilege of presiding over the growth and development of INSAR, and of implementing the goals of the membership, for the past 2 years. Thanks to the energy and commitment of the Board of Directors, our main tasks, identified two years ago, have largely been accomplished. We have a stable, annual meeting, planned several years ahead, and attended by an increasingly large international membership. We have a journal editor and co-editors, and by the time of this meeting, I anticipate that we will also have a contract with a publisher, an editorial board, and a call for papers for the first issue. We have an organizational website that will be able to manage the needs of the organization for membership, meeting planning, and communication. We have recently had an election and have a new slate of officers about to take up the reins. And we have an increasingly large number of participants from diverse backgrounds, all joined in the search to understand autism in all its complexity, and to ameliorate the disabilities that it causes.

It has been an exciting two years – and not too overwhelming too often – thanks to the hard work, deep commitment, incredible talent, and amazing energy of a number of people. Personal thanks go to Bob Schultz, Peter Szatmari, Wendy Stone, Ed Cook and Joe Piven, who have worked very hard on the board, and have been so responsive to emails late in the night asking for opinions on one or another issue. Tony Bailey has moved us forward towards an over-riding goal – a new journal, devoted to interdisciplinary research in autism. The parent groups, NAAR, CAN and Autism Speaks, now merged, have provided advice, funds, and very knowledgeable sounding boards for the many issues that have faced the Executive Board of INSAR. Thank you to Sophia Colamarino, Emanuel DiCicco-Bloom, Andy Shih, and Peter Bell for their counsel and support. Thank you also to Geri Dawson, Susan Bookheimer, Elizabeth Aylward, and Tony Charman, for all that goes into carrying out the IMFAR meetings. And finally a thank you to Teresa Brown, who has served us so well administering the INSAR as well as IMFAR and responded to needs in such a supportive and knowledgeable fashion.

My best wishes go to Bob Schultz and the new board, as they continue to carry out the vision of the membership of INSAR. It is a source of pleasure to reflect on what we have accomplished and to imagine what we will accomplish, what we must accomplish, for persons with autism and their families. Thank you for the privilege of serving the organization.

Sincerely,

Sally J. Rogers
ATTENTION PARENTS!

Several activities at IMFAR this year will be of special interest to parents:

Registration: Parents or relatives of children with autism may wish to identify themselves to others at the meeting. At the registration desk please pick up a red dot sticker to place on your badge. You may particularly wish to speak with scientist participants who are also parents of children with autism.

Morning Sessions: Each day will open with an introduction by one of the autism advocacy groups who have sponsored IMFAR. Founders and members from Autism Speaks, Autism Society of America and Cure Autism Now will speak on behalf of parent advocates for autism research.

Sponsors Booths: Please visit the sponsors booths in Grand Ballroom D where you may find information from advocacy groups, the NIH, and other sponsors contributing to autism research and intervention.

Coffee Break Gatherings: During the morning and lunchtime coffee breaks, parents may want to go to the Willow room, 2nd floor, foyer area, to meet other parents.

Saturday Film Event: The Documentary film “Autism Every Day” will be shown in Grand Ballroom A, B and C at 12:00. This moving documentary depicts the real life stories of several families raising children on the autism spectrum. “Autism Every Day” was featured at the Sundance Film Festival and portions have been shown on Larry King Live, The View and Oprah.
Acknowledgments

The International Society for Autism Research (INSAR) is the professional organization that oversees the annual International Meeting for Autism Research (IMFAR). INSAR is responsible for appointing all committees that govern the organization and approving the content and format of the annual meeting.

INSAR Governing Board 2005-2007
Sally Rogers, Ph.D., President
Marian Sigman, Ph.D., Ex Officio
Peter Szatmari, M.D., Vice President
Wendy Stone, Ph.D., Secretary
Bob Schultz, Ph.D., Treasurer

INSAR Committees
IMFAR 2007, Geraldine Dawson, Ph.D., Conference Chair; Elizabeth Aylward, Ph.D., Conference Co-Chair; Susan Bookheimer, Ph.D., Program Chair
Membership Committee, Nurit Yurmiya, Ph.D., Chair
Nominations Committee, Joseph Piven, M.D., Chair
Publications Committee, Matthew Belmonte, Ph.D., Chair

IMFAR 2007 Scientific Program Committee Members and Reviewers
Marshalyn Allsopp, Centers for Disease Control and Prevention
David Amaral, University of California, Davis
Elizabeth Aylward, University of Washington
Anthony Bailey, Oxford University
Aysenil Belger, University of North Carolina
Susan Bookheimer, University of California, Los Angeles
Sven Braeutigam, Oxford University
Camille Brune, University of Illinois, Chicago
Leslie Carver, University of California, San Diego
Manuel Casanova, University of Louisville, Kentucky
Tony Charman, University College of London Institute of Child Health
Chung-Hsin Chiang, National Chung Cheng University, Taiwan
Sophia Colamarino, Cure Autism Now
Edwin Cook, University of Illinois at Chicago
Pegeen Cronin, University of California, Los Angeles
Mirella Dapretto, University of California, Los Angeles
Geraldine Dawson, University of Washington
Bernie Devlin, University of Pittsburgh
Annette Estes, University of Washington
Fred Frankel, University of California, Los Angeles
Stephanny Freeman, University of California, Los Angeles
Daniel Geschwind, University of California, Los Angeles
Beth Goodlin-Jones, University of California, Davis
Connie Kasari, University of California, Los Angeles
Alexandra Key, Vanderbilt University
Natalia Kleinmans, University of Washington
## IMFAR 2007
### PROGRAM AGENDA

**Thursday May 3rd**

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<tr>
<td>7:00am – 5:30pm</td>
<td>Registration</td>
<td>Grand Ballroom Foyer</td>
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<td>7:30am – 8:15am</td>
<td>Breakfast</td>
<td>Grand Ballroom Foyer</td>
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| 8:00am – 1:00pm  | **Poster Session #1** (Presenters will be by their posters from 12:00-1:00)  
*Clinical Evaluation, Comorbid Psychopathology, Developmental Trajectory, Epilepsy, Immunology, Language, Medical General, Neuropsychology, Psychopharmacology, Services Delivery* | Grand Ballroom D          |
| 8:00am – 8:10am  | **OPENING COMMENTS**  
Geraldine Dawson                                                      | Grand Ballroom ABC        |
| 8:10am – 8:30am  | **ADVOCACY GROUP INTRODUCTION: AUTISM SOCIETY OF AMERICA**  
Cathy Pratt                                                        |                           |
| 8:30am – 9:30am  | **KEYNOTE ADDRESS**  
Anthony Bailey  
“The Neuroscience Of Autism: Tackling Complexity”  
*Introduction:* Geraldine Dawson                                   |                           |
| 9:30am – 9:50am  | Coffee Break                                                        | Grand Ballroom Foyer      |
| 9:50am – 11:45am | **INVITED EDUCATIONAL SYMPOSIUM #1**  
*Infants with Autism Symptoms: New Approaches to Early Detection and Treatment*  
Organizer: Geraldine Dawson  
Speakers: Karen R. Dobkins, Lonnie Zwaigenbaum, Sally J. Rogers, & Geraldine Dawson | Grand Ballroom A          |
| 9:50am – 11:45am | **INVITED EDUCATIONAL SYMPOSIUM #2**  
*Can Animal Models Lead to Treatment for Social Deficits in ASD?*  
Organizer: Emanuel DiCiccioco-Bloom  
Speakers: Larry J. Young, Andreas Meyer-Lindenberg, Ami Klin, Robert H. Ring, Jennifer Bartz  
*SPONSORED BY AUTISM SPEAKS* | Grand Ballroom C          |
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<tr>
<td>11:45am – 1:00pm</td>
<td>Lunch</td>
<td>Grand Ballroom Foyer</td>
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<td>1:00pm – 6:00pm</td>
<td>Exhibits</td>
<td>Grand Ballroom D</td>
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<td>1:00pm – 6:30pm</td>
<td><strong>Poster Session #2</strong> (Presenters will be by their poster from 5:15-6:15) Functional Neuroimaging, Genetic Disorders, Genetic Family Genetic Studies, Neurophysiology</td>
<td>Grand Ballroom D</td>
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<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #1</strong> BRAIN STRUCTURE</td>
<td>Grand Ballroom A</td>
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<td></td>
<td><strong>A. Lepagnol-Bestel et al.</strong> “Expression Is Upregulated In Autism Prefrontal Cortex And Associated With Neurite Outgrowth”</td>
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<td><strong>M. Catani et al.</strong> “Altered Cerebellar Feedback Projections In Asperger's Syndrome: An In Vivo DTI-Tractography Study”</td>
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<td><strong>C. Schumann et al.</strong> “MRI Longitudinal Study Through Early Childhood On The Neuroanatomy Of Autism”</td>
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<td><strong>A. Hardan et al.</strong> “A Longitudinal MRI Study of Cortical Grey and White Matter Structures in Children with Autism”</td>
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<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #2</strong> COGNITION</td>
<td>Grand Ballroom B</td>
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<td><strong>S. Gaigg &amp; D. Bowler</strong> “Illusory Memories Of Emotionally Charged Words In Asperger’s Syndrome”</td>
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<td><strong>S. Johnson et al.</strong> “Individuals With Asperger’s Disorder And Patients With Amygdala Lesions Show Different Learning And Motivational Processes During Decision-Making”</td>
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<td><strong>L. Mottron et al.</strong> “Intelligence In Autism: What Are The Good Predictors?”</td>
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<td><strong>D. Williams &amp; F. Happe</strong> “Theory Of Own Mind: Impaired Awareness Of Own And Others’ Minds In Autism”</td>
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<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #3</strong></td>
<td>S. Sutera et al.</td>
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<td>M. Siller et al.</td>
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<td>J. Reaven et al.</td>
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<td>2:50pm – 4:10pm</td>
<td><strong>ORAL SESSION #4</strong></td>
<td>N. Ramoz et al.</td>
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<td>A. Vicente et al.</td>
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<td>T. Wassink et al.</td>
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<td>Veterans Affairs Medical Center</td>
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<td>J. Wirojanan et al.</td>
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| 2:50pm – 4:10pm | ORAL SESSION #5 | NEUROPHYSIOLOGY AND NEUROPSYCHOLOGY  
B. Jemel et al.  
“VEP Responses To Phase Reversal Gratings Reveal Functional Atypicalities In Early Visual Pathways In Autism”  
W. Groen et al.  
“Diminished Neuro-Integrative Functioning Of Auditory Perception In Autism”  
Y. Adini et al.  
“Abnormal Speech Spectrum In Young Autistic Children”  
M. Eslabbagh et al.  
“Neural Correlates Of Eye Gaze Processing In The Early Autism Phenotype”  
H. Roeyers et al.  
“Inhibition And Working Memory In Children With Autism” | Grand Ballroom B |
| 2:50pm – 4:10pm | ORAL SESSION #6 | DIAGNOSIS AND SCREENING  
Y. Kamio & N. Inada  
C. Dietz et al.  
“Parental Compliance After Screening Social Development In Toddlers”  
S. Ozonoff et al.  
“Motor Development And Early Identification Of Autism”  
P. Filipek et al.  
“Younger Siblings Can Show Deficits As Early As 6 Months Of Age”  
M. Gragg et al.  
“Autism: Count Us In! Parent Telephone Hotline For Community Screening For Autism Spectrum Disorders” | Grand Ballroom C |
| 4:30pm – 5:15pm | SPECIAL PRESENTATION | Allan Jones  
“The mouse transcriptome in 3D: The Allen Brain Atlas Project”  
Introduction: Geraldine Dawson | Grand Ballroom ABC |
| 5:15pm – 6:45pm | General Reception | SPONSORED BY INSAR | Grand Ballroom Foyer |
**Friday May 4**

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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>7:30am – 5:30pm</td>
<td>Registration</td>
<td>Grand Ballroom Foyer</td>
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<tr>
<td>8:00am – 6:00pm</td>
<td>Exhibits</td>
<td>Grand Ballroom D</td>
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<tr>
<td>7:30am – 8:10am</td>
<td>Breakfast</td>
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</tbody>
</table>
| 8:00am – 1:00pm  | **Poster Session #3** (Presenters will be by their poster from 12:00-1:00)  
                | Diagnosis, Early Detection, Education, Instruments, Law Motor Development, Perception, Psychometrics, Screening | Grand Ballroom D                   |
| 8:10am – 8:30am  | ** ADVOCACY GROUP INTRODUCTION: AUTISM SPEAKS**                       | Grand Ballroom ABC                 |
| 8:30am - 9:30am  | **KEYNOTE ADDRESS**                                                  |                                    |
|                  | Patricia Kuhl                                                         |                                    |
|                  | “Language Learning and the ‘Social Brain’: Implications for Children with Autism” |                                    |
|                  | **Introduction: Elizabeth Aylward**                                   |                                    |
| 9:30am – 9:50am  | Coffee Break                                                          | Grand Ballroom Foyer               |
| 9:50am – 11:45am | **INVITED EDUCATIONAL SYMPOSIUM #3**                                  | Grand Ballroom A                   |
|                  | "Medical Aspects of Autism Spectrum Disorders"                       |                                    |
|                  | **Organizer: Margaret Bauman**                                        |                                    |
|                  | **Speakers: Timothy Buie, Daniel Glaze, Robert D. Steiner, Margaret L. Bauman** |                                    |
| 9:50am – 11:45am | **INVITED EDUCATIONAL SYMPOSIUM #4**                                  | Grand Ballroom C                   |
|                  | "Genetic Approaches to Autism: Complex Methods for a Complex Disorder" |                                    |
|                  | **Organizers: Gerard Schellenberg and John Constantino**             |                                    |
|                  | **Speakers: Gerard Schellenberg, John Constantino, Matthew State, Ellen Wijsman** |                                    |
| 11:45am – 1:00pm | Lunch                                                                 | Grand Ballroom Foyer               |
| 12:15 - 12:45pm  | **SPECIAL EVENT: VIDEOTAPED GREETING BY DR. A.P.J. ABDUL KALAM, PRESIDENT OF INDIA** | Grand Ballroom ABC                 |
| 1:00pm – 6:30pm  | **Poster Session #4** (Presenters will be by their poster from 5:15-6:15)  
<pre><code>            | Brain Structure, Cognition, Emotions/Faces, Neuropathology, Structural Imaging | Grand Ballroom D                   |
</code></pre>
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<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
<th>Title</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #7</strong></td>
<td>E. Redcay &amp; E. Courchesne</td>
<td>“Delayed And Deviant fMRI Response To Speech In 25-50 Month Old Children With Autism Spectrum Disorder”</td>
<td>Grand Ballroom A</td>
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<tr>
<td></td>
<td>FUNCTIONAL IMAGING</td>
<td>S. Cox et al.</td>
<td>“Mirror Neuron System Dysfunction Relates To Imitation And Empathy In Children With ASD”</td>
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<td>D. Williams et al.</td>
<td>“Discourse Processing In Autism: Disruption Of The Theory Of Mind Network”</td>
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<td>A. Scott et al.</td>
<td>“Reward Processing In Children With Autism”</td>
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<tr>
<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #8</strong></td>
<td>L. Lee et al.</td>
<td>“Autism In China: Lessons Learned From A Population-Based Study”</td>
<td>Grand Ballroom B</td>
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<td>AUTISM EPIDEMIOLOGY</td>
<td>C. Montiel-Nava &amp; J. Peña</td>
<td>“Epidemiological Findings Of Pervasive Developmental Disorders In A Venezuelan Study”</td>
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<td>K. Van Meter et al.</td>
<td>“Geographical Distribution Of Autism”</td>
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<td>C. Rice et al.</td>
<td>“Prevalence Of The Autism Spectrum Disorders (ASDs) In Multiple Areas Of The United States”</td>
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<td>1:00pm – 2:20pm</td>
<td><strong>ORAL SESSION #9</strong></td>
<td>H. Boorstein et al.</td>
<td>“Different Profiles In Regressive Vs. Non-Regressive Autism”</td>
<td>Grand Ballroom C</td>
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</table>
K. Loveland et al.
“CPEA/STAART Girls With Autism Phenotype Study”

S. Macari et al.
“Exploratory Analysis Of The Latent Variables Differentiating Toddlers With Autism, PDD-NOS, Language Delay, And Global Developmental Delay”

S. Wheelwright & S. Baron-Cohen
“Defining The Broader, Medium, And Narrow Autism Phenotype In Parents Of Children With Autism, Using The AQ”

L. Carver et al.
“Social Referencing In Children At Risk For Autism: Behavior And Brain Activity”

2:20pm – 2:50pm Coffee Break

2:50pm – 4:10pm ORAL SESSION #10
NEUROPATHOLOGY, IMMUNOLOGY AND TOXICOLOGY
M. Casanova et al.
“Abnormalities Of Cortical Minicolumnar Organization In The Prefrontal Lobes Of Autistic Patients”

J. Wegiel et al.
“Abnormal Striatal Circuits In Autism - Links Between Structure And Function”

A. Hogart et al.
“15q11-13 Gabaa Receptor Genes Are Normally Biallelically Expressed In Brain Yet Are Subject To Epigenetic Dysregulation In Autism”

J. Yip et al.
“Studies Of GAD65 Mrna Levels In The Deep Cerebellar Dentate Nuclei In Autism”

A. Zimmerman et al.
“The Frequencies Of Hla-A And B Antigens In Families With Autism”

2:50pm – 4:10pm ORAL SESSION #11
INNOVATIVE TECHNOLOGIES FOR DIAGNOSIS AND TREATMENT
I. Cameron et al.
“Immediate Imitation Predicts Spontaneous And Prompted Representational Play In Toddlers With Autism Whereas Joint Attention And Dyadic Engagement Do Not”
K. Gordon et al.
“The Effectiveness Of Picture Exchange Communication (PECS) Training For Teachers Of Children With Autism: A Pragmatic, Group Randomised Controlled Trial”

O. Golan et al.
“Facilitating Emotional Understanding And Face-Processing In Young Children With Autism Spectrum Conditions, Using Animations Of Vehicles With Faces”

D. Moore et al.
“Computer Technology For People With Autism”

P. Law et al.
“Internet Mediated Research (IMR) In Autism: Initial Experiences Of The Interactive Autism Network (IAN) Research Project”

2:50pm – 4:10pm

**ORAL SESSION #12**

**MODELS OF AUTISM**

I. Dziobek et al.
“Neuropsychology And Cortical Thickness In Adults With Asperger Syndrome”

R. Raymaekers et al.
“EEG Study Of The Mirror Neuron System In Children With HFA”

D. Kennedy & E. Courchesne
“Disrupted And Intact Intrinsic Functional Organization Of Large-Scale Brain Networks In Autism”

J. Lawson
“The Depth Accessibility Model Of Autism: An Update”

G. Joshi et al.
“Examining Clinical Characteristics Including Patterns Of Psychiatric Comorbidity And Prevalence Of Pervasive Developmental Disorders In Clinically Referred Population Of Children And Adolescents”

2:50pm – 4:10pm

**ORAL SESSION #12**

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“Examining Clinical Characteristics Including Patterns Of Psychiatric Comorbidity And Prevalence Of Pervasive Developmental Disorders In Clinically Referred Population Of Children And Adolescents”

4:30pm – 5:15pm

**SPECIAL PRESENTATION**

**Thomas Insel - Director, NIMH**

“The Combating Autism Act”

**Introduction:** Susan Bookheimer

5:15pm – 6:45pm

**RECEPTION**

SPONSORED BY AUTISM SPEAKS

6:45pm – 7:45pm

**BUSINESS MEETING**
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<td>Registration</td>
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<td>8:00am – 12:00pm</td>
<td>Exhibits</td>
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<tr>
<td>7:30am – 8:10am</td>
<td>Breakfast</td>
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<tr>
<td>8:00am – 1:00pm</td>
<td><strong>Poster Session #5</strong> (Presenters will be by their poster from 12:00-1:00)</td>
<td>Grand Ballroom D</td>
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<tr>
<td></td>
<td>Adult Life, Behavioral Intervention, Outcome, Social Behavior</td>
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<tr>
<td>8:10am – 8:30am</td>
<td><strong>ADVOCACY GROUP INTRODUCTION: CURE AUTISM NOW</strong></td>
<td>Grand Ballroom ABC</td>
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<td></td>
<td>Jon Shestack &amp; Portia Iversen</td>
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<td>8:30am – 9:30am</td>
<td><strong>KEYNOTE ADDRESS</strong></td>
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<td></td>
<td>Daniel Geschwind</td>
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<td>“Tackling Genetic Heterogeneity in Autism: An Array of Approaches”</td>
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<td></td>
<td><strong>Introduction:</strong> Susan Bookheimer</td>
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<td>9:30am – 9:50am</td>
<td>Coffee Break</td>
<td>Grand Ballroom Foyer</td>
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<td>9:50am – 11:45am</td>
<td><strong>INVITED EDUCATIONAL SYMPOSIUM #5</strong></td>
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<td>&quot;New Approaches for Neuroimaging in Autism&quot;</td>
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<td><strong>Organizers:</strong> Declan Murphy &amp; Thomas E. Conturo</td>
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<td><strong>Speakers:</strong> Declan Murphy, Thomas E. Conturo, Marco Catani</td>
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<td>9:50am – 11:45am</td>
<td><strong>INVITED EDUCATIONAL SYMPOSIUM #6</strong></td>
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<td>&quot;Adolescent and Adult Interventions and Outcomes&quot;</td>
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<td><strong>Organizers:</strong> Fred Frankel &amp; Catherine Lord</td>
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<td><strong>Speakers:</strong> Catherine Lord, Pat Howlin, Liz Laugeson, Fred Frankel</td>
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<td>9:50am – 11:45am</td>
<td><strong>INVITED EDUCATIONAL SYMPOSIUM #7</strong></td>
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<td>&quot;A World View of Autism Epidemiology&quot;</td>
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<td><strong>Organizers:</strong> Marshalyn Yeargin-Allsopp &amp; Diana Schendel</td>
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<td><strong>Speakers:</strong> Naurendra Aurora, Maureen Durkin, Poul Thorsen, Richard</td>
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<td>Grinker, Young Shin Kim</td>
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<td><strong>Moderator:</strong> Eric London</td>
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<td><strong>SPONSORED BY AUTISM SPEAKS</strong></td>
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<td>11:45am – 1:00pm</td>
<td>Lunch</td>
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<td>12:00pm - 12:45</td>
<td><strong>SPECIAL EVENT: AWARD-WINNING DOCUMENTARY FILM, &quot;AUTISM EVERY DAY&quot;</strong></td>
<td>Grand Ballroom ABC</td>
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<tr>
<td>1:00pm – 4:30pm</td>
<td><strong>Poster Session #6</strong> (Presenters will be by their poster from 3:30-4:30)</td>
<td>Grand Ballroom D</td>
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<td></td>
<td>Animal Models Neurotransmitters and Neurochemistry, Early Development Nonverbal Communication, Epidemiology, Repetitive Behavior</td>
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<td>1:00pm – 1:45pm</td>
<td>AWARDS</td>
<td>Grand Ballroom ABC</td>
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<tr>
<td>1:00pm – 1:15pm</td>
<td>DISSERTATION AND YOUNG INVESTIGATOR AWARDS</td>
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<td>1:15pm – 1:45pm</td>
<td>LIFETIME ACHIEVEMENT AWARD PRESENTATION</td>
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<td>1:45pm – 2:10pm</td>
<td>Coffee Break</td>
<td>Grand Ballroom Foyer</td>
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<tr>
<td>2:10pm – 3:30pm</td>
<td>ORAL SESSION #13</td>
<td>Grand Ballroom A</td>
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<td></td>
<td>EMOTIONS AND SOCIAL INTERACTIONS</td>
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<td><strong>M. Davies et al.</strong></td>
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<td>“Neural Correlates Of Viewing Emotional Faces With Direct Or Averted Gaze In Children With Autism Spectrum Disorders”</td>
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<td><strong>M. Kleinhans et al.</strong></td>
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<td>“Reduced Neural Habituation In The Amygdala Is Related To Social Impairment In ASD”</td>
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<td><strong>L. Quirmbach et al.</strong></td>
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<td>“Social Stories: Mechanisms Of Effectiveness In Increasing Game Play Skills In Children Diagnosed With Autism”</td>
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<td><strong>N. Hwee et al.</strong></td>
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<td>“Perception Of Social Norms By Children With High Functioning Autism”</td>
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<td><strong>C. Mazefsky et al.</strong></td>
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<td>“Adaptive Functioning And Family History In High-Functioning Autism”</td>
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<td><strong>A. Dissanayake &amp; C. Growcott</strong></td>
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<td>“The Development Of Conscience In Children With High Functioning Autism And Asperger’s Disorder”</td>
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<td>2:10pm – 3:30pm</td>
<td>ORAL SESSION #14</td>
<td>Grand Ballroom B</td>
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<td>SENSORY MOTOR SYSTEMS AND REPETITIVE BEHAVIORS</td>
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<td><strong>D. Simmonds &amp; S. Mostofsky</strong></td>
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<td>“Decreased Functional Connectivity Of Motor Systems In Autism”</td>
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<td><strong>E. Anagnostou et al.</strong></td>
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<td>“Intravenous And Intranasal Oxytocin Targets Social Cognition And Repetitive Behavior Domains In Autism: Behavioral And Functional Imaging Findings”</td>
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<td><strong>P. Szatmari et al.</strong></td>
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<td>“Sex Differences In Autism Spectrum Disorder Phenotypes”</td>
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<td>2:10pm – 3:30pm</td>
<td><strong>ORAL SESSION #15</strong>&lt;br&gt;EDUCATION, COMMUNITY-BASED SERVICES AND TREATMENT</td>
<td>Grand Ballroom C</td>
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<td>K. Thomas et al. “Mandates For Insurance Coverage Of Autism In The U.S.”</td>
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<td>P. Mirenda &amp; K. Bopp “Behavior Predictors Of Parenting Stress In Mothers Of Children With Autism Over Two Years”</td>
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<td>A. Stahmer &amp; S. Reed “Practice Variables Associated With Child Engagement In Community Early Intervention Programs For Children With ASD”</td>
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<td>I. Smith et al. “A Novel Community-Based Eibi Program For Autism: One-Year Outcomes”</td>
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<td>J. Suhrheinrich &amp; L. Schreibman “Effectiveness Of A PRT Training Program For Teachers”</td>
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<td>4:30pm</td>
<td>IMFAR 2008 Announcements and Closing Remarks</td>
<td>Grand Ballroom ABC</td>
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# Poster Sessions At-A-Glance

## Thursday May 3\(^{rd}\)

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<td>Co-morbid Psychopathology</td>
<td>8 - 11</td>
<td>Genetic Disorders</td>
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<tr>
<td>Developmental Trajectory</td>
<td>12 - 17</td>
<td>Genetics (Cytogenetics, Molecular)</td>
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<td>Epilepsy</td>
<td>18, 19</td>
<td>Genetic Studies (Family, Twin)</td>
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<td>Immunology</td>
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<td>Neurophysiology</td>
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<td>Language</td>
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<td>Neuropsychology</td>
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<td>Services Delivery</td>
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<td>Toxicology</td>
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## Friday May 4\(^{th}\)

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<td>Brain Structure-Neuroanatomy</td>
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<td>Early Detection</td>
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<td>Cognition</td>
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<td>Emotions And Faces</td>
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<td>Instruments/Scales</td>
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<td>Families/Psychosocial Environment</td>
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<td>Motor Development</td>
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<td>Neuropathology</td>
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<td>Services Delivery</td>
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## Saturday May 5\(^{th}\)

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<td>Adult life</td>
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<td>Animal Models</td>
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<td>Behavioral Intervention</td>
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<td>Broader Phenotype</td>
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<td>Outcome Studies</td>
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<td>Social Behavior</td>
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<td>Non-Verbal Communication</td>
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<td>Repetitive Behaviors</td>
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Invited Educational Symposium #1
Infants with autism symptoms: New approaches to early detection and treatment

Organizer: Geraldine Dawson, *University of Washington*

Speakers:
Karen R. Dobkins, *University of California San Diego*
Lonnie Zwaigenbaum, *University of Alberta*
Sally J. Rogers, *University of California, Davis*
Geraldine Dawson, *University of Washington*

This symposium will explore new approaches to the identification and treatment of infants at risk for autism spectrum disorder (ASD). The symposium will begin with Dr. Karen Dobkins who will present findings on visual sensory processing in infant siblings of children with autism as compared to low-risk infants. An event-related potential study will be reported in which infant siblings showed atypical neural responses to face stimuli at 10 months of age. Dr. Dobkins will also present data that suggest that such face processing impairments may originate in the magnocellular visual pathway, with abnormalities that can be detected by 6 months of age. Next, Dr. Lonnie Zwaigenbaum will review findings from a prospective cohort of 125 infant siblings and 50 low-risk infants, followed longitudinally from age 6-12 months to 3 years. Findings include symptom profiles differentiating 18-month olds with ASD from non-diagnosed toddlers (diagnostic status confirmed at age 3 years), and characteristics (e.g., specific symptoms, language level, IQ) associated with the initial timing of clinical diagnosis. Implications for community-based ASD screening programs will be discussed. Following this, Dr. Sally Rogers will describe collaborative infant sibling studies at UC Davis and UCLA, involving over 100 infant siblings and over 100 control infants from 6 months until 2-3 years of age. A subset of these infants has been followed since birth. Thirteen of the infants have developed ASD. Dr. Rogers will describe experimental paradigms and probes that have been sensitive to symptoms in these infants across the first year of their life. In addition, one infant received a parent-delivered social-communicative intervention from age 10 to 15 months. Changes in this infant over this treatment period will be described and illustrated. Dr. Geraldine Dawson will conclude by discussing future directions in the detection and treatment of autism in the infant-toddler period and their implications for altering the course of brain and behavioral development and outcome in autism.

Karen R. Dobkins, Ph.D.
University of California San Diego
Atypical Visual Processing in Infant Siblings of Children with Autism Spectrum Disorders

Lonnie Zwaigenbaum, M.D.
University of Alberta
Stability and change in toddlers diagnosed with ASD: Insights from prospective research.

Sally J. Rogers, Ph.D.
University of California Davis
Development and treatment in infants at risk for autism

Geraldine Dawson, Ph.D.
University of Washington
Future directions in the detection and treatment of infants at risk for autism
Invited Educational Symposium #2
Can animal models lead to treatments for social deficits in ASD?

Chairs: Emanuel DiCicco-Bloom and Eric London
Sponsor: Autism Speaks

Speakers:
Larry J. Young, Emory University
Andreas Meyer-Lindenberg, National Institutes of Health
Ami Klin, Yale Child Study Center
Robert H. Ring, Wyeth Research
Jennifer Bartz, Mount Sinai School of Medicine

This symposium will explore the possibility that preclinical studies using animal models will lead to pharmacological therapies for treating specific endophenotypes of autism spectrum disorder (ASD). The symposium begins with a presentation by Dr. Larry Young discussing the roles of the neuropeptides oxytocin and vasopressin in the regulation of social behavior in rodent models. Dr. Andreas Meyer-Lindenberg will discuss brain imaging studies examining the impact of these neuropeptides and genetic variation in their receptors on the circuitry for social cognition and fear in humans. Next, Dr. Ami Klin will discuss the nature of the social impairments in ASD as well as relevance of the preclinical studies to ASD. Dr. Robert Ring will discuss the potential for developing pharmacological agents to target oxytocin receptor systems. Finally Jennifer Bartz will discuss preliminary studies on the effects of intranasal oxytocin infusion on social cognition in autistic subjects. While it is not clear this line of research will lead to effective treatments for ASD social deficits, the symposium is designed to provide a model of how research may progress from basic neuroscience in animal models to the development of drugs that will be useful in treating ASD symptoms.

Larry J. Young, Ph.D.
Emory University
Oxytocin, vasopressin and social cognition in animal models

Andreas Meyer-Lindenberg, M.D., Ph.D.
National Institutes of Health
Prosocial neuropeptides, brain function, and human social cognition

Ami Klin, Ph.D.
Yale Child Study Center
Abnormalities of social engagement in autism spectrum disorders

Robert H. Ring, Ph.D.
Wyeth Research
Development of non-peptide oxytocin receptor agonists for the treatment of human psychiatric disorders

Jennifer Bartz, Ph.D.
Mount Sinai School of Medicine
Oxytocin as a potential therapeutic for the treatment of social cognitive deficits on autism
Oral Session #1
Brain structure

Chair: Joe Piven

Speakers:
Aude-Marie Lepagnol-Bestel, Gilles Maussion, Bernadett Boda, Ana Cardona, Anne-Lise Delezoide, Jean-Marie Moalic, Dominique Muller, Philip Gorwood, Joseph D. Buxbaum, Nicolas Ramoz, Michel Simonneau, INSERM U675, France
Molly B. DuBray, Andrew L. Alexander, Jee Eun Lee, Mariana A. Lazar, Jeffrey Lu, Erin D. Bigler, Janet E. Lainhart, University of Utah
Marco Catani, Derek Jones, Eileen Daly, Luca Pugliese, Quinton Deeley, Nitzia Embiricos, Sarah Curran, Dene Robertson, Declan Murphy, Institute of Psychiatry, King's College London
Cynthia M. Schumann, Ruth A. Carper, Graham M. Wideman, Cynthia Carter Barnes, Cathy Lord, Clare Roepke, Eric Courchesne, Department of Neurosciences, UC San Diego
Antonio Y. Hardan, Matcheri S. Keshavan, Dhruman D. Gordia, Nancy J. Minshew, Stanford University

ABSTRACTS

SLC25A12 EXPRESSION IS UPREGULATED IN AUTISM PREFRONTAL CORTEX AND ASSOCIATED WITH NEURITE OUTGROWTH. Aude-Marie Lepagnol-Bestel, Gilles Maussion, Bernadett Boda, Ana Cardona, Anne-Lise Delezoide, Jean-Marie Moalic, Dominique Muller, Philip Gorwood, Joseph D. Buxbaum, Nicolas Ramoz, Michel Simonneau, INSERM U675, France

BACKGROUND: The mitochondrial aspartate/glutamate carrier SLC25A12 gene has been reported associated with autism in several studies.

Objective: Study the SLC25A12 mRNA expression in brain and analysis of the functional effects.

METHODS: Levels of SLC25A12 mRNA expression normalized by NFL, a gene with bona fide neuron-specific expression, were compared between post-mortem brain samples (the Brodmann area 46 and the cerebellar hemispheres) from autistic patients and controls, using real-time quantitative PCR assays. The pattern of SLC25A12 mRNA expression during human prenatal development was investigated by quantitative in situ hybridization. The functional effects of SLC25A12 overexpression was analyzed on primary cultures of prenatal mouse neurons after tranfection of a constitutive expression vector Slc25a12-GFP.

RESULTS: The SLC25A12 level of transcript was significantly higher in the post-mortem BA46 frontal cortex region of autistic subjects than in controls. In contrast, no difference of SLC25A12 expression was observed in the granule cells of cerebellum lobule VI between patients and controls. During human prenatal development, a specific gradient of SLC25A12 mRNA expression, decreasing from posterior to anterior, was found in the telencephalon at 8 weeks. And, SLC25A12 mRNA gradients in the lateral frontal cortex and in the ventral temporal lobe were observed at mid-gestation. Neurons overexpressing Slc25a12 had significantly longer dendrites and more branches than neurons transfected with the control GFP vector.

CONCLUSION: SLC25A12 overexpression may be involved in autism pathophysiology by changing neuronal morphology in specific brain subregions.

Sponsor: Autism Tissue Program; Fédération pour la Recherche sur le Cerveau.
WHITE MATTER ORGANIZATION AND ASYMMETRY OF THE SUPERIOR TEMPORAL GYRUS AND TEMPORAL STEM IN AUTISM
Molly B. DuBray, Andrew L. Alexander, Jee Eun Lee, Mariana A. Lazar, Jeffrey Lu, Erin D. Bigler, Janet E. Lainhart, University of Utah

BACKGROUND: The performance of individuals with autism on the Block Design task is at the intersection of several theoretical accounts of perceptual functioning in autism. The Weak Central Coherence theory attributes the sometimes superior performance in autism to locally oriented processing and poor global integration (Frith, 1989). Enhanced Perceptual Functioning proposes a superiority in local processing with a more general superiority in perceptual functioning (Mottron et al., 2006). However, the multiple facets of the perceptual syndrome may be due to a common underlying factor. Underconnectivity theory makes new predictions about the neural underpinnings of the performance of participants with autism in the Block Design task that may clarify the nature of perceptual processing in autism.

OBJECTIVE: This fMRI study investigated the neural activity of high functioning individuals with autism (HFA) while they performed two types of Block Design tasks (with and without interference from a gestalt design).

METHOD: 16 adults with HFA and 16-age and IQ-matched typical control participants were scanned while they performed a computerized version of the Block Design task. The task was to find a missing block from a gestalt figure or from a figure without an obvious gestalt.

RESULTS: The participants with HFA had reduced connectivity between frontal and posterior regions. The control participants recruited frontal regions more to do the task (especially the gestalt condition), whereas people with autism used more posterior regions (occipital and parietal).

CONCLUSIONS: Reduced connectivity between frontal and posterior regions and less recruitment of frontal lobe functions in autism indicates a difference in the information processing in autism. Individuals with autism appear to compensate for poorer frontal-posterior functional connectivity with hyperspecialization of lower-level perceptual processing centers.

Sponsor: U19 HD035476 which is part of the NICHD/NIDCD Collaborative Programs of Excellence in Autism and T32 NIH Neuroscience Training Grant

ALTERED CEREBELLAR FEEDBACK PROJECTIONS IN ASPERGER’S SYNDROME: AN IN VIVO DTI-TRACTOGRAPHY STUDY
Marco Catani, Derek Jones, Eileen Daly, Luca Pugliese, Quinton Deeley, Nitza Emiricros, Sarah Curran, Dene Robertson, Declan Murphy, Institute of Psychiatry, King’s College London

It has been proposed that the biological basis of autism spectrum disorder (ASD) includes cerebellar ‘disconnection’. However, direct in vivo evidence in support of this is lacking. Here, the microstructural integrity of cerebellar white matter in adults with Asperger’s syndrome was studied using diffusion tensor magnetic resonance tractography. Fifteen adults with Asperger’s syndrome and 16 age- and gender-matched healthy controls underwent diffusion tensor magnetic resonance imaging. For each subject, tract specific measurements of mean diffusivity and fractional anisotropy were made within the inferior, middle, superior cerebellar tracts and short intracerebellar fibres. No group differences were observed in mean diffusivity. However, people with Asperger’s syndrome had significantly lower fractional anisotropy in the short intracerebellar fibres (p<0.001) and right superior cerebellar (output) tract (p=0.003) compared to controls; but no difference in the input tracts. Severity of social impairment, as measured by the Autistic Diagnostic Interview, was negatively correlated with diffusion anisotropy in the fibres of the left superior cerebellar tract. These findings represent direct in vivo support for altered microstructural integrity of cerebellar pathways in people with high functioning ASD. We offer preliminary evidence that the abnormalities are localised in the intracerebellar neural circuits and main cerebellar outflow (but not input) tracts; and speculate that lack of cerebellar feedback to prefrontal cortex may contribute to some characteristic behavioural manifestations of ASD.

MRI LONGITUDINAL STUDY THROUGH EARLY CHILDHOOD ON THE NEUROANATOMY OF AUTISM
Cynthia M. Schumann, Ruth A. Carper, Graham M. Wideman, Cynthia Carter Barnes, Cathy Lord, Clare Roepke, Eric Courchesne, Department of Neurosciences, UC San Diego

BACKGROUND: Cross-sectional MRI and head circumference studies suggest that early brain overgrowth is characteristic of young children with autism. Aberrant growth patterns observed with longitudinal MRI's at early ages can provide a developmental anatomical phenotype for autism spectrum disorder which may have important functional consequences.

OBJECTIVES: The goals of this longitudinal study were to 1) identify early brain structure and
growth pattern abnormalities in toddlers with autism, 2) reconcile findings of cross-sectional studies with longitudinal data, and 3) correlate behavioral and clinical features with affected brain regions.

METHODS: MRI scans (total=244) were collected at ~12 month intervals between ~18-48 months from typically-developing toddlers (n=50) and those with autism (n=32), PDD-NOS (n=11), or developmental delay (n=12). Final Diagnosis was given at ~4 years of age upon completion of the study. For each MRI, the cerebrum was segmented into gray and white matter and individual lobes were defined to obtain measurements of cerebral gray and white matter, lobar gray and white matter, and cerebellar volumes.

RESULTS: Preliminary regression analyses on a subset of longitudinal data revealed significant enlargement of cortical gray matter, overall frontal lobe, and frontal gray matter volumes (p<.05) in toddlers with autism. No differences in cerebellar volume or cerebral white matter volume were detected in preliminary analyses which may be due to the limited sample size.

CONCLUSION: Toddlers with autism have enlarged cerebral and frontal gray matter volumes from 18-48 months of age, which is consistent with the cross-sectional literature. All subjects' regional volumetric measurements, brain structure-behavior correlations, and longitudinal analyses of changes over time will be presented.

Supported by NIH R01-NS-019855.

A LONGITUDINAL MRI STUDY OF CORTICAL GREY AND WHITE MATTER STRUCTURES IN CHILDREN WITH AUTISM Antonio Y. Hardan, Matcheri S. Keshavan, Dhruman D. Gordia, Nancy J. Minshew, Stanford University

BACKGROUND: Increase in the size of several brain structures have been reported in autism. Investigations have consistently described an increase in cortical grey and white matter volumes and total brain size, especially in children. However, the developmental trajectories of these abnormalities remain to be determined and it is unclear whether or not this excess growth persists into adulthood. The main objective of this longitudinal investigation is to examine the development of cortical grey and white matter structures in children with autism.

METHOD: MRI scans were acquired on 18 well-characterized male children with autism (age range: 8 to 12 years) and 19 age- and gender- matched healthy controls at baseline and 30 months later. Total cortical and lobar grey and white matter volumes measurements were obtained on all subjects at both time points using BRAINS2.

RESULTS: No differences in total grey and white matter volumes at baseline or at follow-up were observed between autistics and controls. However, when controlling for confounding factors, differences in these structures were observed between the two groups at baseline but not at follow-up. A similar pattern was observed in frontal and parietal white matter structures but not in grey matter. Decreases in total cortical and lobar grey matter volumes were observed between baseline and follow-up in both groups but was more prominent in autistics.

CONCLUSIONS: Preliminary findings from this investigation support the abnormal developmental trajectories of grey and white matter structures in autism. While the exact pathophysiology of these alterations remains to be determined, abnormal synaptic pruning might contribute to grey matter anomalies and white matter volumetric alteration might underlie the aberrant connectivity reported in this disorder. These abnormalities should not be viewed as independent since disturbances at the neuronal level could affect white matter development and vice versa.
Oral Session #2
Cognition

Chair: Dermot Bowler

Speakers:
Katarzyna Chawarska, Frederick Shic, Yale University School of Medicine
Sebastian B. Gaigg, Dermot M. Bowler, City University (London, UK)
Shannon A. Johnson, Antoine Bechara, Sarah Queller, Robin R. Murphy,
Julie C. Stout, Dalhousie University
Laurent Mottron, Isabelle Soulières, Michelle Dawson, Morton Ann Gernsbacher, Université de Montréal
David Williams, Francesca Happe, Institute of Psychiatry, Kings College, London

ABSTRACTS

VISUAL SCANNING AND RECOGNITION OF FACIAL AND NON-FACIAL STIMULI IN TODDLERS WITH AUTISM SPECTRUM DISORDER, DEVELOPMENTAL DELAY AND TYPICAL DEVELOPMENT
Katarzyna Chawarska, Frederick Shic, Yale University School of Medicine

Objectives: The study examined visual scanning strategies and recognition skills of human faces (Face condition) and block patterns (Block condition) of toddlers (M=25 mo) with Autism Spectrum Disorders (ASD), Developmental Delays (DD), and Typical Development (TD).

Methods: Toddlers were tested using the Visual Paired Comparison paradigm consisting of Familiarization and Recognition phases; their fixation patterns for three Regions of Interests (ROI): upper/eye (UpE), lower/mouth (LoM), and outer/hair (OuH) were recorded with an eye tracking system.

Results: (1) In both conditions, the ASD group was more attentive to the visual stimuli than TD and DD controls. (2) All groups showed distinct distributions of attention for Block and Face stimuli. In the Block condition, attention was distributed randomly between the three ROIs in ASD and DD groups, but in the TD group a tendency to fixate on the UpE region was noted. In the Face condition, all groups showed very strong preference for the UpE region of the face. (3) Analysis of the transition patterns between ROIs revealed longer fixations and lower transition rate in the ASD group; (4) Only toddlers in the TD group showed evidence for recognition of the novel stimuli in both conditions; no evidence for recognition was found in the ASD and DD groups.

Conclusions: Results of the study replicate and extend our previous research (Chawarska & Volkmar, 2007) and suggest that toddlers with ASD attend readily to both static facial and nonfacial stimuli. Despite intact attention to familiarization stimuli, toddlers with ASD show impairments in pattern recognition compared to typical but not DD controls. Based on our results it is hypothesized that toddlers with ASD have strategies of visual processing which differentiate them from the TD and DD controls and might lead to impairments in face recognition in early development.

ILLUSORY MEMORIES OF EMOTIONALLY CHARGED WORDS IN ASPERGER’S SYNDROME
Sebastian B. Gaigg, Dermot M. Bowler, City University (London, UK)

Background: Previous studies have yielded conflicting results regarding semantically induced memory illusions (false memories of non-studied items that are semantically related to studied items) in ASD. In addition, little is known about how emotional factors impact on memory in this population.

Objectives: To assess phonologically rather than semantically generated illusory memories for emotional and neutral words in a group of individuals with Asperger’s syndrome.
INDIVIDUALS WITH ASPERGER'S DISORDER AND PATIENTS WITHAMYGDALA LESIONS SHOW DIFFERENT LEARNING AND MOTIVATIONAL PROCESSES DURING DECISION-MAKING Shannon A. Johnson, Antoine Bechara, Sarah Queller, Robin R. Murphy, Julie C. Stout, Dalhousie University

In a previous study, we found abnormal motivational processes in individuals with Asperger’s Disorder (ASP) during the Iowa Gambling Task (IGT). Specifically, the Expectancy-Valence Learning model (EVL) of the IGT indicated high attention to loss in ASP relative to controls.

OBJECTIVE: To compare behavioral and EVL modeling results of IGT performance in Asperger’s Disorder to patients with amygdala lesions.

METHODS: Fifteen individuals with ASP and 21 patients with amygdala lesions completed the IGT. Seven amygdala patients had a left lesion, nine had a right lesion, and five had bilateral lesions. Participants made a series of selections (100 or 150) from four decks of cards (two advantageous and two disadvantageous) and each selection yielded feedback about wins and losses. Based on deck selections and win/loss outcomes, three psychological parameters were generated from the EVL model: Learning, Attention to Wins/Losses, and Consistency.

RESULTS: The ASP and amygdala groups behaved similarly to each other: both groups selected from the disadvantageous decks more frequently than did controls. Interestingly, however, the EVL modeling results indicated that the poor performance of the ASP group was driven by relatively more attention to losses (than wins) and inconsistent responding, whereas the impaired performance in the amygdala group was due to poor learning (i.e., choices based on most recent outcomes). Post-hoc analyses of amygdala subgroups (left, right, bilateral) indicated that the high recency rate was driven by the left lesion subgroup.

CONCLUSIONS: Despite similar behavioral findings, EVL results indicated differences between ASP and amygdala lesion patients in motivational and learning processes that underlie IGT performance. Results are discussed in the context of the amygdala hypothesis of autism.

INTELLIGENCE IN AUTISM: WHAT ARE THE GOOD PREDICTORS? Laurent Mottron, Isabelle Soulères, Michelle Dawson, Morton Ann Gernsbacher, Université de Montréal

BACKGROUND: Recent findings of discrepancies between intelligence in autism as measured by Wechsler and Raven's Progressive Matrices (Dawson et al., in press) lead to the reconsideration of established relations between variables characterizing the autistic phenotype and intelligence level reached.

OBJECTIVES: To establish how early developmental milestones and cross-sectional adaptive level predicts the intelligence level measured by various instruments, including the Raven's Progressive Matrices.

METHODS: All measures were extracted from the socio-demographic data of Rivière-des-Prairies Hospital’s database, which contains diagnostic and cognitive information on approximately 200 ADI and ADOS-G positive autistics. Correlations were computed between age at first words/phrases-word and other ADI items at age 4-5 and subtests, subscales and global Wechsler intelligence level (WISC-III and WAIS-III), Raven intelligence level, and Vineland adaptation level in school-age children and adults.
RESULTS: Age at first words/phrases was not significantly correlated with intelligence level achieved later in childhood or adulthood, whether measured with Wechsler Scales or Raven's Progressive Matrices. Furthermore, ADI scores (social, communication and repetitive behaviours) were not significantly correlated with intelligence in adulthood. CONCLUSION: The age at which first words or phrases are spoken by autistic children does not predict intelligence level achieved later in childhood or adulthood. Also, ADI scores, often taken to index the so-called "severity" of autistic symptoms, do not predict cognitive outcome in adulthood. Sponsors: CIHR

THEORY OF OWN MIND: IMPAIRED AWARENESS OF OWN AND OTHERS’ MINDS IN AUTISM David Williams, Francesca Happe, Institute of Psychiatry, Kings College, London BACKGROUND: Autism involves a profound deficit in understanding others’ mental states (theory of mind; ToM). Research on the awareness of own mental states in autism has produced less consistent findings. Whether a ToM is needed for self-awareness, or whether we each have first-person access to our mental states, is a matter of extensive debate. A series of studies were conducted to assess awareness of own and other’s mental states in autism. In study 1, a modified version of the ‘unexpected contents’ ToM task was implemented. This task removed the explicit verbalisation by the participant of their own (false) belief, thus removing the possibility of passing the task by simply recalling their statement. Using the traditional task, Perner et al. (1989) found that children with autism find the self question easier than the other question. METHOD: 52 children with autism and 47 comparison children took part. The child was confronted with 3 boxes - a band-aid box (actually containing candles), a Pringles tube and a candy box - having been asked to get the experimenter a band-aid. Their active selection of the band-aid box indicated their belief that it contained band-aids, although this belief was never verbalised. Children were asked the standard self and other belief questions. A sub-sample of children also received the traditional task. RESULTS: Children with autism found the self question significantly harder than the other question. Controls found the questions equally difficult. The self question was also significantly harder than the self question on the traditional task. Results from two other studies indicated that awareness of own and others’ intentions is equally impaired in individuals with autism and is related most strongly to performance on study 1’s ToM task. CONCLUSION: Evidence from autism suggests that awareness of one’s own and others' mental states is dependent on the same neuro-cognitive mechanism. Sponsor: MRC
Oral Session #3
Treatment and outcome

Chair: Lonnie Zwaigenbaum

Speakers:
Saasha Sutera, Alyssa Verbalis, Hilary C. Boorstein, Juhi Pandey, Leandra B. Wilson, Marianne Barton, Sarah Hodgson, Thyde M. Dumont-Mathieu, Deborah A. Fein, University of Connecticut
Michael Siller, Ted Hutman, Marian Sigman, University of California, Los Angeles
Patricia Ann Howlin, Magiati Iliana, Tony Charman, Institute of Psychiatry, Kings College London
Sarah E. Brautigam, Susan M. Stephens, Sharman Ober-Reynolds, R. Curt Bay, Janet Kirwan, Josh Jones, Rachel McIntosh, Kristen Treulich, Terri Grebe, Raun Melmed, Southwest Autism Research and Resource Center
Judy Reaven, Audrey Blakeley-Smith, Shana Nichols, Meena Dasari, Erin Flanigan, Susan Hepburn, University of Colorado at Denver and Health Sciences Center - JFK Partners

ABSTRACTS

DEVELOPMENTAL TRAJECTORIES OF OPTIMAL OUTCOME IN TODDLERS DIAGNOSED WITH AN AUTISTIC SPECTRUM DISORDER Saasha Sutera, Alyssa Verbalis, Hilary C. Boorstein, Juhi Pandey, Leandra B. Wilson, Marianne Barton, Sarah Hodgson, Thyde M. Dumont-Mathieu, Deborah A. Fein, University of Connecticut
In toddlers with an autistic spectrum disorder (ASD), it is important to gain a better understanding of what may predict various developmental trajectories of children with an ASD. We examined the differences between children diagnosed with an ASD at age 2 who retain the diagnosis at age 4, children who achieve an optimal outcome, or ‘recover,’ and children never diagnosed with an ASD. 90 children were evaluated after failing the Modified Checklist for Autism (M-CHAT: Robins, et al., 2001) at age 2 and re-evaluated at age 4. Of these, 73 were diagnosed with an ASD at their initial evaluation, and 17 were diagnosed with a non-autistic spectrum disorder. At reevaluation, 13 of these 73 children no longer met criteria for ASD. Cognitive and adaptive skills were assessed using the Bayley Scales, the Mullen Scales, or the Differential Ability Scales, and the Vineland Adaptive Behavior Scales. The Childhood Autism Rating Scale was used as a measure of symptom severity. At age 2, there were no differences between the optimal outcome and ASD groups in symptom severity. The optimal outcome group had higher Vineland Motor and Mullen Fine Motor scores than the ASD group at age 2. By 4 years of age, the optimal outcome group was functioning better than the ASD group on all measures and equal to or better than the group of children never diagnosed with an ASD. Findings suggest that children who experience optimal outcome are difficult to differentiate at 2 years of age from children who will remain on the spectrum, with the exception of better motor development. However, there is clearly a unique developmental trajectory of these children; by 4 years of age they are virtually identical on all measures to children never diagnosed with an ASD. Since it is difficult to predict at an early age which children will benefit most from early intervention, with possibly even the potential for recovery, it is crucial to provide all children intensive, early intervention.

AN INNOVATIVE PARENT EDUCATION PROGRAM INCREASES RESPONSIVE PARENTAL BEHAVIORS IN AUTISM: PRELIMINARY RESULTS FROM A RANDOMIZED TREATMENT STUDY. Michael Siller, Ted Hutman, Marian Sigman, University of California, Los Angeles
BACKGROUND: Two prospective longitudinal studies have shown that responsive parental
behaviors reliably predict the long-term (16-year) language gains of children with autism (Siller & Sigman, 2002, 2006). Both studies focused on the extent to which parental behaviors were responsive to their child’s focus of attention and activity during shared toy play (i.e., maternal synchronization).

OBJECTIVE: This research aimed to evaluate whether maternal synchronization can be effectively increased using an innovative parent education program. The intervention procedures are manualized and include 12 in-home training sessions.

METHODS: 70 preschoolers with autism and their mothers were enrolled in this study and randomly assigned to either the experimental intervention or a control condition. Children ranged in age between 32 and 82 months (mean = 57.1 months; SD = 12.3) and had limited expressive language skills (mean expressive language age = 15.9 months; SD = 9.0). During the intake and exit assessments, mothers and children were instructed to engage in ten minutes of free play. Interactions were videotaped and coded for responsive maternal behaviors (maternal synchronization).

RESULTS: Data from the first 58 families of our randomized intervention study suggest that mothers who participated in the experimental intervention made larger pre-post gains in synchronization than mothers who participated in the control condition, t(56) = 2.2, p < .05.

CONCLUSIONS: Preliminarily, these results demonstrate that the experimental parent education program effectively increases responsive parental behaviors in autism.

Funding: CPEA Grant HD-DCD35470; M.I.N.D. Institute; STAART Grant U54-MH068172

A COMMUNITY-BASED EVALUATION OF EARLY INTENSIVE BEHAVIOURAL INTERVENTION AND SPECIALIST NURSERY PROVISION FOR CHILDREN WITH AUTISM SPECTRUM DISORDERS, Patricia Ann Howlin, Magiati Iliana, Tony Charman, Institute Of Psychiatry, Kings College London

BACKGROUND: Although it is widely accepted that comprehensive early interventions are beneficial for young children with autism spectrum disorders (ASD), there are few independent comparative evaluations of these programs.

OBJECTIVES: Compare outcome for pre-school children with autism receiving home-based Early Intensive Behavioural Interventions (EIBI) or autism-specific nursery provision in the UK. 

METHODS: Forty-four 2-to-4½-year-old children with ASD participated (28 in EIBI home-based programs; 16 in autism-specific nurseries). Data on cognitive, language, play, adaptive behaviour skills and severity of autism were collected at intake and 2 years later.

RESULTS: Both groups showed improvements in age equivalent scores in some developmental areas; standard scores changed little over time. At follow-up, there were no significant group differences in cognitive ability, language, play or severity of autism. However, there were large individual differences in progress with intake IQ and language level best predicting overall progress. At follow-up, no child was unsupported in mainstream school.

CONCLUSIONS: Home-based EIBI, as implemented in a community setting in the UK and autism-specific nursery provisions produced comparable gains for young children with ASD after two years of intervention.

Funding: Action Research UK; Greek NATO scholarship foundation; British Federation of Women Graduates, Central Research Fund (University of London); Greek State Scholarship Fund IKY.

IMPACT OF PARENTAL DEPRESSION ON OUTCOMES OF CHILDREN WITH AUTISM: AN EVALUATION OF THE SARRC JUMPSTART PROGRAM Sarah E. Brautigam, Susan M. Stephens, Sharman Ober-Reynolds, R. Curt Bay, Janet Kirwan, Josh Jones, Rachel McIntosh, Kristen Treulich, Terri Grebe, Raun Melmed, Southwest Autism Research and Resource Center

BACKGROUND: Parents of children with autism report more stress and depression than parents of children with other developmental disabilities. Given the deficits associated with communication and social skills in children with autism, the negative consequences of maternal depression may be more detrimental to children with autism than to typical children.

OBJECTIVES: Evaluate SARRC’s early intervention program, JumpStart (JS), which aims to empower parents while improving child functioning through one-on-one intervention.

METHODS: Seventy-three (N = 73) children and their parents participated in JS (4 weeks, eight sessions). Efficacy of JS was evaluated utilizing measures of parental empowerment (Family Empowerment Scale), depression (Center for Epidemiologic Studies Depression Scale) and child functioning (Autism Treatment Evaluation Checklist) at baseline (BL) and after visit 8 (V8).
Constructs were measured twice at baseline to assess stability. Repeated measures ANOVA were used to estimate change in the dependent measures over time.

RESULTS: Following participation in JS, depressive symptomatology in parents (n=38) significantly decreased (BL 13.8 ± 9.6, V8 11.3 ± 8.6, p=.04) and feelings of empowerment (N =73) increased (BL 47.0 ± 8.1, V8 50.2 ± 7.2, p<.001). ATEC subscales also showed statistically significant improvement in the following functional areas: communication (BL 10.1 ± 5.6, V8 11.6 ± 5.8, p<.001), sociability (BL 25.0 ± 6.0, V8 27.1 ± 6.1, p=.003), sensory/cognitive (BL 18.8 ± 5.8, V8 20.9 ± 5.5, p=.02), and health physical behaviors (BL 0.87 ± 0.38, V8 0.77 ± 0.38, p<.05). A mediational model suggesting a causal relationship between improvement in child behavior and change in parents’ severity of depression and feelings of empowerment is posited.

CONCLUSION: JumpStart was associated with a decrease in depression and increased sense of empowerment among parents and improvement in child functioning.

Sponsor: private donor.

COGNITIVE-BEHAVIORAL GROUP TREATMENT FOR ANXIETY SYMPTOMS IN CHILDREN WITH HIGH-FUNCTIONING AUTISM SPECTRUM DISORDERS

Judy Reaven, Audrey Blakeley-Smith, Shana Nichols, Meena Dasari, Erin Flanigan, Susan Hepburn, University of Colorado at Denver and Health Sciences Center - JFK Partners

BACKGROUND: Individuals with autism spectrum disorders (ASD) are at increased risk for developing anxiety disorders in childhood, relative to both typically developing children and those with other developmental disabilities. Anxiety symptoms can severely limit the individual’s participation in home, school and community environments.

OBJECTIVE: The primary objective of the present study was to examine whether efficacious empirically-based interventions designed for typically developing children can be modified for children with ASD.

METHODS: Thirty-three (33) children with high functioning ASD, ages 8 to 14 years, and their parents participated in an original, manualized cognitive behavioral group treatment program aimed towards reducing severity of anxiety symptoms in the children, as measured by parent and child report on the SCARED and Leyton Obsessional Inventory. Ten parent-child dyads were entered into the Active Treatment Condition while the remaining 23 dyads were entered into a Wait-List Control Condition. Participants in the Wait-List Control Condition were eventually entered into the Active Treatment Condition.

RESULTS: Results indicated statistically significant reductions in parent, but not child, report of anxiety symptoms on the SCARED after the delivery of the group treatment, compared with the Wait-List Control Condition.

CONCLUSIONS: The findings of this study are promising, particularly in light of the high rates of co-morbidity between ASD and anxiety. Limitations and recommendations for future research directions will be discussed.

Sponsors: Organization for Autism Research (OAR), Doug Flutie Foundation, Cure Autism Now (CAN)
Poster Abstracts – 1
8:00 am – 1:00 pm
Themes: Clinical Evaluation, Comorbid Psychopathology, Developmental Trajectory, Epilepsy, Immunology, Language, Medical General, Neuropsychology, Psychopharmacology, Services Delivery

PS1.1
DYSMORPHOLOGY STATUS IN THE CHARGE STUDY
Kathleen Angkustsiri, Jerald Gardner, Terrance Wardinsky, Billur Moghaddam, Paula Krakowiak, Robin Hansen, Lisa Croen, Irvu Hertz-Picciotto, University of California MIND Institute
Background: There is clinical heterogeneity among the autistic spectrum disorders (ASD). The presence of abnormal morphology (physical anomalies), which may represent an insult in early embryogenesis, is one possible tool for defining an etiologically relevant subset in ASD.
Objectives: To compare dysmorphology status among autistic, developmentally delayed (DD), and typically developing children.
Methods: Children between the ages of 2-5 years were recruited through a larger population study, the CHARGE study. The diagnosis of an ASD was confirmed with ADI-R and ADOS scores. Control groups from the same catchment area included developmentally delayed children (without ASD) and typically developing children from the general population. Photographs of face, profile, and hands were evaluated by at least 2 of 3 clinicians (2 geneticists and 1 pediatrician) blinded to group and classified as dysmorphic if 3 or more minor physical anomalies were present, and nondysmorphic if fewer than 3 minor physical anomalies were present. Disagreements among raters were resolved by consensus of all 3 clinicians.
Results: Photographs for 209 children were reviewed (115 ASD, 30 DD, and 64 typical). Significantly more children with ASD were classified as dysmorphic compared to typically developing children (18% vs. 8%, p<0.04). Delayed children were also more likely to be considered dysmorphic compared to typical children (43% vs. 8%, p<0.0001).
Conclusion: Preliminary data suggest that autistic and delayed children have higher rates of dysmorphology than typically developing children. Further study is needed to categorize the types of specific anomalies present in autistic children.
Sponsors: NIEHS, MIND, EPA

PS1.2
EXAMINING THE USE OF THE CONTINGENCY NAMING TEST AS A MEASURE OF FLEXIBILITY IN CHILDREN WITH AUTISM SPECTRUM DISORDERS. Bryan R. Harrison, Benjamin Yerys, Gregory Wallace, Lauren Kenworthy, Children's National Medical Center
Background: The Contingency Naming Test (CNT) is an established measure of flexibility that has not been used in Autism Spectrum Disorder (ASD) samples. The CNT has been normed for school-age children, and may prove more appropriate than the Intra-Dimensional/Extra-Dimensional (IDED) subtest from the Cambridge Neuropsychological Test Automated Battery, because of the absence of ceiling effects for this age range.
Objectives: Examine the relationship between performance on the CNT and performance on the IDED Task.
Methods: Subjects were recruited for a multimodal research study conducted at Children’s National Medical Center and Georgetown University. Subjects were assessed using an extensive battery, which included the CNT, a measure of reactive flexibility in school-age children, and the IDED Task, which has been previously used to measure flexibility in ASD samples.
Results: Data were collected on 16 children with ASD (mean age=10.81; range=8-14 years; 81.3% males). Analyses indicated a moderate correlation between Trial 4 errors on the CNT and Stage 8 errors on the IDED task. In addition, there was a robust correlation between Trial 4 errors on the CNT and full-scale IQ; this finding highlights how intelligence mediates performance on the CNT.
Conclusion: These results provide convergent validity for the CNT as an effective measure of flexibility in ASD.
Sponsor: Singer Foundation.

PS1.3
PERCEPTIONS OF AUTISTIC TRAITS BY TEACHERS AND PARENTS AND IMPACT ON THE ASSESSMENT OF ASD
Stephen M. Kanne, Nathan Henninger, Patti Lavesser, Maureen Grissom, James Schroeder, University of Missouri - Columbia
Background: When conducting an assessment for the presence of an Autistic Spectrum Disorder (ASD), discrepant results often arise between the various measures. These methods typically include a thorough assessment of the child’s current presentation of symptoms, collecting relevant background information including developmental and medical history, and formally assessing other areas such as cognitive skills, language abilities, early academic skills, and problem behaviors.
Objectives: To better understand how parents, teachers, and clinicians perceive the child with an ASD across the settings, and how these perceptions relate to clinician observations.
Methods: Behavioral report and formal assessment data across several measures and informants (i.e., CBCL, C-TRF, ADI-R, ADOS; N=26) were compared using
correlational analyses.
Results: Little association found between parent and
teacher/clinician assessment of the child’s behaviors. In
contrast, the behaviors that teachers are observing,
especially with regard to emotional reactivity, aggression,
and attentional problems, are predictive of the clinician
observing and assessing the presence of behaviors
consistent with an ASD.
Conclusion: Results demonstrate that teachers, clinicians,
and parents have differing perceptions regarding a child’s
behaviors associated with an ASD suggesting that
gathering information from multiple sources is essential
when conducting a thorough assessment of an ASD.

PS1.4
INTER-RATER RELIABILITY USING A
BEHAVIOR IMAGE WEB PLATFORM Uwe Reischl,
James Ball, Gregory Abowd, Ron Oberleiter, Patt
Elison-Bowers, Boise State University
Background: Limited access to professionals capable of
evaluating the functional performance of children with
autism is impacting the educational progress of children
with autism locally as well as regionally. Application of a
new behavior image platform may facilitate remote
evaluations and increase access to such services.
Objectives: To assess the use and the inter-rater reliability
of a new behavior-image platform for scoring discrete
Methods: A behavior video capture system will be used to
simultaneously record children and their in-person
evaluators during discrete trial sessions. 10 children with
an autism spectrum disorder diagnosis, each performing
10 discrete trials, will be scored by their teacher, as well
as an independent onsite evaluator. The session will be
video recorded digitally, and transmitted to a secure web
platform for review by 10 ‘external’ raters. The reviewers
will rate each of the 100 video clips independently. Their
scores will provide the basis for an inter-rater reliability
estimate. A comparison between the in-person evaluator
and the external evaluator scores will allow an assessment
of the overall effectiveness of the new behavior capture
methodology.
Results: A comparison of the external evaluator scores to
the independent evaluator and among each other will be
used to evaluate efficacy and inter-rater reliability. A
comparison of the in-person evaluator scores with the
external evaluator scores will also yield insight into
potential observational discrepancies.
Conclusion: A high correlation between the on-site
evaluators and the remote evaluators, as well as a high
inter-rater reliability for the external evaluators will
indicate that the new behavior-image technology platform
can be used effectively in the evaluation of functional
performance tests of children with autism.
Sponsors: Princeton Autism Technology, Caring
Technologies Inc.

PS1.5
OBSESSIVE COMPULSIVE DISORDER (OCD) IN
AUTISM SPECTRUM DISORDERS (ASD) - THE
POTENTIAL USEFULNESS OF COGNITIVE
BEHAVIOUR THERAPY (CBT) Ailsa Jean Russell,
David Mataix Cols, Martin Anson, Declan Murphy, Kings
College London, Institute of Psychiatry
Background: High rates of anxiety disorders including
OCD have been reported in ASD. We have previously
reported increased rates of OC symptoms in adults with
high functioning ASD, with symptom content similar to a
comparison group of adults with a primary diagnosis of
OCD. Standard treatments for OCD include anti-
depressant medication and cognitive and behaviour
therapies. These have been subject to rigorous evaluation
in the general population, but it is not clear if they are
equally as useful for people with ASD.
Objectives: To provide preliminary data about the
potential usefulness of CBT for OCD in ASD.
Methods: We conducted an open study - a non-
randomised comparison of adults with high functioning
ASD and OCD, with and without psychological
treatment. 12 adults received CBT for OCD (CBT group),
and 12 were subject to repeat evaluation but received no
treatment for their symptoms (No treatment group). The
Yale Brown Obsessive Compulsive Scale (YBOCS) was
administered by interview at baseline and end of
treatment.
Results: The 2 groups did not differ in terms of age,
length of time between symptom measures, and IQ. The
No-treatment group was older. The CBT group tended to
have more severe OCD at baseline. Repeated measures t-
tests showed significant pre-to-post treatment changes on
the YBOCS total severity and obsession severity scores
for the CBT group, but not the No-Treatment group.
There was a significant group by time interaction. Greater
than 50% of the CBT group showed a clinically
significant (>25%) reduction in OC symptoms compared
with 16% of the No-Treatment group.
Conclusion: OCD symptoms in ASD do not show any
change over time in the absence of treatment. A
proportion of individuals with ASD and OCD may show
significant improvement with standard psychological
treatment, with some adaptations for ASD. This is a
naturalistic study with many confounds, and there is a
need for more systematic treatment evaluations.

PS1.6
INTERIM ANALYSIS: USE OF DESCRIPTIVE
FUNCTIONAL BEHAVIORAL ASSESSMENTS AS
OUTCOMES IN SSRI TREATMENTS FOR
STEREOTYPED/REPETITIVE BEHAVIORS Latha
V Soorya, Katherine Stamper, Erika Swanson, Evdokia
Anagnostou, Eric Hollander, Mount Sinai School of
Medicine
Objectives: Identify feasibility and differential outcomes
obtained from direct observation of repetitive behaviors in
randomized controlled trials targeting reductions in
repetitive behaviors.
Methods: Children ages 5-17 were recruited from ongoing
randomized clinical trials at the Seaver and New York Autism Center of Excellence at the Mount Sinai School of Medicine. Participants were assessed with ADOS-G, ADI and participated in 20-minute structured observation during bi-weekly study visits. Direct observations were modified from experimental functional behavioral assessments (FBA) (e.g. Iwata, et al. 1994). Each descriptive FBA included four conditions based on antecedent based manipulations: 1) Positive attention 2) Demand 3) Tangible 4) Free Play. Videotape coding was conducted by blinded raters.

Results: Data were collected on 24 participants; coded data from ten participants is presented. Moderate to good inter-rater reliability was found between four blinded raters. Results indicate moderate correlations between direct observation data and clinician ratings based on parent report. Descriptive data suggested no change in repetitive behaviors in most conditions for children identified as placebo responders in the clinical trial. In addition, preliminary analysis of group results suggests 60% of participants had higher levels of repetitive behaviors in the Tangible condition, in which highly preferred activities are interrupted (i.e. ‘shared’) with the examiner.

Conclusion: Preliminary findings suggest descriptive, antecedent-based FBAs may have utility in identifying placebo responders and common antecedents to repetitive behaviors in ASD. In this small sample, decreased access to preferred, restricted interests/objects resulted in higher rates of repetitive behaviors than other conditions (e.g. demand, social attention, free-play).

Funded by the Cure Autism Now foundation

PS1.7
SYMPTOM PRESENTATION ON THE SOCIAL COMMUNICATION QUESTIONNAIRE (SCQ) OF AUTISTIC CHILDREN WITH AND WITHOUT MENTAL RETARDATION Vanessa Gonzalez, Marygrace Y. Kaiser, Jennifer S. Durocher, & Michael Alessandri, University of Miami

Background: It is widely accepted that mental retardation is a feature which is frequently associated with Autism Spectrum Disorders (ASDs). However, there is a subset of children who do not exhibit mental retardation. Better characterization of these two subgroups is needed, in order to understand how these groups differ with respect to factors such as symptom presentation, as this is likely to affect long-term outcome.

Objectives: In an attempt to address this issue, this study will utilize a unique community sample of children with Autistic Disorder to examine symptom presentation via the Social Communication Questionnaire (SCQ).

Methods: This study consisted of 77 children with a parent reported diagnosis of Autistic Disorder, including 72 boys and 5 girls. The parents of these children participated in a larger ongoing prevalence study funded by the CDC developed to monitor and track the prevalence of ASDs in Miami-Dade County. Of these children, 39 had an IQ score less than 70 and the remaining 38 had IQ scores of 70 or above. IQ results were obtained via historical records obtained from each child at varying ages.

Results: No significant difference was found for total SCQ score between the means for the two groups. However, risk ratios indicate that children in the ‘lower IQ’ group were more likely to score above the threshold for Autism vs. ASD on the SCQ. In the ‘lower IQ’ group, 41% of children scored above 22 on the SCQ placing them in the Autism category, whereas only 24% of children in the ‘higher IQ’ group scored in this category.

Conclusion: Findings of this study illustrate that symptom presentation of children with Autism may vary as a result of IQ. Parents of children with comorbid mental retardation reported more symptoms, resulting in an Autism categorization, than parents of children without mental retardation, which resulted in an ASD categorization.

Sponsor: CDC

PS1.8
K-SADS DIAGNOSES IN CHILDREN WITH PERVASIVE DEVELOPMENTAL DISORDERS C. Kagan Gürkan, Melda Açıkan, Birim Güray Kiliç, Ayhan Bilgiç, Department of Child and Adolescent Psychiatry, Ankara University Medical School

Background: There is a consensus about existence of high rates of comorbid psychiatric disorders in children and adolescents with Pervasive Developmental Disorder (PDD). However diagnosing children with PDD is a challenging task because of their limited expressive capacity.

Objectives: To investigate the rate of comorbid psychiatric disorders in subsample of clinically referred children with PDD using Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS).

Methods: PDD cases within 6-18 age range who referred to a child and adolescent psychiatry department were included in the study. PDD diagnoses were defined by a semi structured Autism Diagnostic Interview form and Gillberg’s Asperger Syndrome Diagnostic Interview. Children and adolescents with an IQ above 60 according to WISC-R or Stanford-Binet tests were consecutively interviewed and diagnosed through K-SADS.

Results: 17 PDD cases, consisting of 6 children with Asperger Disorder, 6 with PDD-NOS and 5 with Autistic Disorder, were evaluated. The mean age was 11.2±3.6 years (age range=6 to 17 years). 88.2% (n=15) of the cases were males. 94.1% (n=16) of the cases were diagnosed with at least one DSM-IV disorder. It was detected that 5 cases were having two diagnoses while 4 children with three diagnoses. The most common diagnosis was Attention Deficit Hyperactivity Disorder (58.8 %, n=10).

Conclusions: Findings of this study suggest that comorbidity exists in children with PDD almost as a rule. K-SADS seems to be a useful tool assessing comorbidity in subsample of children with PDD who have a relatively high IQ. Comorbidity of psychiatric disorders in children with PDD warrants further investigation.
ADAPTIVE BEHAVIOR DEFICITS ASSOCIATED WITH ADHD SYMPTOMATOLOGY IN CHILDREN WITH AUTISM

Deborah Ann Pearson, Katherine A. Loveland, David M. Lane, Rosleen Mansour, Stacy Reddoch, Julia Parks. University of Texas Medical School at Houston

Methods: This study followed a group of 118 children and young people with autism. Associations between age, gender, degree of intellectual disability and emotional and behavioural disturbance were examined.

Results: The prevalence of current SIB was 34.7 %, while the lifetime prevalence for SIB was 56.3 %. Logistic regression revealed that higher IQ reduced the risk for SIB significantly (p = .001; OR = 0.97), while SIB increased with a greater impairment in social interaction as indicated by ADI-R (p = .008; OR = 1.13), and a history of language impairment (p = .035; OR = 2.94). No statistical association emerged between SIB and the level of repetitive-stereotyped behaviour as assessed by the ADI-R.

Conclusions: Low IQ, impaired social interaction and delayed language development seem to be risk factors for SIB in ASD. Identifying subjects at risk could promote prevention and early therapeutic interventions. Due to the cross-sectional design, we could not examine the longitudinal course of SIB in ASD.

Sponsor: German Research Foundation (DFG)

CHANGE IN BEHAVIOUR AND EMOTIONAL DISTURBANCE OVER TIME

Bruce J. Tonge, Kylie M. Gray, Avril Brereton, John Taffe, Monash University

Methods: This study followed a group of 118 children and adolescents with Autistic Disorder, initially aged 4-18 years, over a period of 12 years. Along with other variables, their emotional and behavioural disturbance was measured at four points in time.

Results: Results indicated that the majority of young people with autism remain severely emotionally and behaviourally disturbed. Results also suggested that higher IQ and age do not significantly affect level of psychopathology. Attention deficit hyperactivity symptoms decreased over time. Depressive symptomatology increased in children as they passed through puberty and adolescence and into young adulthood. Associations were found between behaviour and emotional problems and family history of mental health problems, continuing psychosocial stress, and living in care.

Conclusion: Behaviour and emotional problems persist over time for the majority of young people. The finding that the level of disturbance does not significantly decrease as children grow older indicates that the demand...
for services in this population will not decrease over time. These findings are discussed in relation to the need for a range of psychiatric, medical and psychoeducational services.

Sponsor: National Health and Medical Research Council of Australia (NHMRC)

PS1.12
PREGNATAL TESTOSTERONE, AUTISM, HYPERKINETIC AND RELATED DISORDERS
Malcolm Bang, Simon Baron-Cohen, Erik L. Mortensen, Bent Nørgaard-Pedersen, Jørn Attermann, Søren Dalsgaard, Joachim Knop, Paul Thorsen, NANE A, Dept. Epidemiology, Institute of Public Health, University of Aarhus

Background: Autistic traits are explained by concentrations of prenatal testosterone in small samples of non-diagnosed children; different prevalence of autism, hyperkinetic and related disorders in males and females.


Methods: Twice as many controls as cases are identified in the same registers and biobanks in a matched case-control study. Laboratory analyses are performed on amniotic fluid testosterone and estrogen, as in the model studies being replicated. The exposure variable is level of prenatal testosterone. The outcome variables are diagnoses and developmental outcomes. Matching variables are sex, year of birth, place of birth and citizenship. Confounding variable is amniotic fluid estrogen. Effect modifying variables are expected to be family structure and separation, peer group stability, unemployment and welfare dependency of residential parent. Conditional logistic regression analysis will be used to derive unadjusted and adjusted odds ratios with 95% confidence intervals for each of the outcome variables associated with the prenatal testosterone level. The multivariate models will include as explanatory variables exposure, matching and confounders. Effect modifying variables will be included as interaction terms with exposure.

Results: To be presented at IMFAR 2007 conference.

Sponsors: British and Danish Medical Research Councils.

Perspectives: Etiology of autism, related aetiology of neurodevelopmental disorders, neonatal serum screening, transmission of heredity.

PS1.13
DO DYSREGULATION AND INTERNALIZING SYMPTOMS CHANGE IN TODDLERS WITH AUTISM SPECTRUM DISORDERS? Ayelet Ben-Sasson, Mary Beth Kadlec, Alice S. Carter, University of Massachusetts at Boston

Background: The course of dysregulation and internalizing symptoms in young children with autism spectrum disorders (ASD) is unknown.

Objectives: Examine changes and persistence in internalizing and dysregulation symptoms in young children with ASD at initial and 1-year follow-up assessment.

Method: Seventy young children with ASD participated in a longitudinal study. The mean age at enrollment was 28 months and 41 months at follow-up, 74% were boys. Mullen Scales of Early Learning (Mullen, 1990) Composite Standard Scores were 65 at enrollment and 71 at follow-up. The Infant Toddler Social Emotional Assessment (Carter & Briggs-Gowan, 2006), a parent questionnaire, was used to assess Dysregulation symptoms including Sensory Sensitivity, Sleeping, Eating and Negative Emotionality; and Internalizing symptoms including Depression/Withdrawal, Anxiety, Separation Distress, and Inhibition to Novelty.

Results: Repeated measures multivariate analysis indicated that there was significant change in the Internalizing scales' scores (p=.00) while there was no significant change in the Dysregulation scales (p=.79). Among the Internalizing scales there were different patterns of change: Inhibition significantly decreased, Separation Distress significantly increased, Anxiety marginally increased, and Depression/Withdrawal was stable. In the dysregulation domain, 57% of toddlers who had Sensitivity scores in the top 10th% at initial assessment also had a Sensitivity score in the top 10th% at follow-up, 70% had persistent Sleep problems, 65% had persistent Eating problems, and 29% had persisting Negative Emotionality symptoms.

Conclusions: Findings suggest that over a 1-year period toddlers with ASD tend to show changes in most internalizing symptoms. The persistence of sensitivity, eating and sleeping problems in over half of the sample calls for allocating more early intervention resources to address these issues.

Sponsors: NIMH, GCRC

PS1.14
BEHAVIOR PREDICTORS OF DEVELOPMENT IN CHILDREN WITH AUTISM SPECTRUM DISORDER OVER TWO YEARS Karen D. Bopp, Pat Mirenda, The University of British Columbia

Background: Little is known about how problem behaviors observed in young children with ASD impact their development in cognitive, language, social, and daily living skill domains.

Objectives: To examine the impact of inattentiveness; social unresponsiveness; and problematic eating, acting-out, stereotypic motor, and insistence on sameness behaviors on child development trajectories over 2 years.

Method: Standardized test data were collected for 70 children with ASD prior to intervention (T1) and 6 (T2), 12 (T3), and 24 months (T4) later. Six behavior predictor variables were constructed using cross-test items endorsed by an expert jury. Structural equation modeling was employed to examine T1 behavior variables and changes in behavior variables from T1-T2 and T1-T3 as predictors of the rate of change (ROC) of child development trajectories between T1 and T4.

Results: Higher levels of stereotypic motor behavior,
inattentiveness, and social unresponsiveness at T1 predicted less progress in the ROC over 2 years in one or more developmental domains. Decreases in these behavior variables between T1-T2 and/or T1-T3 predicted more progress in the ROC in one or more developmental domains.

Conclusion: Reductions in certain problem behaviors appear to have a positive impact on child development over time. This has implications for early intervention priorities.

Sponsor: BC Ministry of Children and Family Development; HELP; NAAR/Autism Speaks

PS1.15
GROWTH-RELATED CHANGES IN CONNECTIVITY AND THE AUTISM PHENOTYPE
John Lewis, Jeff Elman, University of California, San Diego

Theoretical considerations, and findings from computational modeling, comparative neuroanatomy and developmental neuroscience, motivate the hypothesis that a deviant brain growth trajectory will lead to deviant patterns of change in cortico-cortical connectivity. Differences in brain size during development will alter the relative cost and effectiveness of short and long-distance connections, and thus impact the growth and retention of connections. Reduced brain size should favor long-distance connectivity; brain overgrowth should favor short-distance connectivity; and inconsistent deviations -- as occurs in autism --- should result in a potentially disruptive collapse of established patterns of functional and physical connectivity during development. To explore this hypothesis, neural networks which modeled interhemispheric interaction were grown at the rate of either typically developing children or children with autism. The influence of the length of the interhemispheric connections was analyzed functionally and physically at multiple developmental time points. All networks were equally affected by lesions early in development, but those that modeled autistic growth were less affected by lesions later in development --- indicating a reduced reliance on long-distance connections. Direct analysis of the connection weights also showed later underconnectivity in the networks that modeled autistic growth. Additionally, these reductions in long-distance connectivity were associated with increased error during learning. These modeling results support the hypothesis that the deviant growth trajectory in autism may lead to a collapse in established patterns of connectivity during development. Such a collapse is argued to plausibly underlie core aspects of the behavioral phenotype and many of the peripheral findings, particularly the presence of developmental regression.

This research was supported by grant NIH/NIMHR01-MH60517 to the second author.

PS1.16
EFFECTS OF AUDIO-VISUAL SYNCHRONY ON THE VIEWING PATTERNS OF CHILDREN WITH AUTISM
David Lin, Warren Jones, Frederick Shic, Kelley Knoch, Sarah Shultz, Ami Klin, Yale Child Study Center, Yale University School of Medicine

BACKGROUND: Previous research has shown that when watching naturalistic scenes of social interaction, individuals with autism, relative to typically-developing peers, fixate more on people’s mouths and inanimate objects, while looking less at people’s eyes. Recent research from our group suggests that a possible reason for these preferences is that children with autism are acutely sensitive to physical contingencies such as the audio-visual synchrony aspects of speech sounds and lip movements.

OBJECTIVES: To study the effects of audio-visual synchrony on the viewing patterns of children with autism while viewing point-light animations and naturalistic scenes.

METHODS: Adolescents with autism and matched controls viewed point-light animations of caregivers emulating social experiences (e.g., an animated adult trying to draw the attention of an infant with ‘pat-a-cake’ or ‘peek-a-boo’) as well as video scenes (full-screen video plus audio track) showing a female actor playing the role of caregiver. Visual fixation patterns were measured with eye-tracking technology. Motion in both the point-light animations and the video scenes were analyzed by optical flow (Lucas & Kanade, 1981). Audio-visual synchrony was quantified by a spatio-temporal correlation of motion with the audio signal. Finally, audio-visual synchrony was used to predict visual fixation patterns and the accuracy of these predictions were used as an indicator of the effect of audio-visual synchrony on visual fixation patterns.

RESULTS: Our preliminary results show that children with autism were more sensitive to audio-visual synchrony than matched controls.

CONCLUSIONS: The present study offers a unique method for quantifying the effects of audio-visual synchrony on viewing patterns during conditions of natural viewing. Our results suggest that physical rather than social-affective contingencies may primarily drive the viewing patterns of children with autism.

SPONSOR: NICHD

PS1.17
MEASURES OF SOCIAL COMMUNICATION AND REPETITIVE BEHAVIORS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS IN THE SECOND AND THIRD YEARS OF LIFE
Amy M. Wetherby, Lindee Morgan, Angie Barber, Chris Schatschneider, Somer Bishop, Mia Coffing, Susan Risi, Catherine Lord, Florida State University FIRST WORDS Project

Objective: The purpose of this longitudinal study of the FIRST WORDS Project was to measure social communication and repetitive and stereotyped behaviors (RSB) of children with autism spectrum disorders (ASD) between 12 and 36 months of age.
Method: CSBS Behavior Samples were videotaped for 122 children later diagnosed with ASD (n=222 samples). Samples were analyzed across age groups: Early 2nd (12-17 months, m=15.3, n=30), Late 2nd (18-23 months, m=21.0, n=73), Early 3rd (24-29 months, M=26.9, n=54), and Late 3rd (30-36 months, m=33.5, n=65). Social, speech, and symbolic composites and measures of RSB were obtained from the CSBS. ADOS measures were obtained at an average age of 35.7 months. Results: Analyses of 222 samples indicate significant increases in the speech and symbolic composite between successive age groups but the only significant difference in the social composite was between early 2nd and late 3rd. Analyses of 141 samples indicate that RSB with body and objects are evident early in the 2nd year with no significant differences across age groups. The social and RSB domains were not related early in the 2nd year but show moderate correlations by late 2nd year. Moderate to large correlations were observed between the CSBS social composite and both ADOS domain scores, with larger correlations in the 3rd year. Moderate correlations were observed between RSB and the ADOS Restricted Repetitive Behaviors domain score in all 4 age groups. Conclusions: Measures of social communication using the CSBS suggest a deceleration of skills in the social composite compared to speech and symbolic from early 2nd to late 3rd year. In contrast, measures of RSB were present in the early 2nd year and did not change significantly through late 3rd year. These findings have important implications for understanding the unfolding of core features of ASD in the 2nd and 3rd years and improving early identification. Sponsors: NIH/NIDCD, USDOE/OSERS; Simons Foundation

PS1.18
EEG ABNORMALITIES IN YOUNG CHILDREN WITH AUTISM
Sarah Jane Spence, Sadat A. Shamim, Ashura W. Buckley, Susumu Sato, Audrey Thurm, Susan E. Swedo, National Institute of Mental Health
Background: It has long been reported that up to 1/3 of individuals with autism or ASD have epilepsy. However, the reported rates of EEG abnormalities in the absence of clinical seizures have been more variable. The role of these abnormalities in the ASD phenotype is unknown and there is substantial controversy regarding treatment. Objective: The presence of epilepsy and/or EEG abnormalities was explored as part of an ongoing large phenomenological study investigating clinical subtypes of ASD.
Methods: Children (age 1-6 yrs) underwent extensive diagnostic, behavioral and cognitive testing to establish research diagnoses of autism. Both unsedated routine EEGs (usually awake and/or drowsy state) and overnight continuous EEG video monitoring (capturing natural sleep) were performed. EEG interpretation was blind to seizure history collected by a pediatric neurologist.
Results: Preliminary data are reported here. No subject had a history of a clinical seizure disorder. Of the first 6 subjects who received routine EEG, 4 were read as abnormal. All showed some degree of epileptiform abnormalities (sharp waves, spikes and spike and wave complexes). Three of the five overnight studies were reported as abnormal. Again, all of these showed epileptiform abnormalities. Interestingly, there was discordance between the results of the routine vs overnight studies in 2 of the 5 subjects who received both studies.
Conclusion: Preliminary data show a very high rate of epileptiform discharges in these young children without clinical seizure history. The study plans to recruit 125 subjects with autism, as well as 25 controls with Rett Disorder and 25 controls with developmental delay in whom the relationships between EEG abnormalities and various measures including medical histories, sleep disturbances, IQ, language function, autism symptomatology, history of regression, and other laboratory tests will be explored. Sponsor: NIMH-IRP

PS1.19
THE FREQUENCY OF EPILEPSY AMONG CHILDREN WITH AUTISTIC SPECTRUM DISORDER: A POPULATION-BASED STUDY
Edwin Trevathan, Robert T. Fitzgerald, Carolyn Soke, Andrea Hoog, Maia Piccagli, John N. Constantino, Washington University in St. Louis, School of Medicine
Background: Epilepsy is common among children with autistic spectrum disorders (ASD). Yet the frequency of epilepsy among children with ASD ascertained in the general population is poorly defined.
Objective: Determine the frequency of epilepsy among children with ASD ascertained from the general population.
Methods: Children with ASD who were born in 1994 and who were 8 years of age in 2002 were ascertained in the 5-county region in and around St. Louis, Missouri, using a multiple-source surveillance system as part of the CDC-funded ADDM network; data sources included both medical and non-medical facilities. A separate EEG lab-based surveillance system for epilepsy was established using all EEG laboratories in the study area that performed EEGs on children, as well as records of clinicians who ordered the EEGs and/or who made clinical diagnostic decisions related to epilepsy. ASD cases born in 1994 who were 8 years of age in 2002 were evaluated for epilepsy via the EEG lab-based surveillance system for epilepsy. A pediatric neurologist with expertise in clinical neurophysiology and epilepsy reviewed all clinical and EEG data, and used standardized criteria for epilepsy diagnosis and classification to determine epilepsy case status.
Results: 205 children with ASD were ascertained via the ADDM surveillance system in Missouri (estimated ASD prevalence of 7.3 per 1000; 95% CI = 6.4, 8.4). Among these 205 children, 87 children had 130 EEGs. Eighteen of the 205 children with ASD (8.9%) had epilepsy. An additional 6 children had suspected epilepsy (maximum estimate of 24/205 or 11.7%). Only 1 child with ASD and epilepsy did not undergo an EEG. Five children suffered...
documented status epilepticus. Two children had Lennox-Gastaut Syndrome. Only 1 of 205 children with ASD had acquired epileptic aphasia or Landau-Kleffner syndrome. Conclusion: Epilepsy is an important co-morbid condition among children with ASD. Yet the frequency of epilepsy among children with ASD is likely over-estimated from studies based in neurology clinics and in hospitals.

Sponsor: Centers for Disease Control and Prevention (CDC), UR3/DD000081, Trevathan, PI. The findings and conclusions in this abstract are those of the authors and do not necessarily represent the views of the CDC.

**PS1.20**

**PLASMA LEPTIN LEVELS IN AUTISM: ASSOCIATION WITH EARLY ONSET PHENOTYPE?**

Paul Ashwood, Christina Kwong, Irva Hertz-Picciotto, Paula Krakowik, Robin Hansen, Lisa A. Croen, Isaac N. Pessah, Judy Van de Water, Department of Medical Microbiology and Immunology and M.I.N.D. Institute

Background: Autism spectrum disorders (ASD) are characterized by impairment in social interactions, communication deficits, and restricted repetitive interests and behaviors. Although there are currently no biological correlates for ASD, there is evidence of immune dysregulation in some children with ASD. We examined the hormone/cytokine leptin based on its reported role in inflammation-mediated autoimmune disorders. Method: Plasma leptin levels were evaluated by ELISA. Seventy children diagnosed with autism (including 37 with developmental regression) were compared with 99 age-matched controls including 50 typically developing non-ASD controls, 26 siblings without ASD, and 23 children with developmental disabilities but not ASD. Findings: Children with ASD had significantly higher plasma leptin levels compared with typically developing non-ASD controls (p<0.006). When the subjects with ASD were further sub-classified based on clinical phenotypes of regression or early onset ASD, children with early onset ASD had significantly higher plasma leptin levels when compared with all groups including children with regressive ASD (p<0.042), typically developing non-ASD controls (p<0.0015), and controls with other developmental disabilities (p<0.004). Interpretations: Our data demonstrate an increase in plasma leptin levels in subjects with ASD compared with the typically developing non-ASD controls, siblings, and children with developmental disabilities, a finding apparently driven predominantly by higher levels in children with an early onset ASD phenotype. The differences in leptin levels may suggest a biological distinction between those children with early onset ASD and those who develop and then lose language and social skills that could reflect distinct genetic and/or environmental factors.

Sponsor: NIEHS 1 P01 ES11269-01, the U.S. Environmental Protection Agency (U.S. EPA) through the Science to Achieve Results (STAR) program (Grant R829388).

**PS1.21**

**MATERNAL PLASMA ANTIBODIES TO HUMAN FETAL BRAIN IN AUTISM**

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Background: There is mounting evidence of an association between maternal anti-fetal brain autoantibodies and development of autism in some children.

Objectives: Identify and compare the prevalence of maternal anti-fetal brain autoantibodies within a large population of mothers of children with autism (AU) as well as typically developing (TD) and developmental delay (DD) controls.

Methods: Plasma antibodies against human fetal brain proteins were analyzed by Western blot in 61 mothers of children with autistic disorder and 102 controls matched for maternal age and birth year (62 TD and 40 non-ASD DD). Regression diagnosis was based on responses to Q11 and Q25 on the ADI-R.

Results: Bands of reactivity at approximately 100kD, 73kD, 37kD and 32kD were observed more frequently in the mothers of children with autism (AU) than either control group. Specifically, a highly significant association with a diagnosis of autism in the offspring was observed with maternal autoreactivity to a band at 37kD (26.2% AU v. 8.1% TD; p=0.0086), conferring a striking odds ratio of 5.69 (95% confidence interval 2.09-15.51). Additionally, significant associations were observed for the simultaneous presence of two bands at 37kD and 73kD (11.5% AU v. 0% TD; p=0.0061). Furthermore, the mothers of children with autism who were diagnosed with the regressive phenotype displayed antibody reactivity to the 37kD protein significantly more often than the mothers of children in either control group (27.8% v. 8.1%; p=0.0174(GP); 27.8% v. 2.5%; p=0.0023(DD)).

Conclusion: The presence of anti-fetal brain autoantibodies in the plasma of some mothers of children with autism supports a potential role for the involvement of IgG autoantibodies in aberrant neurodevelopment and the ontology of autism in some children.

Sponsor: NIEHS 1 P01 ES11269-01, the U.S. Environmental Protection Agency (U.S. EPA) through the Science to Achieve Results (STAR) program (Grant R829388).

**PS1.22**

**IMBALANCE OF SERUM IMMUNOGLOBULINS IN AUTISM**

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Background: Immune, autoimmune and infectious factors for Basic Research in Developmental Disabilities

Inflammation and behavior communication deficits, and restricted repetitive interests are characteristic by impairment in social interactions, characterized by impairment in social interactions, communication deficits, and restricted repetitive interests and behaviors. Although there are currently no biological correlates for ASD, there is evidence of immune dysregulation in some children with ASD. We examined the hormone/cytokine leptin based on its reported role in inflammation-mediated autoimmune disorders. Method: Plasma leptin levels were evaluated by ELISA. Seventy children diagnosed with autism (including 37 with developmental regression) were compared with 99 age-matched controls including 50 typically developing non-ASD controls, 26 siblings without ASD, and 23 children with developmental disabilities but not ASD. Findings: Children with ASD had significantly higher plasma leptin levels compared with typically developing non-ASD controls (p<0.006). When the subjects with ASD were further sub-classified based on clinical phenotypes of regression or early onset ASD, children with early onset ASD had significantly higher plasma leptin levels when compared with all groups including children with regressive ASD (p<0.042), typically developing non-ASD controls (p<0.0015), and controls with other developmental disabilities (p<0.004). Interpretations: Our data demonstrate an increase in plasma leptin levels in subjects with ASD compared with the typically developing non-ASD controls, siblings, and children with developmental disabilities, a finding apparently driven predominantly by higher levels in children with an early onset ASD phenotype. The differences in leptin levels may suggest a biological distinction between those children with early onset ASD and those who develop and then lose language and social skills that could reflect distinct genetic and/or environmental factors.

Sponsor: NIEHS 1 P01 ES11269-01, the U.S. Environmental Protection Agency (U.S. EPA) through the Science to Achieve Results (STAR) program (Grant R829388).
subclasses (IgG1, IgG2, IgG3, IgG4). IgA is the most abundant immunoglobulin in body fluids such as saliva and mucosal secretions of gut. IgM deals most efficiently with polyvalent antigens such as bacteria and viruses, and it also activates complement.

Objective: To compare the levels of IgG and its subclasses, IgA and IgM in the sera of children with autism and their developmentally normal siblings.

Methods: Children with autism (ages 2-12 years), and their control siblings participated in this study. The blood samples were collected in the absence of anticoagulant. Serum samples were obtained by separating supernatants upon centrifugation of blood samples at 2,500 g for 10 minutes. The levels of IgG and its sub-classes, IgA and IgM were measured in the serum samples from autism and control groups by nephelometric analysis using assay kits from Binding Site.

Results: The levels of IgG and its sub-classes were increased while those of IgM were decreased in the serum of autistic children as compared to their non-autistic siblings. IgA levels were not significantly different in autism and controls.

Conclusion: These results suggest that autism may be associated with an imbalance of immunoglobulins levels.

Sponsors: This study was supported by the funds from NYS Legislative Grant for Autism Research and NYS Office for Mental Retardation and Developmental Disabilities.

PS1.23

PARENTAL AGE AND MATERNAL ANTIBODIES TO FETAL BRAIN IN AUTISM

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Background: Transfer of maternal autoantibodies to neural antigens may occur in utero in autism. These antibodies may be related to maternal or paternal age.

Objective: To study clinical factors in families and their associations with autoantibodies to fetal brain tissue in maternal serum.

Methods: In mothers of children with autistic disorder (n=107) and controls (n=100), Western immunoblotting was used to identify the number of bands present in maternal serum against human fetal (17 wks gestation) brain regions. Two unidentified protein bands were found at 36kDa and 39kDa, in autism more than control mothers. The group with 36kDa positive was compared against 36kDa negative for maternal and paternal age at the child’s birth, total number of pregnancies before the birth of the index child, and maternal autoimmune disorders. Similar comparisons were performed for those with the 39kDa band.

Results: 48 children had both social and language regression. Of these, 7 were maternal 36kDa positive and 41 negative; 9 were maternal 39kDa positive and 39 negative. Maternal and paternal ages at the birth of the index child were both higher in the 36kDa positives (maternal age mean=36.2, SD=4.7; paternal age mean=35.0, SD=6.7). Notably, the maternal and paternal ages in the 36kDa positives were not only greater, but also clustered in a smaller range than controls.

Conclusion: Older maternal and paternal age at the child’s birth in the 36kDa positives but not in the 39kDa positives suggests that 36kDa may link with more severe forms of regression in autism.

Sponsor: NAAR

PS1.24

CIRCULATING AUTOANTIBODIES AND ANTIVIRAL ANTIBODIES IN AUTISM

Robert S. Fujinami, Jane E. Libbey, Nikki J. Kirkman, Thayne L. Sweeten, Judith N. Miller, Janet E. Lainhart, William M. McMahon, University of Utah School of Medicine

Background: Controversy exists over the role of autoantibodies to central nervous system antigens such as glial fibrillary acidic protein (GFAP) and myelin basic protein (MBP) in the pathogenesis of autism. Similarly, others have reported higher antibody titers against measles virus in children with autism than controls.

Objectives: To investigate the role for autoantibodies and antiviral antibodies in the pathogenesis of autism, we investigated autoantibody titers to GFAP, MBP, as well as antibody titers to measles, mumps and rubella viruses in children with classic onset and regressive onset autism, controls (age- and gender-matched) and individuals with Tourette’s Disorder.

Methods: An enzyme-linked immunosorbent assay was used to detect levels of autoantibodies or antiviral antibodies. Proteins were coated onto 96 well plates and plasma samples from individuals in the four subject groups were tested at various dilutions for reactivity. An avidin-biotin approach was used to monitor the presence of antibodies and optical density measured.

Results: No significant antibody titer differences were found between the control group and the autism groups. We found a significant difference in autoantibody titers to GFAP between the Tourette’s and regressive onset autism groups and a significant difference in autoantibody titers to MBP between both Tourette’s and classic onset autism when compared to regressive onset autism. No significant differences in antibody titers to the viruses were found among the four subject groups. Likewise, there were no significant differences between the four subject groups for total immunoglobulin.

Conclusion: Our data suggests responses against GFAP and MBP as well as measles and mumps are unlikely to play pathogenic roles in autism. Interestingly, we did find a difference in the ability of children with autism to respond to rubella antigens versus controls.

Sponsor: NIH U19 HD/DC 35476

PS1.25

IN VITRO HUMAN IMMUNE RESPONSE TO LOW DOSE MERCURY

Renee M. Gardner, Jennifer F. Nyland, Sean Evans, Ellen K. Silbergeld, Johns Hopkins Bloomberg School of Public Health

There is growing recognition that exposures to both
inorganic and organic mercury (Hg) compounds can affect immune function by interacting with environmental triggers of disease, with potential consequences for host resistance to infections and risks of autoimmune disease. These effects are strongly influenced by genotype. However, there is little information on human responses to low level Hg exposures or the potential role of genetics. For this reason, we are investigating immune function using in vitro exposures to Hg in primary cultures of human peripheral blood mononuclear cells (PBMCs) from healthy adult volunteers. PBMCs were exposed to a concentration of HgCl$_2$ up to 200 nM (which roughly corresponds to a whole blood concentration of 50 µg/L, or the upper range of occupationally exposed or fish eating populations) in the presence and absence of activation by LPS. We found that these concentrations are non-cytotoxic and do not affect cell subsets or markers of cell activation. However, Hg does affect cytokine levels in cell culture supernatants. In PBMCs from both males and females, dose-dependent increases in both TNFs and IL-6 were observed in the presence of LPS. No changes were observed in IFNg, IL-4, IL-5, or IL-13 levels. No changes were seen in any cytokine in the absence of LPS. The results indicate that Hg can exert significant effects on parameters of immune function of human cells in vitro, at exposures that are non-cytotoxic and environmentally relevant. These low level effects of Hg likely reflect changes in signal transduction pathways. We will use these markers in PBMCs in order to characterize differences in in vitro responses among persons with known polymorphisms in key immune response genes and also in a cohort of autistic trios (case, parent, sibling) in order to investigate the possibility that some persons with ASD may have altered responses to Hg related to genetic determinants.

Sponsors: CAN & NIEHS grant #1R21ES014857-01

**PS1.26**

**REDUCED LEVELS OF IMMUNOGLOBULIN IN CHILDREN WITH AUTISM CORRELATES WITH BEHAVIORAL SYMPTOMS**

Lukes Heuer, Paul Ashwood, Irvan Hertz-Picciotto, Robin Hansen, Lisa A. Croen, Isaac N. Pessah, Judy Van de Water, Division of Rheumatology, Allergy and Clinical Immunology, University of California at Davis.

Background: Although autism is diagnosed on the basis of behavioral parameters, several studies have reported immune system abnormalities.

Objectives: To assay plasma immunoglobulin levels in children with autism and typically developing controls as an indicator of immune function, and correlate these levels with severity of behavioral symptoms.

Methods: Plasma was collected from children with autistic disorder (AU, n=170), developmental delay but not autism (DD, n=54), siblings of autism subjects without autism, (n=60) and age-matched typically developing controls (TD, n=208). Samples were then assayed for systemic levels of immunoglobulin (IgG, IgM, IgA, and IgE) by enzyme-linked immunosorbent assay (ELISA). Subjects with AU were evaluated using the ADOS, and ADI-R, and all subjects scored on the Aberrant Behavior Checklist (ABC) by parents.

Numerical scores for each of the three tests were then correlated with Ig levels.

Results: AU children have a significantly reduced level of plasma IgG (6.24±0.31mg/mL) compared to the TD population (8.96±0.37mg/mL; p<0.001), siblings (8.82±0.46mg/mL; p<0.001), and children with DD (8.67±0.76mg/mL; p<0.05). Children with AU also have a reduced level of plasma IgM (0.75±0.047mg/mL) compared to siblings (1.19±0.16mg/mL; p<0.01) and the TD subjects (1.09±0.07mg/mL; p<0.01). When plotted against behavioral outcomes, the levels of IgG negatively correlated with scores on both the ABC and ADOS (p<0.0002 and p=0.01 respectively) while IgM levels negatively correlated only with the ABC score in AU (p=0.01).

Conclusion: Children with autism have reduced levels of plasma IgG and IgM compared to both DD and TD controls suggestive of an underlying defect in immune function. This reduction in specific Ig levels correlates with behavioral severity, where those patients with the highest scores in the behavioral battery have the most reduced levels of IgG and IgM.

Sponsor: NIEHS1P01ES11269-01, U.S. EPA Grant R829388.

**PS1.27**

**SERUM ANTIBRAIN ANTIBODY DIFFERENCES IN MOTHERS OF CHILDREN WITH AUTISTIC DISORDER: A STUDY WITH FETAL HUMAN AND RODENT TISSUE**

Harvey S. Singer, Christina M. Morris, Colin D. Gause, Pam Gillin, Li-Ching Lee, Andrew W. Zimmerman, The Johns Hopkins University

Background: There is accumulating evidence for immune mechanisms in autism. We hypothesize that autism can occur due to the placental transfer of maternal antibodies that interfere with fetal brain development.

Objective: To measure serum antibodies in mothers of children with autistic disorder (MCAD) and compare to age-matched mothers with unaffected children (MUC) using fetal human (17 weeks gestation) and rodent (embryonic day 18) brain tissue as the antigenic substrate.

Methods: Serum antibodies were assayed in 100 MCAD (40+6 yrs; range 27-66 yrs) and 100 MUC (43+5 yrs; range 27-66 yrs) using Western immunoblotting techniques. Medical histories were recorded.

Results: Numerous bands were identified in all individuals against fetal tissues. On analysis of scanned images, immunoblots with fetal human brain showed significant differences at 39kDa; 14 MUCs with this band had a higher average band density than 15 MUCs with the band, as measured by peak height and area under the curve (AUC) (p=0.03 and p=0.05, respectively). Peak height and AUC at 61kDa were also higher in 30 MUCs than 31 MUCs (p=0.03 and p=0.04). Ten percent of MUCs had a band at 36 kDa as compared to only 2% of MUCs (p=0.02). Blots with fetal rodent tissue showed that MCAD had a greater percentage of bands at 73 and 36 kDa. Parent ages at birth of the child with autism were
older in those with bands at 36 kDa.
Conclusions: This study has identified significant
differences in maternal groups based on the presence
of autism in their offspring. Further studies are underway
to determine the specific human antigenic proteins at 61, 39
and 36 kDa and to confirm pathologic effects of maternal
antibodies.
Sponsor: NAAR

PS1.28
SELECTIVE INDUCTION OF BRAIN-DERIVED
NEUROTROPHIC FACTOR (BDNF) SECRETION
BY ASTROCYTES CHALLENGED WITH A TOLL-
LIKE RECEPTOR (TLR) 9 AGONIST: POSSIBLE
LINK BETWEEN PERINATAL INFECTION AND
ELEVATED BDNF LEVELS IN AUTISM
Daryl S. Spinner, Elaine J. Marchi, Daniel J. Kerr, Emily
Babcock, Giuseppe LaFauci, George S. Merz, Richard J.
Kascak, W. Ted Brown, New York State Institute for
Basic Research in Developmental Disabilities
Background: Elevation of the neurotrophic factor BDNF
in serum and glial cell activation in the brain are both
common features of autism. Viral infection during the
perinatal period such as rubella in humans, or influenza
and Borna disease in rodents are also associated with
autism or autism-like neurodevelopmental abnormalities.
Since viral and other infections trigger innate immune
responses by activating members of the Toll-like receptor
(TLR) family (TLR1-13), we investigated whether TLR
ligation increases secretion of autism-associated
neurotrophic factors by glial cells.
Objectives: To determine whether activation of TLR
signaling in microglia and astrocytes influences the
secretion of neurotrophic factors.
Methods: Microglia and astrocytes in culture were
exposed to agonists for TLR2 (bacterial lipopeptide
pam3CSK4), TLR3 (poly(I:C) double-stranded RNA),
TLR4 (lipopolysaccharide), or TLR9 (unmethylated CpG
DNA) at 10 ug/ml for 48 hrs. Levels of BDNF in culture
medium were quantified by a Luminex-based
immunoassay.
Results: BDNF secretion in astrocytes was substantially
increased upon exposure to the TLR9 agonist CpG DNA,
but not following exposure to agonists for TLR2, 3, or 4.
In microglia, however, BDNF remained undetectable
under all experimental conditions. Both astrocytes and
microglia were found to express all TLRs tested (TLR2,
3, 4, and 9).
Conclusions: Activation of TLR9 signaling in astrocytes
specifically upregulates BDNF secretion. These findings
provide links bridging infection, gliosis, and biochemical
features of autism, and thus have significant implications
regarding a role for innate immune activation in the
etiology of autism.
Sponsors: New York State OMRDD, Richmond County
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Association/Stranahan Foundation

PS1.29
BRAIN-SPECIFIC AUTOANTIBODIES IN THE
PLASMA OF PATIENTS WITH AUTISM
SPECTRUM DISORDER
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Hertz-Piccio, Robin Hansen, Lisa A. Croen, Isaac N.
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Background: Although autism spectrum disorder (ASD) is
diagnosed on the basis of behavioral parameters, several
studies have reported immune system abnormalities and
suggest the possible role of autoimmunity in the
pathogenesis of ASD.
Objectives: To analyze the incidence of brain specific
autoantibodies in the plasma of children with autism(AU)
compared to siblings without ASD, typically
developing(TD) controls, and children with other
developmental disabilities, but not autism(DD).
Methods: Plasma from 172 individuals (63 AU, median
age: 43 months; 63 TD controls, median age: 48 months;
25 siblings, median age: 61 months; and 21 DD controls,
median age: 38 months) was analyzed by Western blot for
the presence of IgG antibodies against protein extracts
from specific regions of the human adult brain including
the hypothalamus, thalamus, cerebellum, and cerebral
cortex.
Results: The presence of a ~ 52kD MW band, primarily in
the thalamus (29%) and hypothalamus (30%), in the
plasma of subjects with AU was detected with a
significantly higher incidence when compared with 8%
(p=0.0027) and 11% (p=0.01) in the thalamus and
hypothalamus, respectively, for the TD controls.
Interestingly, 21% of subjects with AU demonstrated
reactivity to a 52kD brain protein from cerebellum while
this band was not seen for any control group (p=0.0001).
Reactivity to three proteins (42-48 kD), most intensively
in the hypothalamus, was noted in 37% of subjects with
AU compared with 13% TD controls (p=0.004). Finally,
based on our data, the 52kD was not directed against
the glial fibrillary acidic protein (GFAP) which has a similar
molecular weight, and to which autoantibodies have been
previously reported for autism.
Conclusion: Multiple brain specific autoantibodies are
present at significantly higher frequency in children with
AU, suggesting a loss of self-tolerance to one or more
neural antigens during early childhood.
Sponsor: NIEHS1P0 ES11269-01, the U.S. EPA (Grant
R829388).

PS1.30
ELEVATED RATIO OF LEVELS OF TUMOR
NECROSIS FACTOR-ALPHA IN
CEREBROSPINAL FLUID VERSUS SERUM IN
AUTISTIC PATIENTS WITH REGRESSION
Michael Gene Chez, Sutter Neuroscience Group, Sutter
Hospital
Background
Recent reports have implicated elevated cytokines in the
central nervous system in a small number of patients
studied with autism and regression. These studies have
not focused on tumor necrosis factor alpha as a possible
marker for inflammatory damage that may play a role in autistic regression or changes in neuronal function.

Methods
A series of ten children with autism had samples of their serum and spinal fluid for inflammatory changes and possible metabolic disease as part of their neurological evaluation during anaesthesia for diagnostic MRI neuroimaging. Tumor necrosis factor-alpha levels were obtained for CSF and serum simultaneously.

Results
Elevation of cerebrospinal fluid levels of tumor necrosis factor alpha was significantly higher (n=104.10 pg/mL) than concurrent serum levels (m=2.78 pg/mL) in all of the patients studied. The ratio of the cerebrospinal fluid levels to serum levels averaged 53.69:1. This is a ratio that is significantly higher than elevations found in other pathological states in the medical literature where cerebrospinal fluid and serum tumor necrosis factor alpha levels have been simultaneously measured. No other routine cerebrospinal fluid markers routinely studied were abnormal in our patients. A single patient tested with Lennox-Gastaut Syndrome did not have this finding.

Conclusion
Elevation of the ratio of tumor necrosis factor-alpha in the cerebrospinal fluid versus the serum suggests this may be a unique isolated inflammatory finding possibly contributing to the pathology of autism. This may allow for early detection in infancy.

PS1.31
ANOMALOUS CONTEXTUAL INTEGRATION IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS: A MAGNETOENCEPHALOGRAPHIC STUDY Sven Braeutigam, Anthony Bailey, University of Oxford
Behavioural studies have pointed to an abnormal semantic organisation in individuals with autism spectrum disorders (ASD), however, very little is known about the neural mechanisms underlying semantic processing in autism.

Objective: To use magnetoencephalography to examine the neural correlates of contextual integration in individuals with ASD. Synchronised gamma-band (20 - 45 Hz) oscillations are used as markers of coordination of neural activity in large-scale semantic networks.

Design/Methods: Whole-head MEG was used to study the neural responses in 11 adults with ASD and 11 adult controls reading meaningful and senseless sentences (e.g., He sent a photo to the trumpet). The participants were asked to perform a simple task to maintain their attention on the sentences. Synchronised gamma-oscillations were characterised using a time- and frequency-dependent measure, which can be viewed as the phase-locked gamma-band equivalent of an evoked response.

Results: Dependent on the sentence condition, gamma-oscillations differed markedly between individuals with ASD and normal controls. Specifically, in individuals with ASD oscillatory activity following meaningful sentences was significantly increased over left anterior cortical areas compared to senseless sentences. By contrast, senseless sentences elicited widespread and sustained 40 Hz oscillations. No such effect was observed in control subjects.

Conclusions: These findings provide evidence for specific, albeit different-from-normal neuronal processes sensitive to sentence context in individuals with ASD. The existence of extended and synchronised gamma-oscillations suggest that autism can not be explained in terms of a general deficit in temporal binding or a deficit in long-range connectivity, as some current models predict.
This work was supported by the Welton Foundation, the Ferguson Trust, The University of Oxford and the Wellcome Trust VIP award scheme.

PS1.32
TOPIC INITIATIONS IN FAMILIAL INTERACTIONS WITH CHILDREN WITH AUTISM SPECTRUM DISORDER Amber L. Deveau, Clare MacMartin, Erinoak

Background: Research has shown that children with Autism Spectrum Disorder (ASD) have difficulty initiating conversations with others due to their communication impairment.

Objectives: This study, supported by the University of Guelph, examined initiation sequences unfolding between children with ASD and their family members during informal conversations.

Methods: The qualitative methodologies of discourse analysis (DA) and conversation analysis (CA) were used to study audiotapes of four videotaped conversations between children with ASD and their parents at home. DA studies the actions and functions performed by discourse and its rhetorical effects. More micro-analytic in focus, CA investigates the orderliness and sequential organization of talk as an unfolding interaction involving two or more speakers.

Results: Parents engaged more frequently in topic initiation than did children, using ‘teaching questions’ to encourage children’s participation in conversation. Children used two types of initiation sequences to introduce new topics into conversation: news announcements and itemized news enquiries (Button & Casey, 1985).

Conclusion: This study identified conversational features related to topic initiations in conversations between children with ASD and their parents. Results are illustrative and not representative of all children with ASD, but still offer insight into the ways that topics can be initiated and maintained, including the important role of parents in scaffolding conversational competence in their children. This study contributes to the burgeoning new literature in CA and DA on the study of populations with identified communication difficulties, as well as suggesting potential resources for interventions to build social communication skills in children with ASD.

Sponsor: University of Guelph General Purpose Research Grant
EMOTIONAL PROSODY IN CHILDREN AND ADOLESCENTS WITH AUTISM  Lisa R. Edelson, Ruth Grossman, Helen Tager-Flusberg, Boston University

Introduction: Individuals with autism are often described anecdotally as having an ‘odd’ quality to their vocal prosody. This study investigates how emotional speech of individuals with autism differs prosodically from that of typically developing peers, using quantifiable acoustic analyses.

Methods: Participants included 33 males (mean age: 14;2; range: 8-19 years); 20 with a diagnosis of autism (ASD) and 13 age- and IQ-matched typically-developing (TD) controls. Participants watched a video of a young man telling four short stories, each containing five distinct emotions: neutral, happiness, fear, anger, and surprise. We digitally recorded the retelling of these stories. Acoustic measurements included pitch (F0), intensity, and rate of speech. Pitch- and intensity range were also calculated. We made qualitative judgments regarding pitch slopes.

Results: The ASD group produced significantly higher pitches and lower intensities with wide ranges of each. The trend for rate of speech neared significance with the ASD group producing fewer syllables per second. Chi-squared analyses showed significant group differences for pitch slope, with the ASD group favoring a downward slope, and the TD group favoring a rising-falling slope. The TD group also used significantly more ‘complex’ slopes involving both rises and falls than did the ASD group; the ASD group produced more ‘flat’ utterances. The greatest group differences for pitch slope and slope complexity were found in the ‘fear’ and ‘anger’ sentences.

Conclusions: The ASD group shows a quantifiably distinct profile for emotional prosody, particularly when emulating fear and anger. This group tends to speak more slowly and in higher, quieter voices, using more ‘canonical’ (i.e., falling for a statement) pitch slopes and producing more ‘flat’ utterances. Those who did vary their intonation did so with significantly larger pitch- and intensity ranges.

Sponsor: NAAR, NIH Grant U19 DC 03610

JOINT ATTENTION AND SOCIAL COMMUNICATION INTERVENTION IN YOUNG CHILDREN WITH AUTISM  Ann M. Mastergeorge, Colby E. Chlebowski, Talsa Patra, Cynthia Zierhut, University of California, Davis/M.I.N.D. Institute

Study Objectives: This study examines joint attention intervention with measures of social communication, eye-tracking gaze shifts and gaze patterns in laboratory visits, and weekly videotaped mother-child intervention interactions over a 16 week period.

Methods: Ten young children diagnosed with autism were selected based on a diagnosis of autism within 6 months of the study onset, with a mean age of 34 months. All subjects participated in four laboratory visits, and 16 weeks of home intervention in designated joint attention and social communication activities. Children were administered the Early Social Communication Scales (ESCS), the MacArthur Communication Development Inventory, and the Mullen Scales of Early Development. Eye-tracking paradigms were developed to examine gaze shifts and gaze patterns in social communication interactions. Mothers also completed daily language diaries, and weekly social communication and joint attention rating scales related to the intervention strategies employed.

Results: Preliminary analyses indicate significant improvements in joint attention and social communication behaviors over the 16 weeks of the intervention. In addition, as joint attention behaviors increase, there are also expected significant positive correlations in gaze pattern shifts.

Conclusions: A targeted joint attention intervention program conducted across 16 weeks in mother-child interactions appears to play a significant role in increasing social communication skills. In addition, utilizing language diaries, and joint attention and social communication indicators to document change in behavioral outcomes is related to changes in gaze patterns as indicated by eye-tracking data. These findings may have important implications for both language development and early intervention.

Acknowledgement: This work was supported by the M.I.N.D. Institute Gift Fund for pilot research projects.

REFERENTIAL COMMUNICATION IN HIGH-FUNCTIONING AUTISM: DECREASED ADAPTATION OF DESCRIPTIONS TO A PARTNER’S VISUAL PERSPECTIVE  Aparna S. Nadig, Sally Ozonoff, University of California, Davis, M.I.N.D. Institute

Background: Social communication impairments are characteristic of autism and cause difficulty in daily life. Objectives: Assess whether children with high functioning autism (HFA) modify their descriptions according to their partner’s perspective in a naturalistic communication task.

Methods: 8- to 16-year-olds with HFA and typically-developing controls matched for verbal IQ participated in a referential communication game. Participants were asked to describe an object from an array of four so their partner could find it. There were 3 conditions: 1) the target object was the only one of its type in a display, therefore describing it with a noun was adequate; 2) the target object appeared with a similar object that contrasted in size(e.g. a big and small cup) visible to both participant and partner, thus additional description was needed; 3) the target object appeared with a contrasting object that was visible to the participant alone, so describing with a noun was sufficient.

Results: Preliminary data from 13 participants with HFA and 8 controls reveal that while controls gave adequate descriptions to their partner in all 3 conditions, HFA participants gave significantly fewer adequate
descriptions in condition 2, where additional distinguishing information was required. Control participants used size adjectives specifically in condition 2, whereas HFA participants used them at similar rates in all conditions. HFA participants gave more extra, task-irrelevant information. Data collection is ongoing (targeted N=20 in each group), and additional analyses will examine individual differences in communication in relation to IQ, working memory, expressive language, and adaptive level.

Conclusion: Individuals with HFA fail to modify their object descriptions to the appropriate level of informativity. Factors that contribute to this behavior may include IQ, expressive language level, adaptive level, and/or working memory ability.

Sponsor: NIDCD

PS1.36
RELATION BETWEEN ATTENTION TO SOCIAL STIMULI AND AUTISM SEVERITY Jane Elizabeth Roberts, Grace T. Baranek, Jennifer Dalton, Megan McLeaster, Linda R Watson, University of North Carolina at Chapel Hill

Background: Children with ASD fail to attend as expected to social stimuli, such as child-directed communication. Also, children with greater preferences for nonspeech over mothers’ speech reportedly show more severe social-communication symptoms.

Objectives: (1) compare boys with ASD to typically developing [TD] boys on measures of attention to nonsocial vs. child-directed communication stimuli; (2) determine the relation between attention to child-directed communication & autism severity in boys with ASD.

Methods: Children with ASD were recruited primarily via the Autism Research Registry at UNC-CH, with the ADI-R & ADOS used to confirm diagnoses. In an experimental session, children viewed brief episodes of nonsocial stimuli (i.e., music video) & child-directed communication (e.g., storybook reading). Videos of the session were coded for looking behavior.

Results: 23 boys with ASD (MCA=34.8 m, range 28 to 42 m) & 29 boys with TD (MCA= 22.9 m, range 7-42 m) participated. Preliminary analyses for children with ASD indicate looking during child-directed communication is related to ADI-R communication symptoms (r=-.61, p=.02, df=14), as well as ADOS social symptoms (r=-.551, p=.03, df=16). In addition, correlations between looking during child-directed communication & ADI-R social symptoms as well as ADOS communication symptoms approached significance (p<.10). Correlations between attention to child-directed communication & restricted & repetitive behaviors were nonsignificant. Comparisons of boys with ASD to boys with TD are in progress.

Conclusion: Findings support the value of early measures of attention to social stimuli as an index of social-communication symptom severity in autism.

Sponsor: NAAR/Autism Speaks

PS1.37
RISK FACTORS FOR LANGUAGE DELAY AT THE AGE OF THREE IN A PREGNANCY COHORT STUDY Synne Schjoelberg, Christine Roth, Ted Reichborn-Kjennerud, Per Magnus, Kari Kveim Lie, Camilla Stoltenberg, Michaeliene Bresnahan, Mady Horning, Ezra Susser, Ian Lipkin, ABC Study Group, Norwegian Institute of Public Health, Dep Mental Health

Background: There is a growing body of research suggesting that children with language delay (LD), and more specific language problems, will have difficulties that persist into later childhood and adolescence. Obstetric complications are related to increased risk for ASD and early LD is a prime feature of ASD.

Objectives: The study evaluates the relationship between obstetric risk factors and LD in a total population pregnancy cohort study, the Norwegian Mother and Child study (MoBa).

Methods: Subjects are recruited into the MoBa study during early pregnancy. Parents complete questionnaires throughout pregnancy as well as when the child is 6, 18 and 36 months of age. LD is determined by questions from the 36 months questionnaire on language competence and syntax complexity. Three groups were established: LD with possible cause; LD without known cause and referred to specialist, LD without known cause and not referred to specialist.

Risk factors are measured by adverse pregnancy outcomes as reported in the Norwegian Medical Birth Registry and by parental questionnaire report of obstetric complications.

Results: By December 2006 12130 mothers had responded to the 36 months questionnaire. 2.7% of the children were reported to have LD and about 50% of these had already been referred to a specialist. Children with multiple problems possibly causing the LD were analysed as a separate group.

Risk factors in these three groups will be compared to controls in the same cohort with no report of developmental problems.

Conclusion: Odds ratios for LD will be reported, controlling for well known confounders like parents socioeconomic status, smoking and alcohol use during pregnancy.

Sponsor: The study is supported by NIH/NINDS (grant no 1 U01 NS047537 for the Autism Birth Cohort Study).

PS1.38
A REVIEW OF RESEARCH ON STIMULUS-STIMULUS PAIRING TO INCREASE VOCAL BEHAVIOR IN CHILDREN WITH AUTISM Richard A. Stock, Pat Mirenda, University of British Columbia

Background: Adult vocalizations to young children are often paired with reinforcers such as food and attention. Applied behavior analytic research has investigated the effectiveness of a stimulus-stimulus pairing procedure in the development of early vocal behavior in children with autism. To date, the results have been inconclusive despite previously successful use of this technique with other populations.
Objectives: To conduct a systematic review of the literature and propose procedural modifications for future research and clinical applications.

Method: Seven studies examining the use of stimulus-stimulus pairing were reviewed. Analyses were conducted with regard to pairing effect; number of pairing trials per session; number of sounds per pairing trial; participants’ age, diagnosis, and pre-intervention imitation skills; and the reinforcer(s) employed during pairing.

Results: Factors related to successful outcomes included use of fewer sounds per trial but more trials per session; and use of social rather than tangible reinforcers. Scant information is available regarding how the social reinforcers were presented in terms of their emotional evocativeness.

Conclusion: Future research should investigate the effectiveness of social reinforcers delivered in an emotionally positive manner during few pairing trials per session with many repetitions per trial. Research on stimulus-stimulus pairing is important for children with autism who fail to develop vocal behavior through standard imitation training.

Sponsor: None

**PS1.39**

**PROPERTIES OF DISCOURSE AND THE LANGUAGE OF CHILDREN WITH AUTISM**

Lauren Dasey Swensen, Letitia Naigles, Deborah Fein, University of Connecticut

Background: Little research has investigated how the discourse between mothers and their autistic children might relate to the child’s language development. ASD children have difficulties with pragmatics, including conversational competence (Dunn & Rapin, 1997). However, mothers of ASD children who engage in more joint attention have children who progress in syntax more quickly (Rosenthal Rollins & Snow, 1998).

Objectives: We investigated whether specifics of the interchanges between mothers and their children with autism predict future language progress in those children, potentially shedding light on why some children make great progress with language while others do not.

Method: Participants are 10 boys with Autism Spectrum Disorder (ASD) participating in a longitudinal study. At Visits 1-4 (33-45 months old) the mother-child dyads participated in 15-minute free play sessions, which were transcribed and coded for discourse type (Ninio & Snow, 1987). Our first analysis compared the interchanges of the two children whose outcomes at visit 4 were the most linguistically divergent (A=better outcome, B=poorer outcome).

Results: The most common type of interchange dealt with negotiating activities (e.g. MOT: Do you want to play with the puzzle?) At visit 2, when child A was 41 months, he engaged in more negotiating interchanges than child B (45 months). Moreover, A’s exchanges included more turns than B’s; A also engaged in pretend play negotiations, while B did not. While A’s standardized scores were already somewhat ahead of B’s at visit 2, they diverged more strongly at visits 3 and 4.

Discussion: These analyses will be extended to the rest of the ASD sample, as well as our typical controls. This pattern of findings suggests that both more and longer negotiating exchanges facilitate ASD children’s language development. Discourse analyses with this population suggest both linguistic and clinical implications.

**NAAR, NIH-DCD**

**PS1.40**

**ANAPHORIC COMPETENCE IN CHILDREN AND ADOLESCENTS WITH HIGH-FUNCTIONING AUTISM SPECTRUM DISORDER**

Yuko Tanaka, Yoko Kamio, RISTEX Japan Science and Technology Agency (JST)

Background: It has been said that individuals with HFASD possess intact language ability, yet they have a trouble with interactive communication. A deficit in pragmatic language is a manifestation of their communicative difficulty.

Objectives: This study examines the competence for the use of anaphoric expressions in HFASD.

Methods: 14 individuals with HFASD (mean age = 22 years; VIQ>90) and 9 TD (mean age = 22 years) controls were assessed on an anaphora task. The task was composed of 40 dialogs. Each dialog included a Japanese demonstrative, Ko-, So-, or A-. In a half of the dialogs the demonstratives referred to the mutual knowledge between the interlocutors (ToM condition), and in the other half they referred to an antecedent in the sentence (non-ToM condition). Of the three demonstratives, only A- can refer to the mutual knowledge. Participants were given a written version of dialogs and were instructed to choose an appropriate demonstrative in the target sentence from among the three alternatives (Ko-, So- and A-).

Results: There were significant differences in the accuracy between the HFASD group and the TD group, indicating that the individuals with HFASD had a difficulty in the use of anaphoric expressions. There was a significant interaction between the participant group and the referent conditions. The HFASD group performed poorly in the ToM condition.

Conclusion: The present study found that the individuals with HFASD have specific difficulty with anaphoric expressions referring to the mutual knowledge.

**PS1.41**

**ENHANCED PICTURE NAMING IN AUTISM**

Matthew Walenski, Stewart H. Mostofsky, Jennifer C. Gidley-Larson, Michael T. Ullman, Department of Psychology, University of California San Diego

Background: Although deficits of language and communication are diagnostic of autism, not all aspects of language appear to be equally affected. Impairments are consistently observed in pragmatics, whereas lexical abilities are generally spared. However, lexical abnormalities in autism might be obscured by normal performance on easier items, such as higher frequency words.

Objective: Examine lexical processing in children with autism using a picture-naming task.
Methods: Subjects named pictures of objects, whose names varied in their frequency of occurrence in English. We tested native English-speaking high-functioning boys with autism (age: 8-14 years; n=21) and age-matched typically-developing control boys (n=26) and control girls (n=27).

Results: Although no group differences in response time were found for higher-frequency names, the groups differed significantly on lower-frequency names: the boys with autism responded faster than control boys, but not faster than control girls, who were themselves faster than control boys. These response-time differences cannot be explained by a speed-accuracy tradeoff, as no group differences were found in accuracy. They are also not explained by potentially confounding variables such as word-length, item-order, age, or IQ, among others.

Conclusion: The sex difference between the control groups is consistent with a female advantage at lexical and declarative memory, which underlies lexical and conceptual knowledge. The lack of a difference between the boys with autism and control girls therefore also implies enhanced declarative memory in autism (at least in certain respects), relative to typically-developing boys. The findings extend to language the view that the ‘disorder’ of autism may constitute not simply a set of deficits, but rather a set of relative strengths and weaknesses within and across domains.

Sponsors: NIH R01MH58189 (MTU); NIH R01NS048527 (SHM); NAAR (MTU, MW, SHM)

PS1.42
VAGAL TONE AS A PREDICTOR OF LANGUAGE & SOCIAL OUTCOMES IN PRESCHOOLERS WITH ASD

Linda R. Watson, Jane E. Roberts, Grace T. Baranek, Twyla Perryman, Kerry C. Mandulak, University of North Carolina at Chapel Hill

Background: Past research has reported lower resting vagal tone (a physiological index of self-regulation) in children with ASD than controls, but has not examined the relation of vagal tone to developmental outcomes in ASD.

Objectives: Examine relation of vagal tone during child-directed communication to language & social outcomes in children with ASD.

Methods: Children with ASD (<42 m of age) were recruited primarily through the Autism Research Registry at UNC-CH. Diagnoses were confirmed with the ADI-R & ADOS. At Time 1, vagal tone was measured during exposure to nonsocial stimuli (a music video) & child-directed communication stimuli. Time 2 assessments were completed after 12 months. Time 1 & Time 2 assessments included the Mullen Scales of Early Learning (MSEL), the MacArthur Communicative Development Inventory (MCDI), the Vineland Adaptive Behavior Scales (VABS), & the Preschool Language Scale.

Results: Longitudinal data were obtained for 15 of 22 eligible participants. The predictive relationships between vagal tone at Time 1 and language & social outcomes at Time 2 were examined via hierarchical linear regression analyses. In preliminary analyses, vagal tone during child-directed communication at Time 1 explained a significant proportion of variance in Time 2 expressive language (MCDI, MSEL) & social adaptive scores (VABS), after accounting for variance explained by the corresponding Time 1 language/social measures & vagal tone during the nonsocial stimuli condition.

Conclusion: Physiological self-regulation during exposure to child-directed communication may be a factor in later language & social outcomes in young children with autism.

Sponsor: NAAR/Autism Speaks

PS1.43
THE SHAPE BIAS: INVESTIGATIONS OF WORD LEARNING IN CHILDREN WITH AUTISM

Saime Tek, Gul Jaffery, Lauren Swensen, Deborah Fein, Letitia Naigles, University of Connecticut

Background: Many children with ASD acquire a sizeable lexicon, and can fast-map novel words; however, they may use word meanings differently from typically developing children (Kelley et al., 2006). How early does this discrepancy emerge? The Shape Bias, in which the referent of a novel noun is mapped onto the shape rather than color, etc. of a novel object, is an index of vocabulary use (Smith, 2000).

Objective: Investigate whether ASD children, even those with a sizeable vocabulary, have difficulty with the shape bias.

Method: 14 typically developing toddlers and 10 children with ASD participated in a longitudinal study; they had been matched on expressive vocabulary at the onset. At visit 2, (mean ages = 25 months (typical), 37 months (ASD)), the shape bias was tested via preferential looking: Six novel objects were presented, each followed by two alternatives; one matched the original in shape while the other matched the original in color. During the baseline test, the audio asked ‘which one looks the same?’ During the word test, the original object was given a label (e.g., ‘dax’) and the audio asked ‘Find another dax.’ Children looking longer at the shape match during the word test than during the baseline test provided evidence for a shape bias.

Results: The typical group looked significantly longer at the shape match during the word test for five of the six items; the ASD group showed no such preference. However, by visit 2 the typical children had larger vocabularies than the ASD children (390 vs. 222 words on the CDI). We are now re-testing the ASD group at visit 3, as their CDI scores (372 words, n = 5) and Mullen scores are more comparable. The ASD children tested thus far still show no word-specific shape bias, whereas the typical group (n = 6) continues to show a shape bias.

Conclusions: These findings support a dissociation between vocabulary size and use in ASD children from the beginning of language development.

NIH-DCD
PS1.44
QUANTITATIVE ANALYSIS OF GRAMMATICAL AND PRAGMATIC PROSODY IN AUTISM SPECTRUM DISORDER Jan P. van Santen, Rhea Paul, Lois M. Black, Emily Tucker, Oregon Health & Science University

Background: Expressive prosody is often compromised in autism spectrum disorders (ASD), but it is unclear how to objectively measure it and which prosodic aspects (grammatical, pragmatic, affective) are affected most.

Objectives: Develop objective measures of expressive prosody and compare children with ASD, developmental language disorders (DLD), and typical development (TD).

Methods: Data collected from 9, 3, and 7 children with ASD, DLD, and TD included diagnostic measures for ASD and DLD, and neurocognitive measures for detailed characterization of the children.

Tasks: (i) Lexical Stress task (repeating a randomized list of 5 two-syllable words each recorded once with initial stress and once with final stress). (ii) Pragmatic Style task (making a statement about a picture [e.g., a ball] using prosody appropriate for addressing a baby vs. an adult).

Analysis: Pitch and energy contours were computed. (i) Stress. Contours for each word pair (e.g., shiNAIG, SHiNAIG) were time-aligned, and differenced (SHiNAIG minus shiNAIG) to produce difference contours. These contours have up-down-up patterns when the correct syllable is stressed. A measure, Stress(p,c,d) [p: word pair, c: child, and d: pitch or energy], was developed to capture this pattern. Positive values indicate the correct stress. (ii) Style. Pitch and energy maxima were computed. A measure, Style(p,c,d), was developed that is positive when these maxima are higher in the baby-directed speech.

Results: Both measures were significantly positive for pitch but not for energy. The DLD group tended to score lower than the ASD group on the Stress measure, with the reverse pattern on the Style measure; the TD group generally had the highest score.

Conclusions: Expressive prosody can be captured with objective measures. Grammatical and pragmatic prosodic skills may be differentially compromised in ASD and DLD.

Sponsor: NIH (1R01DC007129)

PS1.45
PRAGMATIC LANGUAGE IN CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD): RELATIONSHIPS TO STRUCTURAL LANGUAGE AND COGNITION Joanne Volden, Julie White, Jamesie Collican, Susan Byson, University of Alberta

Background: Pragmatic communication impairment (i.e., the functional use of language) is often reported as universally impaired in ASD. However, few studies have systematically investigated how pragmatic language relates to other aspects of language or to indices of cognition.

Objectives: Our goals were to examine the relationship between structural and pragmatic language ability in children with ASD, as well as with standardized measures of cognition.

Method: Participants were 37 children aged 6-13 years, 13 diagnosed with Asperger Syndrome (AS) and 24 diagnosed with autism (AU) based on ADI-R,ADOS and DSM-IV criteria. The children were assessed on the Clinical Evaluation of Language Fundamentals III (CELF-III), a measure of structural language, the Test of Pragmatic Language (TOPL), for pragmatic skills, and the Stanford-Binet (S-B), a measure of cognitive status.

Results: A 2 (between-subjects factor: Diagnostic Group; AS, AU) x 2 (within-subjects factor: Test scores; CELF-III SS, TOPL Language quotient) MANOVA revealed significant main effects for both Diagnostic Group (AS M = 98.1; AU M = 78.7; F (1, 35) = 25.2, p < .001), with no significant interaction. Performance on both the CELF-III and the TOPL was strongly correlated to S-B Verbal scores in each group.

Conclusions: In each group, average performance on the CELF exceeded average performance on the TOPL, suggesting that pragmatic skill generally lags behind structural language performance. While the AS group had higher scores on both tests than the AU group, the pattern of scores was the same in each. It is not surprising that both types of language skill would be strongly related to verbal cognitive status, but preliminary analysis suggests that the relationship between the TOPL and the S-B was weaker than the relationship between the S-B and CELF-III, particularly in the AS group.

Sponsor: NIH-CPEA to Bryson.

PS1.46
IS JOINT ATTENTION NECESSARY FOR WORD LEARNING IN PRESCHOOL CHILDREN WITH AUTISM? Amie Marie Williams, Laura G. Klinger, Jason Scofield, University of Alabama

Background: Joint attention (JA) is believed to be necessary for language development. Recent studies have shown that children with typical development (TD) can learn words without JA. This has implications for language learning in children with autism spectrum disorders (ASD) who have JA delays.

Objectives: Compare word learning in optimal and minimal conditions of JA in children with ASD and children with TD.

Methods: Participants with ASD were recruited from early intervention preschools. Diagnoses were confirmed using the ADOS-G. Language was assessed by the Mullen Scales of Early Learning and JA skills were assessed by the Parent Interview for Autism, Early Social Communication Scales, and the ADOS-G. Participants completed an experimental word learning task in which they were exposed to novel objects paired with novel labels. Two conditions were used; an optimal JA condition and a minimal JA condition (i.e., no joint attention at labeling).

Results: Data were collected on 11 children with ASD (mean age = 52 months, mean receptive language age = 34 months) and 11 children with TD (mean age = 31 months, mean receptive language age = 35 months). Both
groups showed the same pattern of performance across word learning tasks. That is, both groups chose the target object at higher rates when the optimal conditions of JA were present as opposed to the minimal conditions of JA. Interestingly, although they had lower JA abilities, children with ASD showed the same rate of word learning.

Conclusion: Preliminary findings indicate that children with ASD learned words in a similar manner to children with TD despite impairments in JA. This has important implications for early interventions that aim to increase language abilities in children with ASD, and indicates that alternative strategies that do not focus on JA may be beneficial for language development.

Sponsor: University of Alabama Graduate School

PS1.47
GASTRO-INTESTINAL SYMPTOMS AND GUT PERMEABILITY IN PERVERSIVE DEVELOPMENTAL DISORDERS Iris Carcani-Rathwell, Tony Charman, Emily Simonoff, Peter Sullivan, Gillian Baird, Institute of Psychiatry, KCL; Oxleas NHS Trust, UK

Background: Increased rates of gastro-intestinal symptoms (GIS), inconclusively linked to abnormal gut permeability and restrictive diets, have been reported in individuals with PDD.

Objective: Compare the rates of GIS and their correlates in children with PDD to those without.

Methods: As part of a population-based prevalence study of PDD (SNAP), following screening with SCQ, a stratified sample of 9-14 years old children (255) with PDD and those with only special educational needs (no-PDD SEN) was assessed using the ADI and ADOS to establish the PDD diagnosis. IQ was established by a variety of measures. Comprehensive information about their medical histories, presence of GIS and their typical diet was collected through clinical interviews and questionnaires. Gut permeability was indexed by urinary lactulose/manitol ratio using MSMS. Similar data were collected from typically developed children.

Results: 348 subjects in total (105 subjects with broad PDD, 53 with childhood autism, 97 with no-PDD SEN and 93 typically developed children) with a male: female ratio 4:1 were included in the analyses. Current (last three months) and past GIS were grouped into symptoms present, historically present and never present. Presence of GIS in PDD was associated with a lower IQ, perceived hyperactivity and sensation seeking.

Conclusion: Preliminary findings indicate that children with PDD possibly related to diet and IQ with no differences in gut permeability between children with PDD and those without.

Sponsor: The Welcome Trust, DOH

PS1.48
PEPTIDE DIGESTION IN INDIVIDUALS WITH AUTISM Rafail I. Kushak, Furong Xiao, Harland S. Winter, Timothy M. Buie, Massachusetts General Hospital, Pediatric GI/Nutrition

Background: Many of children with autism experience gastrointestinal problems such as diarrhea, constipation, abdominal pain, bloating, food intolerance that may contribute to patients aberrant behaviors. The cause of autism is unknown, but genetic, environmental, immunological, and dietary factors are believed to be relevant. Among dietary factors, significant attention is paid to peptides from casein and gluten that may penetrate the blood-brain barrier and interact with opioid receptors in brain. The critical enzyme in these peptides hydrolysis is dipeptidyl peptidase IV (DPP IV). It is suggested that autistic individuals are DPP IV deficient. Other peptidases also might be decreased.


Methods: We studied 19 children with autism and 14 controls with similar gastrointestinal symptoms undergoing upper gastrointestinal tract endoscopy. In the autistic group were 18 males and 1 female; in the control group were 8 males and 6 females. The average age of patients in both groups was 8 years. DPP IV activity in duodenal biopsies was tested with Bella et al. method and ApN activity was evaluated with a modified Fujita et al. method. Protein level was measured by Bradford method.

Results: There was no significant difference in peptidases activities (umol of hydrolyzed substrate/min/g protein) between autistic and non-autistic individuals.

Patients DPP IV ApN
Controls 16.32±0.96 51.00±2.28
Autistic 17.42±1.16 51.24±3.36

Conclusion: It appears that DPP IV and ApN activities are not affected in the duodenum of children with autism. However, because protein digestion and absorption occurs primarily in the lower jejunum and ileum, and not duodenum, further studies might find changes in peptide digestion in autistic individuals in this region of the small intestine.

Sponsors: NWAF, ARI

PS1.49
SCOTTISH INTERCOLLEGiate GUIDELINES NETWORK (SIGN); GUIDELINE ON AUTISM SPECTRUM DISORDER (ASD) IN CHILDREN AND YOUNG PEOPLE Iain McClure, Acorn Centre, Vale of Leven Hospital

Background: In 2001, the Public Health Institute of Scotland (PHIS) recommended that SIGN develop an evidence-based guideline on ASD.

Objectives: the guideline set out to review all the world literature published in peer-reviewed journals since 1995 on screening, assessment and clinical interventions in
Executive function deficits in processes primarily related to affect regulation is characterized by predominantly cognitive abilities versus neurophysiological models of prefrontal function. A systematic review of the literature was carried out using a search strategy devised by a SIGN Information Officer. Databases searched included Medline, Embase, Cinahl, PsychINFO and the Cochrane Library. For most searches, the year range covered was 1996-2006. Internet searches were carried out on various websites. The main searches were supplemented by material indentified by individual members of the development group.

Results: The guideline was developed during 2004-2006 and was published in February, 2007. It received excellent feedback from national and international peer reviewers, carer’s organisations and the lay public, during its development.

Conclusion: The SIGN guideline on ASD probably represents the most comprehensive and robust survey of the evidence worldwide to date, regarding screening, assessment and clinical interventions in ASD in the 0-18 population.

Sponsor: SIGN is part of NHS Quality Improvement Scotland, publicly funded by the Scottish Executive.

PS1.50
SPECIFICITY IN EXECUTIVE FUNCTIONS IN YOUTH WITH AUTISM SPECTRUM DISORDER
Danielle I. Dyke, Vicki L. Schwean, Donald H. Saklofske, Janine Montgomery, Adam McRimmon, Yvonne Hindes, Keoma Thorne, JoAnne Burt, Candace Kohut, Division of Applied Psychology, University of Calgary

Many investigators have argued that Autism Spectrum disorder (ASD) is best characterized as a disorder of higher cortical neural substrates and associated executive functions (EFs; eg. Minshew & Goldstein, 1993; Ozonoff & Jensen, 1999; Bailey, Philips & Rutter, 1996). While most investigators support the view that the prefrontal cortex (PFC) plays a primary role in EFs, there are differing views regarding which specific regions of the PFC (and related functions) are most highly associated with the behavioural characteristics of individuals with ASD (Dawson et al., 1998; Kleinhans, Akshoomoff & Delis, 2005; Allen & Courchesne, 2003).

Neuropsychological models of PFC functioning have provided insight into dissociations amongst various aspects of executive functions. Consequently, this research involves an examination of the performance of youth with ASD aged 17 to 21 years, from three Canadian provinces, on various psychometric and experimental indices of executive functions for coherence with neuropsychological models of prefrontal function. Specifically, a typology of executive functions characterized by predominantly cognitive abilities versus processes primarily related to affect regulation is explored. Executive function deficits in youth with ASD are expected to correlate more strongly with primarily affective executive functions (associated with orbitofrontal PFC function) than primarily cognitive executive functions (associated with dorsolateral PFC function). Factor and regression analyses were used to test hypotheses surrounding the grouping of executive process by type (either primarily cognitive or affective). An evaluation of the utility of neuropsychological models of executive and associated prefrontal function to guide us towards a more specific behavioural EF profile for youth with ASD is explored.

Sponsor: Alberta Centre for Child, Family & Community Research

PS1.51
THE SPECIFICITY OF EXECUTIVE DYSFUNCTIONS FURTHER EXPLORED: A COMPARISON BETWEEN CHILDREN WITH ASD AND CHILDREN WITH ADHD.
Hilde M. Geurts, Marjolein Luman, Katrien van Meel, Department of Psychonomics, Universiteit van Amsterdam

Background: It has been shown that children with ASD and children with ADHD often encounter executive dysfunctions (ExDys). Direct comparisons between ASD and ADHD revealed striking similarities, although some crucial differences became apparent.

Objective: To disentangle the underlying deficient processes that lead to the observed deficits in cognitive flexibility and inhibitory control in ASD and ADHD.

Method: As for now the participants were 20 boys with ASD, 29 boys with ADHD and 32 typically developing boys matched on age (8 to 13 years). In the first experiment an adjusted Eriksen Flanker task was applied. This inhibitory control task measures the ability to suppress irrelevant information, in a neutral and a motivational situation. In the motivational situation, participants were told that they were competing with peers. In the second experiment an adjusted Intra-dimensional Extra-Dimensional task switching paradigm (ID/ED) was applied. This task measures cognitive flexibility and includes shifts within one dimension (within colour and form: ID) and shifts from one dimension to another dimension (between colour and form: ED). The latter is a more complex shift, which will result in higher switch costs.

Results: Preliminary analysis suggests that especially boys with ADHD were impaired in inhibitory control. All groups benefited from social motivation: The boys were faster and made fewer errors when they were competing with peers. The ID/ED data collection is finished at the end of January.

Conclusion: The findings will be discussed in terms of the ExDys account of ASD and ADHD. However, this will be related to a relatively new model of ADHD that accounts for both the observed ExDys as well as emotional deficits (Sonuga-Barke, 2003; 2005). We will argue that this model can inform us about underlying deviant processes in ASD as well.
PS1.52

MOTIVATION AND SELF-MONITORING AS PREDICTORS OF SYMPTOM SEVERITY IN AUTISM Camilla Marie Hileman, Mark Jaime, Caley Schwartz, Nicole Zakhra, Annie Inge, Nicole Kojkowski, Drew Coman, Heather Henderson, Peter Mundy, University of Miami

Background: EEG asymmetry is used to index individual differences in social motivation, while error-related negativity (ERN), an EEG/ERP measure of error-monitoring, is used to index individual differences in self-monitoring.

Objective: To examine the combined influence of EEG asymmetry and ERN in the prediction of social behavior and symptom severity among HFA children.

Methods: EEG was recorded from 18 scalp sites during a baseline condition and a modified Flanker task. Baseline EEG data were used to calculate asymmetry scores for homologous electrode pairs. For the Flanker task, data were analyzed from the mid-line recording sites, and artifact-free, response-locked EEG trials were averaged for each participant (N =24). Additionally, participants and their parents completed behavioral measures.

Results: Left frontal asymmetry was associated with greater awareness of atypicality, more obsessive/compulsive symptoms, greater social stress, and fear of negative evaluation. Children with larger ERN amplitude at site Cz had lower social impairment scores on the Social Communication Questionnaire (SCQ) (r (23) = 0.46, p < 0.05) yet higher social stress scores on the Behavior Assessment for Children (r (23) = -0.41, p < 0.05). Social symptoms on the SCQ were predicted by the interaction of anterior EEG asymmetry and ERN amplitude (F (1, 21) = 8.13, p < 0.015).

Conclusion: The most significant social impairments in autism may be seen in individuals who withdraw socially, as indicated by right frontal EEG asymmetry, and monitor their own behaviors poorly, as indicated by small amplitude ERN.

Sponsor: NIMH grant 5R01 MH071273; Motivation, Self-Monitoring & Family Process in Autism; PI = Mundy

PS1.53

FACIAL EMOTION PROCESSING ABILITY OF CHILDREN WITH AUTISTIC SPECTRUM DISORDERS: USING MORPHED STIMULI Lam Ling, Institute of Neuropsychology, Department of Psychology, University of Hong Kong

Background: Studies on the facial emotion processing of children with Autistic Spectrum Disorders and their differences with typically developing peers have been a paucity among the Chinese cultures. The current study is a local, indigenous study of its kind to explore the social cognitive impairment of Chinese school-aged children with ASD.

Objectives: Some children with autistic spectrum disorder were found to be able to perform well on prototyped facial emotions. Using morphed stimuli might serve a design to add on the subtly of human emotions and to differentiate children of different levels of abilities.

Methods: 41 children with high-functioning ASD (mean age= 8.527 years; age range= 6.3 years to 11.8 years; IQ mean= 107.367, S.D.= 28.565) and 39 controls (mean age= 9.685 years; age range= 7.1 years to 12.3 years ; IQ mean= 117.429, S.D. = 11.660) were recruited. 2/3 of the participants are males. Participants were diagnosed according to the DSM-IV. Their social adaptive and executive functioning were measured on the Social Responsiveness Scale and the Behavior Rating Inventory of Executive Functioning. The experimental stimuli of the facial emotion recognition task was taken from Matsumoto and Ekman's (1988) ‘Japanese and Caucasian facial expressions of emotions’ (JACFEE). Two sets of 56 morphed stimuli capturing different degree of subtlety of each basic emotions (Neutral + Happy/ Sad/ Angry/ Fear in different degree of combinations) were presented.

Results: Preliminary analyses indicate that the children with ASD make more errors in differentiating facial emotions than normal control. Individuals with autism might do as good as normal subjects in recognizing facial emotion of Happy, but not other emotions. By ANCOVA with subjects’ IQ controlled, the children with ASD performs significantly poorer than controls (t =4.735, p<.000).

Conclusion: Preliminary findings of this study seemed to support previous research findings.

PS1.54

VISUAL SEARCH IN ADOLESCENTS WITH HIGH FUNCTIONING AUTISM: EYE-TRACKING FINDINGS ON VISUAL FIXATION Sandra S. Sanchez, Laurie A. Brenner, Brandon B. Keehn, Sandra P. Marshall, Ralph-Axel Müller, Brain Development Imaging Laboratory, Department of Psychology, San Diego State University

Background: Individuals with Autism Spectrum Disorder (ASD) have been found to perform visual search tasks with greater speed when compared to typically developing (TD) individuals. Though it has been suggested that individuals with ASD have superior visual discrimination abilities, the mechanisms underlying enhanced visual search remain unknown.

Objectives: To examine visual fixation in adolescents with ASD during efficient and inefficient visual search.

Methods: Eye-tracking data were obtained from seven individuals with ASD and eight gender and age- matched TD individuals. Rate of fixation was determined by dividing total number of fixations by RT. The target was an upright letter T and distractors were Ts in different cardinal orientations. Our visual search paradigm varied distracter composition (heterogeneous or homogenous), set size (6, 12, or 24) and target (present or absent).

Results: We found a significant group x target interaction for rate of fixation, F(1, 14) = 29.87, p < .001. Paired t-tests revealed a significant difference between target present and absent factors in the homogeneous distracter condition for the ASD group t(6)=-5.88, p < .05, but not the TD group, t(7)=2.21, p >.05.

Conclusion: Although these findings should be interpreted...
with caution due to the relatively small sample size, they suggest atypical patterns of visual fixation in individuals with high functioning autism. This may reflect different search strategies for individuals with ASD in target absent trials as compared to TD individuals. Previous research has demonstrated that enhanced performance of individuals with ASD is driven by accelerated RT in target absent conditions. Our data suggest that individuals with ASD make fewer fixations in order to determine that a target is not present.

Funding: NIH R01-DC6155

PS1.55

FIXATION BEHAVIOR OF CHILDREN AND ADOLESCENTS WITH AUTISM WHILE VIEWING SOCIAL VIGNETTES Leigh Sepeta, Ting Wang, Mirella Dapretto, Susan Bookheimer, Marian Sigman, University of California, Los Angeles

Objective: To investigate visual processing patterns of social scenes in individuals with Autism Spectrum Disorders (ASD) in comparison to a typically developing (TD) group. We hypothesized that ASD individuals would fixate less on the face region and more on the object and body regions of the scenes than the TD group. Further, we hypothesized that the ASD group’s processing pattern would be more similar to the TD group (i.e., focusing more on the face region) when the scenes contained ambiguous scenarios requiring a careful analysis of the characters’ affect (Ironic Condition), than when the scenes did not necessarily require such a careful analysis (Control Condition).

Methods: A group of high-functioning individuals with ASD (n=20; age 8-19) was compared to a matched TD group (n=17) as they viewed cartoon drawings of children in social scenes in two different vignette conditions. In the Ironic condition, some of the scenes ended with an undesirable outcome and a final remark uttered in an ironic tone of voice; in the Control condition, all of the scenes ended with a straightforward outcome and final remark. Following each final remark, participants decided whether the speaker meant what was said. Using an eye-tracking device, fixation times for the face, body and object regions, were compared between groups.

Results: Preliminary results indicate that contrary to the original hypothesis, individuals with ASD show fairly typical visual processing of social scenes overall and for both Ironic and Control conditions, with no between-group differences in fixation time for the face, body and object regions.

Conclusion: These findings suggest that the ASD group may display more typical processing patterns of social scenes overall when the task explicitly requires one to determine the meaning of the scene.

Sponsors: NICHD (P01 HD035470), NAAR

PS1.56

CONTROLLED AND AUTOMATIC INFORMATION PROCESSING IN NON-RETARDED ADULTS WITH AUTISM SPECTRUM DISORDERS Hans Bogte, Bert Flamme, Jaapvan Der Meere, Herman van Engeland, Adhesie

The ability to shift from controlled, effortful information processing towards automatic processing was studied in non-retarded adults with Autism Spectrum Disorders (ASD). For this purpose a computerized memory recognition reaction time task with two levels of mental load (difficulty, related to the number of items) was used. During controlled processing the mental load factor has a considerable effect on the mean reaction time (RT): the higher the mental load, the longer the mean RT. However, when information processing becomes automatic as a result of practice, the effect of load on RT decreases. The group of participants with ASD appeared to shift from controlled towards automatic information processing as a consequence of practice. However, in spite of this, their information processing strategy remained relatively controlled and thus slow and effortful, as compared to the information processing strategy of the control group. Possible consequences of this deficiency in automatization are discussed.

PS1.57

PSYCHOTROPIC MEDICATION USE BY CHILDREN WITH AUTISM IN A LARGE HMO IN CALIFORNIA Maria Pilar Bernal, Kaiser Permanente Santa Teresa Medical Center, Department of Psychiatry

Background: There is a dearth of empirical information on use of psychotropic medications in community samples of children with ASD.

Objectives: To examine the use of psychotropic medications in a large community sample of children with ASD and compare it to use by children with other mental health disorders (MHD).

Methods: The study population was comprised of children between the ages of 2-18 who were members of Kaiser Permanente (KP) in Northern California from July 2003-June 2004. All children with a diagnosis of ASD (N=3,053) and a random sample of children with MHD other than ASD (N=1,876) were included. Among the ASD group, 33% had other MHD diagnoses (ASD+MHD, N=996). Psychotropic medication use was based on prescriptions dispensed at a KP pharmacy in the study year. Use by children with ASD+MHD, ASD only, and other MHD only was compared.

Results: Approximately 43% of children with ASD were prescribed psychotropic medications. The most commonly prescribed medications were antidepressants (21%), antipsychotics (15%), and miscellaneous psychotherapeutic agents (15%). Children with ASD+MHD had significantly higher use of any agent (84%) compared to children with ASD only (24%) and children with other MHD only (54%), especially of antidepressants (44% vs. 9% vs. 23%), antipsychotics (29% vs. 8% vs. 5%), antiadrenergics (14% vs. 4% vs. 4%), anticonvulsants (17% vs. 5% vs. 5%), and anti-
anxiety agents (8% vs. 3% vs. 3%). Within each drug category, children with ASD+MHD received more prescriptions than children with other MHD only. Conclusion: A significant percentage of children with ASD receive prescriptions for psychotropic medications. The presence of other mental health disorders in children with ASD significantly increases the likelihood that psychotropic medications are prescribed. Research is needed to test the effectiveness of these agents in the ASD population.

Sponsor: Kaiser Foundation Research Institute

PS1.58
DIAGNOSIS OF ASD IN TWO YEAR OLDS: A STUDY OF COMMUNITY PRACTICE Natacha Akshoomoff, Christina M. Corsello, Aubyn C. Stahmer, Radmilla West, Meghan Lukasik, University of California, San Diego

Background: Recent longitudinal studies have demonstrated that children as young as two years of age can be reliably diagnosed with ASD, and children diagnosed with PDD-NOS at two are more likely to be diagnosed at follow-up with PDD-NOS or autistic disorder (AD) than nonspectrum. Objectives: To examine the ASD diagnostic practices in a community clinic.

Methods: Clinical reports were examined for over 100 children between 24 and 36 months of age given an ASD diagnosis in the Developmental Evaluation Clinic at Rady Children's Hospital over a two-year period.

Results: Sixty percent of the two-year-olds were given a diagnosis of PDD-NOS while 30% were given a diagnosis of AD. A diagnosis of AD was more likely when the ADOS was used and the scores fell above the autism cutoff. Among the children who came back to the clinic for a follow-up evaluation, a diagnosis of AD was twice as likely at follow-up than at the time of the initial visits.

Conclusion: A smaller proportion of two-year-olds referred for possible autism were given a diagnosis of AD in this community sample compared with published samples from autism specialty clinics or longitudinal research studies. Possible explanatory factors include greater heterogeneity of patients, more conservative diagnostic practices, and less frequent use of more accurate parent questionnaires/interviews and observation tools. In California, early intervention services are available to children under 36 months with a diagnosis of PDD-NOS as well as AD, which may also help to account for more frequent use of the PDD-NOS label.

Sponsor: NIMH K23MH071796

PS1.59
PREDICTORS OF PSYCHIATRIC HOSPITALIZATION AMONG CHILDREN WITH ASD David S Mandell, University of Pennsylvania School of Medicine

Background: Psychiatric hospitalization represents a restrictive and expensive intervention. While some children may benefit, in many cases it may represent a failure of the service system. Understanding factors associated with hospitalization may improve our ability to intervene to keep children in their communities.

Objective: to examine the frequency and correlates of psychiatric hospitalization among children with ASD.

Methods: 760 caregivers of children with ASD in Pennsylvania were surveyed. Bivariate differences between hospitalized and nonhospitalized children on all variables of interest were examined. Cox proportional hazard models were used to examine factors associated with hospitalization.

Results: Hospitalized youth were, on average, older, more likely to be African American, and more likely to be adopted than nonhospitalized youth. They were more likely to display self-injurious or aggressive behaviors and less likely to display stereotypies, and more likely to have been diagnosed with a variety of other psychiatric disorders. Caregivers of hospitalized youth were less likely to be married, had lower incomes and less education. Hospitalized children were diagnosed 1.6 years later, on average, than nonhospitalized children, although there was no reported difference in age of first concern. In adjusted analyses, each year of age was associated with a decrease in hospitalization risk (odds ratio [OR]=0.81). Youth in single parent homes were more likely to be hospitalized (OR=2.54). Engaging in self-injurious behavior (OR = 2.14), aggressive behavior (OR=4.83), being diagnosed with depression (OR=2.48) or obsessive compulsive disorder (OR=2.35), or taking psychotropic medications (OR=2.08) increased the odds of hospitalization.

Conclusion: Factors other than clinical presentation are important in predicting hospitalization. Interventions should be developed to help families with fewer resources keep their children at home.

PS1.60
IMPROVING ACCESS TO SERVICES FOR CHILDREN WITH ASD Patty Manning-Courtney, Donna Murray, Carolyn Luzader, Cincinnati Children's Hospital Medical Center

Background: Children with ASD benefit from early, intensive intervention. The increasing numbers of children diagnosed with ASD are stressing already overwhelmed treatment systems. Children with ASD may wait months for needed treatment. The Kelly O’Leary Center for Autism Spectrum Disorders (TKOC) was chosen to participate in a chronic care process improvement initiative, funded by a Robert Wood Johnson Pursuing Perfection grant awarded to Cincinnati Children’s Hospital Medical Center, to address improving access to autism treatment.

Objective: Improve access to autism treatment at a hospital-based, multidisciplinary diagnostic and treatment program using quality improvement science.

Design/Methods: Numbers of children undergoing treatment at TKOC were tracked monthly, with a goal of increasing the total number of children accessing services at TKOC by 25% over 12 months, utilizing the same FTE staffing. Treatment programs were re-designed to be more ‘scalable,’ and to decrease the number of children being
maintained in ‘traditional’, weekly therapy models, thus allowing for increased access to children not previously treated at TKOC. New treatment models were implemented to allow children to move more dynamically through various treatment models (individual and group). Results: Numbers of children treated at TKOC increased 26.5% from June 2005-June 2006 (from 178 to 225) with the same FTE status. Between June and Dec. 2006 a further increase of 38.5 % (225 to 312) has occurred. Conclusions: Access to autism treatment can be improved through quality improvement science techniques. The increased demand for, and potential benefit of early, intensive autism treatment necessitates research in autism treatment outcomes, as well as in the systems delivering these treatments to improve access to the growing number of children diagnosed with ASD.

**PS1.61**
**PRESCHOOL SLEEP PATTERNS** Beth Goodlin-Jones, Karen Tang, Stephanie Sitnick, Sara Waters, Thomas Anders, M.I.N.D. Institute, Dept. of Psychiatry, UCDHS

Introduction: This project describes sleep in preschool (2-5 years) children with autism (Aut), developmental delay (DD), or with typical development (Typ) from objective measures (actigraphy, videomorphography) and parent diaries and questionnaires. The goal is to objectively describe sleep disorders in children with neurodevelopmental disorders and to measure daytime impairment in sleep disordered children.

Methods: Children (n=186) were assessed for one week and then followed for two more observations for six-months. These results pertain to the first week. Children wore the actigraphy for one week, completed daytime functioning assessments, and a subset had two nights of videotaping. Parent diaries and questionnaires and Teacher questionnaires were collected.

Results: At consent, 39% of families reported a child sleep problem. The 24-hour total sleep duration averaged 9 hours, 19 min (range 6.8 hrs to 11 hrs). For nighttime sleep duration, DD exhibited shorter sleep periods than Typ and Aut were intermediate (F 2,180 = 4.1, p<.05). Once in bed DD spent significantly more time awake (13.7%) than Aut (10.2%) (F 2,180 = 4.26, p <.05). The average sleep onset latency at the beginning of the night was 38 minutes (sd =26.3). For night waking, (overall 15%), DD (33%) have greater percentage of night waking problems than Aut or Typ. DD averaged 3.85 wakings as measured by actigraphy however all parents (Aut, DD, Typ) reported, on average, under one waking per night (average=.50/night). There were significant associations on a PEP-R battery and hand-eye coordination task with sleep duration and Teacher report for children with Aut only.

Conclusions: Children with DD have greater difficulty with night waking and sleep duration than children with Aut or Typ. However, children with Aut may be impacted when they experience sleep problems. The stability of these findings over three months will be addressed.

Funding: NIH (RO1 MH068232) (TFA)

**PS1.62**
**SLEEP BEHAVIORS AND SLEEP QUALITY IN CHILDREN WITH AUTISTIC SPECTRUM DISORDERS** Margaret Cooney Souders, University of Pennsylvania

Background: Children with Autistic Spectrum Disorders (ASD) are at increased risk for sleep disturbances. Core deficits of ASD and their underlying neurophysiology may predispose children to intrinsic and extrinsic stressors that threaten sleep. Poor sleep in children can alter learning, attention and performance and adversely affect sleep quality in parents. Approximately 75% of parents report a sleep disturbance with their child with ASD.

Objectives: Describe the sleep behaviors and sleep quality in a cohort of children with ASD, ages 4-10, (24 Autism, 24 PDD-NOS and 24 Asperger Disorder) as compared to 72 typical controls.

Methods: Cases were randomly recruited from the Regional Autism Center (RAC) at The Children’s Hospital of Philadelphia. RAC cares for over 2000 children with ASD, approximately 50% of the school age children with ASD in the state of Pennsylvania. By selecting a random sample, the prevalence of sleep disturbances can be estimated. Case diagnosis was confirmed with the DSM-IV-TR, ADOS-G or ASDS. Controls were screened with the SCQ. Sleep behaviors and quality are described utilizing a questionnaire, CSHQ, sleep diaries and 10 nights of actigraphy. Actigraphic data is being translated into sleep measures with an Actigraphic Scoring Analysis program.

Results: Data has been collected on 19 cases (mean age of 6.8) and 24 controls (mean age of 7.3). 60% of children with ASD are taking a medication to aid sleep. Preliminary analyses shows that cases have poorer sleep efficiency, more frequent night arousals, greater sleep latency and shorter total sleep time then controls despite receiving a sleep aid. Cases have greater sleep anxiety, parasomnias and daytime sleepiness.

Conclusion: Strong descriptive epidemiological data on a well described ASD group compared to controls utilizing standardized measures of sleep behaviors and quality will provide a foundation for future studies of etiology and intervention.

**PS1.63**
**CHARACTERIZATION OF SLEEP PROBLEMS IN CHILDREN WITH AUTISM: RESULTS FROM THE CHILDHOOD SLEEP HABITS QUESTIONNAIRE** Diane Treadwell-Deering, Daniel G. Glaze, Amy Malphrus, Anne Porter, Baylor College of Medicine

Background: There is evidence that the incidence of problem sleep is elevated among children with ASD. However, better characterization of the frequency and type of sleep problems, as well as identification of possible associated factors, is needed.

Objectives: The primary aim of this study is to identify the prevalence of sleep problems among a well-
characterized group of children with ASD. A secondary objective is to identify factors that may be associated with sleep problems in this population.

Methods: Parents of patients evaluated in the Clinic for Autism Spectrum Disorders at Texas Children’s Hospital completed the Childhood Sleep Habits Questionnaire (CSHQ), a validated instrument extensively used to evaluate sleep in diverse populations, as part of a comprehensive multidisciplinary assessment. Data were retrospectively collected from the medical record and analyzed for prevalence and correlates of sleep problems.

Results: Data were collected on 138 patients, 99 with autism or ASD and 39 with other developmental disorders. Overall, composite scores exceeded the reported CSHQ cutoff of 41. Composite scores did not differ significantly between children with ASD and non-ASD, developmentally disordered children. Elevated subscale scores in bedtime resistance, sleep anxiety and daytime sleepiness appeared to contribute substantially to the elevated composite scores. In children with ASD, neither gender nor IQ was associated with increased sleep problems; however, higher educational attainment of the parents was associated with decreased sleep problems.

Conclusion: Preliminary analyses revealed increased sleep problems in children with ASD and other developmental disorders relative to community populations. Neither the magnitude nor pattern of sleep problems was unique to ASD children when compared to non-ASD, developmentally disordered children. Additional analyses to further elicit the character of these sleep problems will be conducted.

PS1.64
POLYSOMNOGRAPHIC ABNORMALITIES IN YOUNG CHILDREN WITH AUTISM
Ashuraw Buckley, Sarah J. Spence, Sadata Shamim, Susumu Sato, Audrey Thurm, Susan E. Swedo, National Institute of Mental Health

Background: Sleep disturbance in autistic children, as documented by parental report, is a major concern for parents and clinicians. Overnight polysomnography (PSG) is a valuable way to explore sleep abnormalities. The few studies that have examined (PSG) in the ASD population have done so in older children.

Objectives: Analyze the sleep architecture with PSG in preschool aged autistic children for deviation from normal pediatric standards.

Methods: Children (ages 2-6) who met research criteria for autism (or a provisional diagnosis because of young age) had a modified PSG as part of an ongoing large phenomenological study investigating clinical subtypes of ASD. Children were admitted overnight for modified PSG and continuous EEG. Sleep history was obtained via Children’s Sleep Habits Questionnaire.

Results: Preliminary data are reported here. Of the first 6 subjects, 5 showed definite abnormalities in sleep architecture. Four children had an abnormally low percentage of REM sleep and the remaining two fell in the low normal range. Four of the six children were greater than two standard deviations above the mean for latency to REM sleep and two of these were outside the normal range. Three children met criteria for periodic limb movements of sleep (PLMS).

Conclusion: Compared to published normative sleep data, our population of autistic children exhibited abnormalities in REM (duration and latency) and PLMS in surprising numbers. The current sample size is too small to correlate with behavioral results and additional subjects are being recruited. This ongoing study affords the unique opportunity to look at the relationship between sleep architecture and various areas of observed behavioral abnormalities in this very young cohort of autistic children. Relationships between sleep architecture abnormalities and IQ, social and communication deficits, and medication effects will be explored.

Sponsor: NIMH-IRP

PS1.65
MERCURY LEVELS IN CHILDREN WITH PDD AND THEIR MOTHERS: A CASE-CONTROL STUDY
Eric Fombonne, Rita Zakarian, Mary Tsonis, Eric Dewailly, Montreal Children’s Hospital

Study Objectives: Concerns have been raised about mercury exposure as a potential cause for autism. The study was undertaken to compare levels of mercury in biological tissues of preschoolers recently diagnosed with autism and of their mothers to those of pediatric controls.

Methods: 71 patients with PDD were recruited from the Autism Spectrum Disorders Clinic of the Montreal Children’s Hospital and were assessed with the ADI, the ADOS-G, IQ tests and the Vineland Adaptive Behavior Scales. 77 children attending pediatric clinics of the same hospital were recruited and matched to the cases for age and gender. Blood, hair, and toenail specimens were collected from all children and their mothers. Specimen were analyzed with inductively coupled plasma mass spectroscopy (ICPMS).

Results: Children with PDD (mean age: 4.1 years; 88% male) did not differ from pediatric controls with respect to blood, hair and toenail levels of mercury. Similarly, maternal levels of mercury were comparable in cases and controls. Furthermore, mean mercury levels of children with PDD were comparable to published population norms. Further analyses showed that, within the PDD group, no relationship was found between mercury levels and severity of autistic symptomatology, level of functioning and the presence/absence of regression.

Conclusion: There is no evidence that children with PDD have elevated levels of mercury or that they have deficiencies in mercury excretion. The findings do not support the use of chelation therapies as a treatment of autism.

Sponsor: Fonds de la recherche en santé du Québec (FRSQ-MSSS)
PS2.1 NEURAL CORRELATES OF IMPLICIT MENTALIZING IN AUTISM SPECTRUM DISORDERS: FUNCTIONAL MRI STUDY Michael Assaf, Matthew Johnson, Robert Schultz, Talma Hendler, Robert Sahl, Vince Calhoun, Godfrey Pearlson, Olin Neuropsychiatry Research Center, Institute of Living/Hartford Hospital and Yale University

Background: Autism Spectrum Disorders (ASD) share a common core deficit in social skills. One influential cognitive theory proposed to explain this impairment is ‘mind-blindness’, i.e. deficiency in the ability to attribute states of mind (including emotions, desires and goals) to other people. This process, also known as Theory-of-Mind (ToM), or Mentalization, is a crucial component of social behavior allowing prediction and interpretation of others’ behavior and consequent adjustment of one’s own. However, only preliminary neuroimaging studies have investigated the faulty neural mechanism associated with impaired implicit ‘on-line’ ToM in ASD patients.

Objectives: To compare brain activations of ASD patients to matched healthy controls during implicit ‘on-line’ mentalizing, and to investigate the relationship between ASD brain abnormalities during a ToM task and the severity of patients’ social dysfunction.

Methods: Using fMRI, we evaluated 15 high-functioning ASD patients and 15 matched healthy controls with an innovative social, competitive ‘Domino’ task. To win the Domino game, players occasionally have to choose to bluff their opponent, and risk being caught and punished. When playing fairly, players are rewarded if challenged by the opponent. Thus, players find it advantageous to try to predict their opponent’s moves (i.e. ‘on-line’ ToM).

Results: Preliminary results show that ASD patients despite understanding the rules and winning some games, under-activated the mentalization network (including medial prefrontal cortex, temporoparietal junction and temporal pole). Moreover, patients’ activations in this network correlated with their social impairment severity as measured by the Autism Diagnostic Observation Schedule (ADOS) social subscale.

Conclusions: These results suggest that abnormal neural activation in the mentalization network underlie the social impairments in ASD.

Sponsors: NAAR and Hartford Hospital

PS2.2 WHO IN A SUSCEPTIBLE FAMILY DEVELOPS AUTISM? A QUESTION OF FUNCTIONAL CONNECTIVITY Matthew Kenneth Belmonte, Marie Gomot, Simon Baron-Cohen, Cornell University

Background: In terms of specific psychophysical and physiological measures, family members with and without autism spectrum conditions (ASC) seem often to differ more by degree than by kind. How is it, then, that some in these families develop ASC whilst others do not? Objectives: To compare behaviour and neurophysiology in affected and “unaffected” ASC family members and unrelated controls during a visual divided-attention task.

Methods: 8 10-to-15-year-old boys with ASC were diagnosed by ADI-R, screened by Autism Spectrum Quotient (AQ), and matched by age and IQ to groups of 7 ASC sibs and 9 unrelated controls. Subjects responded to a spatially disjoint conjunction of colour and orientation in sine-wave gratings presented for 167ms with spatially intervening distractors. For trials with correct responses, brain activation as a function of distractor congruence was contrasted between groups by whole-brain statistical parametric mapping, and by functional correlation amongst 38 bilateral regions of interest.

Results: Behaviourally, sibs’ accuracy lay between ASC and controls (p=0.015). Physiologically, both ASC and sibs manifested delayed and prolonged fronto-cerebellar activations to incongruent distractors (corrected p<0.05), but only the ASC group manifested an overall decrease in functional correlation (p<0.00001).

Conclusion: Whereas atypical frontal activation may reflect familial susceptibility in general, low functional connectivity may more directly index differences in developmental outcome - either as a cause, or as a consequence or reflection of autistic cognitive development.

Sponsors: Cure Autism Now, MRC

PS2.3 NEUROFUNCTIONAL CORRELATES OF VISUAL SEARCH IN ADOLESCENTS WITH HIGH-FUNCTIONING AUTISM Laurie A. Brenner, Molly M. Davies, Brandon M. Keelh, Erica D. Palmer, Ralph-Axel Müller, Brain Development Imaging Lab, Department of Psychology, San Diego State University

Background: Visual search has been identified by previous studies as an area of relative strength for individuals with Autism Spectrum Disorder (ASD). Neurophysiological bases remain largely unknown, although one study (Manjaly et al., 2004) suggested unusual cerebellar activity in ASD during visual search.

Objective: We hypothesized that adolescents with ASD rely on a different neurofunctional network for visual search than typical adolescents, focusing specifically on the cerebellum.

Methods: Our current sample includes five male adolescents with high-functioning autism (mean age 16
years) and six typically developing (TD) adolescents matched on chronological age, handedness, gender and performance IQ. The task was a visual search paradigm developed specifically for event-related functional Magnetic Resonance Imaging (fMRI). Search difficulty was manipulated by varying set size (6, 12 or 24 items), distractor composition (heterogeneous or homogeneous) and presence/absence of target. Functional MRI data acquired on a 3T GE scanner were preprocessed in AFNI and effects of trial types were examined by general linear tests.

Results: Data for two ASD participants and one TD participant were severely affected by head motion. Artifact in functional runs for these participants rendered the data unfit for group analysis. First-level analyses at the individual level showed consistent cerebellar activity in ASD participants but not in TD participants.

Conclusions: If confirmed by additional data and higher-level analysis of group statistical maps, the results described here suggest that individuals with ASD are more likely than TD individuals to rely on the cerebellum during visual search.

Supported by NIH RO1-DC006155

PS2.4
BISENSORY FACILITATION IN AUTISTIC ADOLESCENTS Christine M. Brown, Emily L. Grenesko, Laurie A. Brenner, Ralph-Axel Mueller, San Diego State University

Background: Evidence of reduced long-distance connectivity in autism may suggest impaired crossmodal sensory integration, but relevant evidence remains inconclusive. We applied an auditory-visual paradigm - known to yield bisensory facilitation effects in typical adults - to adolescents with autism in a behavioral and fMRI study.

Objective: We hypothesized that bisensory facilitation would be reduced in autism.

Methods: The ongoing study currently includes 5 male autistic participants (ages 14-18 years) and 6 matched controls. Participants pressed one of two buttons (up, down) in response to three stimulus types: Auditory (a high or low tone), Visual (a dot presented in a top or bottom square) or Bisensory (simultaneous presentation of both). Stimuli were presented in two different conditions: a Repetitive Task consisting of the repeated presentation of each stimulus type in separate runs; and a Modality Switching Task with randomly alternating stimulus types.

Results: As expected, the control group showed significant bisensory facilitation effects (i.e., reduced RTs) for both the Repetitive and Modality Switching tasks. Although RTs tended to be lower for bisensory compared to unimodal trials in the autism group as well, this difference was not significant (and especially modest for the Modality Switching task).

Conclusion: Current findings suggest reduced, but not absent, bisensory facilitation effects in autism. Our ongoing fMRI study in an extended sample will aim to corroborate this behavioral finding and investigate its neurofunctional correlates.

PS2.5
AN FMRI- STUDY OF LOCAL-GLOBAL PROCESSING IN AUTISM: ALTERED EARLY VISUAL PROCESSING OF THE BLOCK DESIGN TEST Sven Bölte, Daniela Hubl, Thomas Dierks, Fritz Poustka, Dept. of Child and Adolescent Psychiatry, J.W. Goethe-University

Background: Autism has been associated with altered visual local-global processing. Originally, the notion is based on the observation of superior performance of subjects with autism on the visuo-spatial Block Design Test (BDT) from the Wechsler Intelligence Scales.

Objectives: To establish the neurofunctional correlates of the BDT.

Methods: Functional MRI was used to analyze hemodynamic responses in the striate and extrastriate visual cortex during BDT performance and a color counting control task in seven subjects with autism and seven healthy controls.

Results: Processing of the BDT in autism was accompanied by significantly lower blood oxygenation level-dependent signal change in the right ventral quadrant of V2. Findings indicate an altered functional architecture of the BDT in early areas of the right ventral stream of the visual cortex in autism.

Conclusion: Unypical local-global strategies may appear early in the visual system of individuals with autism, with bottom-up processing being less affected by top-down mechanisms, such as attention and working memory.

PS2.6
EXPLORING THE STRUCTURE AND FUNCTION OF THE AMYGDALA IN CHILDREN WITH AUTISM Blythe Anne Corbett, Vanessa Carmean, Cameron Carter, University of California, Davis

Background: The human amygdala plays an essential role in the processing of affect, responding to novelty, and has been implicated in the neuropathology of autism based on converging evidence from neuropathology, lesion, structural MRI, and functional MRI (fMRI) studies.

Objective: Structural and functional MRI were collected using established probes of amygdala function.

Methods: Participants included 31 children between 7 to 12-years of age with high functioning autism (N=14) and typical development (N=17). The first experiment consisted of a block design with alternating blocks of rapidly presented (200 ms) fearful faces, neutral faces, and fixation trials. The second experiment involved explicit matching of facial expressions, people and objects. In addition, volumetric analysis of the amygdala was conducted using an established protocol by raters blind to diagnosis.

Results: The results of the fMRI studies demonstrated that typically developing children showed activation of the right amygdala (p<.005) to rapidly presented fear faces and left amygdala activation (p<.01) on an emotion matching task. In contrast, the children with autism showed relative deactivation of the anterior medial
temporal lobe in the region of the amygdala. There were no observed differences in the volume of the amygdala bilaterally across the groups.

Conclusion: These findings support previous research showing abnormalities in amygdala function in individuals with autism. Analyses involving the level of processing of affective stimuli and other regions of interest will be discussed. Further, volumetric analyses of the amygdala will be presented in relationship to laterality effects, the functional data, age and social functioning of the children with autism.

Funding: NIH

**PS2.7**

**ATYPICAL BRAIN ACTIVATION DURING NOVELTY DETECTION CORRELATES WITH NUMBER OF AUTISTIC TRAITS**

Marie Gomot, Matthew K. Belmonte, Edward T. Bullmore, Simon Baron-Cohen, INSERM - ARC

Background: Although repetitive and restricted behaviour and interests in autism are diagnostically essential, they have received little research attention. We hypothesise that resistance to change in autism may be related to unusual processing of infrequent, novel stimuli.

Objectives: Examine the brain basis of auditory novelty detection in autism spectrum conditions (ASC) using fMRI, and correlate with incidence of autistic behavioural traits.

Methods: Participants were 12 10-to-15-year-old boys with ASC diagnosed by ADI-R, and a group of 12 age- and IQ-matched typical controls. All completed the AQ (Autism Spectrum Quotient).

Results: The ASC group responded faster to novel target stimuli. Group differences in brain activity mainly involved the right prefrontal region, which was more activated in the ASC group than in controls. Results also showed significantly higher activity in the left inferior parietal region in the ASC group. Activation of prefrontal regions during target detection was positively correlated with AQ scores.

Conclusion: Target detection in autism is associated not only with superior behavioural performance, but also with activation of a more widespread network of brain regions. This pattern also shows quantitative variation with number of autistic traits, even among controls. This finding might contribute to a better understanding of the neurophysiological processes underlying narrow interests and ‘need for sameness.’

Sponsors: FRM, France Télécom, MRC

**PS2.8**

**AMYGDALA RESPONSE TO BACKWARD MASKED EMOTION IN AUTISM**

Geoffrey B Hall, Dianne C West, Jeremy Goldberg, Krissy A.R. Doyle, Peter Szatmari, McMaster University, Department of Psychiatry and Behavioural Neurosciences

Objective: To examine amygdala activation induced by subconscious presentation of negative face stimuli in high functioning adult males with autism.

Background: Subconscious presentation of negative face stimuli to typically developed adults increases neural activity in the amygdala (Morris et al., 1998). However, Hall et al. (in press) have found that the social decisions of children with autism are less influenced by subconscious presentation of negative face stimuli, than controls. As such, it is suggested that information normally available at the amygdala through subcortical routes is reduced in autism.

Methods: 10 high functioning males with autism and matched male controls participated. Stimuli were presented to the participants in the MRI scanner via an overhead visor, with responses made via a hand-held response pad. Functional BOLD imaging was done using an interleaved echo-planar imaging sequence with TR=2700ms, TE=35ms.

Backward Mask Stimuli: Sixty-four neutral (32 male and 32 female) and 64 fearful face stimuli were used in an event related design. Participants were presented a neutral face (mask) and asked to identify whether the face was male or female. The presentation of neutral face was interrupted at fixed intervals by two subthreshold (33 msec) presentations of a fearful face. Each trial was 2700 ms in duration, and was followed by a fixation stimulus. The intertrial presentation was jittered, with delays between 2700 ms and 8100 ms (average 5400 ms).

Results: Preliminary results suggest that in controls backward masking produced amygdala activity. In contrast, at the same threshold level, activation visual association areas and no activation of the amygdala is seen in the data of a subject with autism. Conclusion: These data point to reduced subcortical amygdala involvement in the processing of fear stimuli in autism.

**PS2.9**

**VISUOSPATIAL PROCESSING IN AUTISM: THE LOCAL, THE GLOBAL, AND THE NEURAL**

Rajesh Kumar Kana, Diane L. Williams, Timothy A. Keller, Nancy J. Minshew, Marcel A. Just, Carnegie Mellon University

**BACKGROUND:** The performance of individuals with autism on the Block Design task is at the intersection of several theoretical accounts of perceptual functioning in autism. The Weak Central Coherence theory attributes the sometimes superior performance in autism to locally oriented processing and poor global integration (Frith, 1989). Enhanced Perceptual Functioning proposes a superiority in local processing with a more general superiority in perceptual functioning (Mottron et al., 2006). However, the multiple facets of the perceptual syndrome may be due to a common underlying factor. Underconnectivity theory makes new predictions about the neural underpinnings of the performance of participants with autism in the Block Design task that may clarify the nature of perceptual processing in autism.

**OBJECTIVE:** This fMRI study investigated the neural activity of high functioning individuals with autism (HFA) while they performed two types of Block Design tasks (with and without interference from a gestalt design).

**METHOD:** 16 adults with HFA and 16 age and IQ-matched male controls participated. All subjects performed two types of Block Design tasks, each lasting 20 min: 10 trials of standard Block Design with one trial of Block Design reversed with 10 trials of standard Block Design. The intertrial presentation was jittered, with delays between 2700 ms and 8100 ms (average 5400 ms).

**RESULTS:** Whole brain analysis revealed significantly greater activity in the left parietal lobe for the standard condition than the reversed condition. In contrast, activity in the right hemisphere was not different between the two conditions. The reversal condition also revealed increased activity in the left inferior parietal and inferior temporal regions.

**CONCLUSION:** These findings suggest that the reversal condition is more difficult for individuals with autism, and that the reversal condition may be a more effective way to assess visuospatial processing in autism.
matched typical control participants were scanned while they performed a computerized version of the Block Design task. The task was to find a missing block from a gestalt figure or from a figure without an obvious gestalt.

RESULTS: The participants with HFA had reduced connectivity between frontal and posterior regions. The control participants recruited frontal regions more to do the task (especially the gestalt condition), whereas people with autism used more posterior regions (occipital and parietal).

CONCLUSIONS: Reduced connectivity between frontal and posterior regions and less recruitment of frontal lobe functions in autism indicates a difference in the information processing in autism. Individuals with autism appear to compensate for poorer frontal-posterior functional connectivity with hyperspecialization of lower-level perceptual processing centers.

Sponsors: NICHD, NIDCD, Cure Autism Now

PS2.10
DEVELOPMENTAL CHANGES OF PREFRONTAL ACTIVATION DURING VERBAL FLUENCY TASK IN INDIVIDUALS WITH AUTISM AND HEALTHY SIBLINGS

Yuki Kawakubo, Department of Neuropsychiatry, University of Tokyo

Background: Developmental changes in the prefrontal dysfunction in autism and genetic influences on the phenomena remain unclear.

Objective: We investigated the change of oxyhemoglobin in the prefrontal cortex measured with near-infrared spectroscopy (NIRS) in children and adults with autism, and compared the data on autism with those on healthy siblings.

Methods: Twelve children with autism (mean age=9.9), 12 healthy child siblings (mean age=10.3), 12 control children (mean age=11.2), 11 adults with autism (mean age=27.8), 11 healthy adult siblings (mean age=23.0) and 11 control adults (mean age=27.0) participated in this study. All participants and their parents gave written informed consent. The relative concentration of oxyhemoglobin [oxyHb] was measured during the letter fluency task.

Results: For children, neither [oxyHb] change during the task or task performances were significantly different among three groups. For adults, [oxyHb] increases during the task were significantly smaller in the bilateral prefrontal cortex in individuals with autism than those in control subjects, although task performances were similar. Conclusion: The results suggest a poorer development of efficient recruitment of prefrontal cortex during executive processing in individuals with autism. Furthermore, this prefrontal immaturity may be a trait-related marker of genetic liability for autism.

Financial support: A grant-in-aid for scientific research (17790806 to KY) from Japan Society for the Promotion of Science and the Ministry of Education, Culture, Sports, Science and Technology, and a grant for Health and Labour Sciences Research (Research on Psychiatric and Neurological Diseases and Mental Health to KK and NK) from Ministry of Health, Labour and Welfare.

PS2.11
fMRI ACTIVATION OF LANGUAGE AREAS AND WHITE MATTER CONNECTIONS IN AUTISTIC CHILDREN

Tracey A. Knaps, Andrew M. Silver, Kristen A. Lindgren, Nouchine Hadjikhani, Helen Tager-Flusberg, Department of Anatomy and Neurobiology, Boston University School of Medicine

Background: Language deficits are one of the core symptoms of autism. Functional neuroimaging studies have examined language functions in autism but their results have been variable.

Objectives: The purpose of this study was to examine brain activation during a language task & to look at the integrity of white matter connections in autistic children compared to typically developing children.

Methods: We used fMRI to examine individual & group activation patterns during a language task in 10 right-handed autistic boys & 9 normal right-handed boys. We used DTI to compare FA in the autistic group to the control group.

Results: Performance on the language task was similar in both groups. Both groups demonstrated activation in left pars triangularis & superior, middle, & inferior temporal gyri, as well as bilaterally in the amygdala & hippocampus. Autistics also had additional regions activated. In both groups, regions of interest located in frontal & temporal language-related areas (pars triangularis & pars opercularis & posterior superior temporal gyrus) revealed left lateralized activation (p<.001). In addition, autistics had higher percent signal change in frontal regions compared to controls (p=.009). There was a significant correlation between signal change in left frontal with left temporal in controls (r=.908, p=.001), but not in autism (r=.621, p=.051). FA maps indicated higher FA in controls than autistics in many areas, including parts of the arcuate fasciculus.

Conclusion: The fMRI results suggest that language functions may be organized differently in autism, resulting in more activation than typically developing controls despite similar performance level. The lack of correlation between frontal & temporal language region activation as well as the reduction of FA in autism, particularly within the arcuate fasciculus also suggests that these regions may not be working together as efficiently in autism as in controls.

Funding: NIDCD(U19 DC03610)

PS2.12
NEURAL ACTIVATION AND ATTENTION BIAS TO EMOTIONAL FACES IN AUTISM SPECTRUM DISORDERS

Christopher S. Monk, Shih-Jen Weng, Hugo Louro, Giovanna Zaccagnini, Scott J. Peltier, Lauren I. Dayton, Patrick Bisett, Whitney J. Guthrie, Susan Risi, Catherine Lord, Chao Liu, University of Michigan

Background: Although many investigations have examined the brain basis of face processing in autism
spectrum disorders (ASD), the results are often inconsistent. The inconsistency may partly be due to variations in the allocation of attention to faces.

Objectives: Using event-related functional MRI (fMRI) and a task that provides a behavioral measure of attention to faces, we are evaluating differences in brain function between adults with ASD and typical adults. Group differences in the measure of attention will be considered in the neuroimaging analysis. We hypothesize that when group differences in attention are treated as a covariate in the fMRI analysis, subjects with ASD relative to controls will show greater amygdala activation to faces.

Methods: During fMRI acquisition, a probe detection task is used to derive a measure of attention to faces. Participants view pairs of faces (angry/neutral, sad/neutral, and happy/neutral) for either 17 msec or 500 msec. Seventeen msec face presentations are followed by scrambled faces (mask) to make awareness of the faces all but impossible. Following these stimuli, subjects press a button to an asterisk that was either on the same (congruent) or opposite (incongruent) side as the emotional face. Reaction time differences between congruent and incongruent trials provide a measure of attention bias to emotional faces. As a comparison, neutral/neutral faces pairs are also presented. Participants are recruited through the University of Michigan Autism and Communications Disorders Center and the community. Adults with ASD are diagnosed with the ADOS and ADI-R.

Results: To date, we have collected usable data on 7 adults with ASD. We plan to collect data on 3 more adults with ASD and 10 typical adults. Analysis will focus on group differences in the amygdala.

Conclusions: By considering attention bias in the fMRI analysis, it may be possible to clarify the brain basis of abnormal face processing in autism.

PS2.13
COMBINED EEG AND MRI APPROACHES TO FUNCTIONAL CONNECTIVITY IN AUTISM
Michael Murias, Natalia Kleinhans, Neva Oskin, Andrew Poliakov, Elizabeth Aylward, Geraldine Dawson, Kristen Merkle, Sara J. Webb, Todd L. Richards, University of Washington Autism Center

We illustrate an approach to integrate functional (EEG) and anatomical (MRI) measurements in order to investigate the anatomical substrates of neural connectivity among individuals with autism. The time series of intracerebral source models is computed from scalp recorded dense array EEG by means of low resolution electromagnetic tomography (LORETA, Pascual-Marqui and Michel 1994), a solution to the EEG inverse problem that estimates cortical sources of scalp potentials with minimal distortion from the poorly conductive skull. Using LORETA software, estimates of cortical potentials are co-registered to the gray matter surface of a template brain (from the Montreal Neurological Institute) at 2,394 voxels (approximating 7-mm resolution), each containing an equivalent current dipole. The resulting LORETA time series at each voxel are transformed into the frequency domain, and source power and coherence calculated between voxel pairs. Using FSL’s FLIRT (Jenkinson et. al., 2002) combined with our laboratory software, high resolution MRI images (including structural and diffusion tensor images) are converted to the same low resolution MNI imaged used by LORETA. The cortical source estimates of EEG power and coherence values can then be examined spatially in conjunction with MRI brain anatomy, white matter tractography and diffusion tensor data. Both EEG and MRI data are available from 6 adults with autism for this analysis. We demonstrate coherent EEG oscillations at the scalp and at the cortical surface, and co-register cortical source power and coherence with MRI images in single subjects.

We gratefully acknowledge financial support from the NIH CPEA and STAART networks and the Perry Fellowship.

PS2.14
LOW-RESOLUTION BRAIN ELECTROMAGNETIC TOMOGRAPHY OF FACE PROCESSING IN AUTISM
Neva Oskin, Kristen Merkle, Sara Webb, Todd Richards, Elizabeth Aylward, Geraldine Dawson

Background: The social cognitive impairments that are characteristic of autism may be related to a difficulty in processing faces. A peak in the ERP in the range of 130-170 ms (the N170 or face specific peak) has been found to be correlated with face processing.

Study objectives: Low-resolution brain electromagnetic tomography (LORETA) is used to evaluate whether the locations of the neurons involved in generating the N170 component are different between control individuals and individuals with autism.

Methods: ERP data were acquired in a face stimulus experiment for 24 individuals with autism and 22 control individuals. Cortical current density distribution maps were generated for each individual using the LORETA-KEY software package (Pascual-Marqui et al., 1994). Non-parametric permutation tests were then used to test for statistically significant differences in the current density maps over the latency of 136-142 ms, a range which encompassed the N170 peak of both groups.

Results: Although no significant difference was found in the strength of right fusiform activity between the two groups, the control group showed a statistically significant increase in left fusiform activity when compared to the autism group. Additionally, the control group showed more frontal lobe activity at the latency of the N170 than the autism group.

Conclusion: These preliminary findings are consistent with results from other functional imaging modalities showing differences in fusiform activity between control individuals and individuals with autism during face processing. Additionally, they suggest a difference in frontal lobe activity between the two groups at the time of the generation of the N170 component.

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PS2.15
PERCEPTION OF SIMPLE AND COMPLEX SOUNDS IN AUTISM: AN fMRI STUDY Fabienne Samson, Thomas A. Zeffiro, Jyrki Ahveninen, Anna Bonnel, Pierre Ahad, Pascal Belin, Valter Ciocca, Adrianna Mendrek, Laurent Mottron

Background: Studies investigating the mechanisms underlying the superior and inferior abilities of autistics clearly demonstrated the existence of atypical perceptual processing (Mottron et al., 2006). On the basis of diminished second-order and enhanced first-order visual discrimination performance, Bertone et al., (2005) proposed that complex neural information processing should be impaired in autism, while more "simple" processing, involving primary sensory areas, would be enhanced. Results demonstrating enhanced simple and impaired complex auditory processing in autism suggest that this atypical pattern of sensory processing could also be seen in auditory tasks, as vision and audition share similar hierarchical neural organization structures. (Samson et al., 2006)

Objectives: We investigated fMRI activations to sounds with parametrically varied spectral and temporal complexity to characterize the neurophysiology of altered perception in autism and to test whether the biased allocation of processing resources between complex vs. simple processes extends to the auditory modality in autistics.

Methods: Participants listened to four types of auditory stimuli: a 300 Hz pure tone or a harmonically complex tone (300-1200Hz), which were either non-modulated or frequency modulated at 5 Hz. During functional imaging, autistics and a group of typically developing comparison participants were asked to detect if the presented sound is modulated or not.

Results: The preliminary analysis revealed that activity related to the perception of temporal and spectral complexity was more restricted to the vicinity of primary auditory cortex (Heschl's gyrus) in autistics. This atypical displacement towards primary auditory sensory areas could represent a neurophysiological correlate of enhanced pure tone processing and atypical processing of complex sounds.

Conclusion: These results support extension of the complexity-hypothesis to the auditory modality.

Sponsors: ART, CIHR

PS2.16
THE NEURAL SUBSTRATES OF COGNITIVE CONTROL IN AUTISM Marjorie Solomon, Sally J. Ozonoff, Stefan Ursu, Susan Ravizza, Neil Cummings, Cameron S. Carter

Background: Cognitive control refers to the ability to represent and maintain behaviorally-relevant information or 'context' to support adaptive responding in the changing environment. Cognitive control has been mapped to neural circuits and studied with functional magnetic resonance imaging (fMRI).

Objective: The goals of this study were to investigate whether individuals with ASDs showed deficits in cognitive control, to examine the neural substrates of these deficits, and to relate them to autism symptoms and/or co-morbid psychopathology.

Methods: 15 children and adolescents aged 10 to 17 with ASDs and 15 age, IQ, handedness, and gender matched control subjects completed cognitive, diagnostic, and behavioral assessments, as well as a measure of cognitive control that was analyzed to assess overcoming a prepotent response tendency (context processing) and task switching.

Results: Compared with typically developing subjects, individuals with ASDs exhibited deficits in cognitive control as assessed by behavioral measures. They also showed differences in activation patterns in regions of the brain that have been closely associated with cognitive control including the dorsolateral prefrontal cortex (DLPFC), anterior cingulate cortex (ACC), and posterior parietal cortex (PPC). Atypical patterns of neural activation were associated with autism symptoms and parent reports of psychopathology.

Conclusion: Autism involves impairments in cognitive control. A cognitive control based model offers a theoretically driven way to advance the study of 'executive functions' deficits and to relate them to behavioral symptoms.

Sponsor: NIH K12 HD051958, Imaging Research Center Pilot Award, MIND Institute Pilot Award

PS2.17
PRAGMATIC LANGUAGE COMPREHENSION IN ADULTS WITH ASD: AN fMRI STUDY Cathelijne Tesink, Peter Hagoort, Karl Magnus Petersson, Jos van Berkum, Rutger Jan van der Gaag, Cees Kan, Jan Buitelaar, Department of psychiatry, Radboud University Medical Centre/F.C. Donders centre for cognitive neuroimaging

Background: During every day communication as listeners we automatically integrate knowledge about the speaker with the message that he/she conveys. In other words, we use pragmatic knowledge to make sense of what a speaker says. Among adults with ASD, deficits in these pragmatic aspects of communication occur universally.

Objectives: To identify neural correlates of pragmatic language aspects in high-functioning adults with ASD and to compare these with activation patterns in matched controls.

Methods: fMRI data were collected on 24 adults with high-functioning autism or Asperger’s syndrome and 24 matched healthy controls. While lying in a 1.5T MRI scanner, subjects listened to sentences whose content did or did not match voice-based expectations about the speaker’s age, gender or social background. Each sentence was congruent when spoken in a particular voice, but was rendered unlikely at a specific critical word when spoken in an alternative voice.

Results: Preliminary fMRI results showed that in both
healthy controls and adults with ASD the left inferior frontal gyrus is activated stronger during listening to speaker-incongruent sentences, i.e. sentences in which the meaning did not match speaker-related pragmatic information, than during listening to speaker-congruent sentences. However, different activation patterns were found in temporal cortex.

Conclusion: Preliminary fMRI results show partially overlapping, but different activation patterns in adults with ASD and healthy controls during processing of pragmatic information.

PS2.18
VISUAL DETAIL PERCEPTION IN AUTISM SPECTRUM DISORDER: AN IMBALANCE BETWEEN FEEDFORWARD, HORIZONTAL AND FEEDBACK PROCESSING Myriam W.G. Vandenbroucke, H. Steven Scholte, Herman van Engeland, Victor A.F. Lamme, Chantal Kemner, University Medical Center Utrecht / Department of Child and Adolescent Psychiatry

In the current research, an explanation for enhanced detail perception in Autism Spectrum Disorder (ASD) is proposed and investigated based on insights in the role of visual feedforward, horizontal and feedback connections. Whereas by feedforward and horizontal processing global features are extracted, feedback activity from higher to lower visual areas leads to the incorporation of details in a visual scene. An imbalance between these mechanisms could cause an imbalance between global and detail processing in ASD. To test this we used both psychophysical and EEG data from a new texture discrimination task, where surface segregation was varied independently from texture boundaries. Subtraction ERP's could distinguish between feedforward, horizontal and feedback activity. The results showed that subjects with ASD (N = 13) had lower performance scores compared to controls (N = 31) which was supported by the EEG data. The ERP related to horizontal connection activity was significantly smaller in the ASD group. In contrast, the consecutive feedforward activity to extrastriate cortex was enhanced compared to control subjects and, finally, there was a delay in the feedback related ERP signal. From the current results we can conclude that aberrancies in early, low-level visual mechanisms in subjects with ASD indicate an imbalance between feedforward, horizontal and feedback processing. This might be the underlying cause of enhanced detail perception in these patients.

PS2.19
EEG AND HEART RATE RESPONSES TO FAMILIAR AND UNFAMILIAR PEOPLE IN CHILDREN WITH AUTISM Amy Vaughan Van Hecke, Jocelyn Lebow, Elgiz Bal, Olga Bazhenova, John W Denver, Emily Harden, Alexis Kramer, Damon Lamb, Katherine D. Marczek, Martha McCool, Wendy Padilla, Andrea Plaut, Marika Wrozek, Stephen W Porges, University of Illinois at Chicago

Background: Few studies have examined whether familiarity of the social partner affects social responses in children with autism. The Polyvagal theory proposes a system that involves the interaction of temporal lobe brain activity and heart regulation by the vagus nerve, which may affect the expression of social behavior. The theory predicts that familiar people may elicit adaptive responses from children with autism.

Objectives: To study heart rate and neural responses to familiar and unfamiliar people in children with autism

Methods: Heart rate and electroencephalogram (EEG) were measured while 15 8-12 year-old children with high-functioning autism (matched to 12 neurotypical children in a control group) viewed two 5-minute movies of their caregiver and an unfamiliar person reading a story.

Results: Results for heart rate indicated a significant video x group interaction, F (2, 23) = 4.11, p < .05. Children with autism increased RSA to the familiar person, vs. control children, who showed no RSA changes. Results for EEG indicated a main effect for video: both groups showed an increase in right parieto-temporal brain activity to the familiar person video, F (1, 25) = 10.03, p < .004.

Conclusions: Children with autism showed increased regulation of the heart and increased activity in right parieto-temporal cortex to a video of a familiar person.

PS2.20
EFFECT OF SEROTONIN ON PROCESSING OF EMOTIONAL FACES, A fMRI STUDY OF ACUTE TRYPTOPHAN DEPLETION. Eileen Daly, Quinton Deeley, Brian Hallahan, Simon Surguladze, Mary Phillips, Declan GM Murphy, King’s College London Institute of Psychiatry

Background: One of the difficulties found in Autistic Spectrum Disorder is the processing of emotional faces. Modulation of the Serotonergic system by Acute Tryptophan Depletion (ATD) has shown an affect on the detection of emotional faces.

Objectives: To elucidate the role of the serotonergic system in the neuroprocessing of emotional faces in healthy controls, we employed the methods of fMRI and Acute Tryptophan Depletion (ATD).

Methods: We studies 14 healthy male controls. Mean age 27 ± 10 years. FSIQ 139 ± 14. Subjects were scanned on two separate occasions. On one occasion a sham amino acid drink was consumed. On another occasion a Tryptophan depleted amino acid drink was consumed. Scanning on both visits employed implicit emotional face processing tasks with an explicit gender identification response to the stimuli. 4 separate runs were performed on happy, sad, disgust and fearful faces.

Results: There was a >70% blood Tryptophan reduction on consumption of the depleted drink. When contrasting the emotional faces to neutral faces, there was a greater...
BOLD response on the sham day vs. the ATD day, for Fear, Happy and Disgust. However for the response to Sad, the ATD experiment showed greater BOLD response than the sham.

Conclusions: Modulation of serotonin levels in the brain leads to differential effects on the processing of emotional faces. We will continue this study scanning patients with ASD.

Sponsor: PPP Healthcare

**PS2.21**

**FREQUENCY OF FRAGILE X IN MULTIPLEX AUTISM: TESTING THE AGRE FAMILIES**

W. Ted Brown, Sarah L. Nolin, Carl S. Dobkin, Sarah J. Spence, Dan H. Geschwind, NYS Inst Basic Resh DD

Objective and Methods: Autism has high heritability. The Autism Genetic Resource Exchange (AGRE) is a publicly available resource of well-characterized multiplex families for genetic studies of autism. To better characterize this resource, we conducted fragile X DNA analysis (Brown 93) on one proband in each of 480 AGRE families, with follow-up family studies when indicated.

Results: Testing revealed 6 families to be positive for fragile X. Review of 326 available medical records showed 114 (35%) had prior negative genetic testing. Thus, the prevalence of fragile X among the approximately 312 previously untested AGRE families was ~ 1.9%. An estimate of the IQ score of the autistic subjects was 80±35 with range 34-144, based on the Raven. Thus, the AGRE sample is likely to have a higher IQ distribution than typical for fragile X subjects (mean ~40+25). Previous prevalence studies of fragile X in autistic samples range from 0 to 16%; with mean ~4%; (Feinstein 98). Our 1.9% is similar to a report of 1.6% among 123 unrelated autistic individuals (Bailey 93), but lower than the 13% we found on an earlier multicenter study of 183 individuals (Brown 86). An additional 210 families added to AGRE subsequent to this study have also been tested and found negative for fragile X. This may indicate greater awareness of Fragile X and more common screening in multiplex families.

Conclusions: A growing awareness of fragile X syndrome may increase the probability of prior fragile X screening in multiplex autism families and their exclusion from AGRE. The observed frequency of 1.9% is lower than the expected 4%. This appears to be due to higher mean IQs in AGRE subjects than is typical for fragile X. It confirms an association of fragile X and autism.

Support: OMRDD/AGRE/CAN.

**PS2.22**

**SOCIAL IMPAIRMENT PATTERNS IN INDIVIDUALS WITH AUTISM DUE TO TUBEROUS SCLEROSIS & SUPERNUMERY MARKER CHROMOSOME 15**

Patrick F. Bolton, Caroline Sporikou, Sarah Curran, The Institute of Psychiatry, Kings College, London

The pattern of social impairment in individuals with autism due to tuberous sclerosis or supernumery marker chromosome 15 was evaluated using data from the Autism Diagnostic Interview and Autism Diagnostic Observation Schedule. Ratings of social disinhibition, social responsiveness and social disinterest distinguished the groups, with the individuals with tuberous sclerosis exhibiting more socially active, disinhibited and inappropriate social approaches compared with the individuals with chromosome 15 abnormalities who displayed more passive and disinterested patterns of impairment. The results suggest that the pattern of social impairment may index the nature of the underlying genetic risk factors and that this typology may index genetic heterogeneity and therefore be worthy of inclusion as subtype analysis in molecular genetic studies of idiopathic cases of autism.

**PS2.23**

**MUTATION ANALYSIS OF OLIGODENDROCYTE MYELIN GLYCOPROTEIN (OMGP) GENE IN AUTISTIC INDIVIDUALS.**

Dorota A. Crawford, Wendy Roberts, Stephen W. Scherer, York University

Background: Linkage studies in autism have identified susceptibility loci on chromosome 17q11.2, region containing the oligodendrocyte myelin glycoprotein (OMgp). OMgp is expressed on the surface of oligodendrocytes and neurons during myelination and later in adult. OMgp has a unique leucine-rich region (LRR) domain through which it interacts with the Nogo receptor. Thus, interfering with the OMgp/Nogo receptor pathway may result in pathologies of the nervous system and may be of significance in autistic disorder.

Objectives: This study discusses OMgp gene as a potential candidate for autism.

Methods: In the present study we performed mutation screening of the OMgp gene in autism patients. We analyzed the coding sequence of OMgp gene by direct sequencing. Patients were assessed with the ADI and ADOS, resulting in a confirmed diagnosis of autism. All patient and control samples were obtained with consent.

Results: Our analysis identified a number of variants within the coding sequence. A variant that resulted in an amino acid change in the LRR domain was found in a patient with significant expressive language delay and autism. This variant was also detected in the patient’s mother with some phenotypes of autism, but not in controls. We also show that the OMgp gene expression was reduced in the patient and his mother. Sequence variations in the LRR domain may alter OMgp interaction with its receptor and subsequently contribute to developmental changes in the CNS. Moreover, if the dosage is important at a given time in development the reduction of the OMgp gene expression could also result in specific abnormal brain development and contribute to this phenotype.

Conclusion: Our results suggest that OMgp may contribute to the clinical features seen in the proband and that it should be assessed as a candidate for autism disorder.

Sponsor: Genome Canada/Ontario Genomics Institute and the Hospital for Sick Children Foundation.
PS2.24
DIFFERENCE IN AGE OF REGRESSION IN CHILDREN WITH AUTISM WITH AND WITHOUT DOWN SYNDROME Cynthia A. Molloy, Heidi Castillo, Anne Kinsman, Donna Murray, Francis Hickey, Bonnie Patterson, Cincinnati Children's Hospital Medical Center

Background: Regression, the loss of previously acquired language and/or other socio-communitive skill, occurs in approximately 25% of children with autism. Children with Down syndrome are at ten times greater risk for autism than the general population, and regression has been reported to occur in up to 50% of children with autism and Down syndrome.

Objective: Characterize and compare regression patterns in children with autism with and without Down syndrome.

Methods: This case-control study compared age at loss of language or other skill as measured by the Autism Diagnostic Interview - Revised. Cases (n=10) were children with Down syndrome and a confirmed diagnosis of autism that included a definite history of regression. Controls (n=10) were children without Down syndrome who had a confirmed diagnosis of autism and a definite history of regression, matched to cases on chronologic age at time of ADI-R, and gender.

Results: In children with autism without Down syndrome the mean age of language loss was 17.0 mo (SD = 3.2mo) and other skill loss was 18.1 mo (SD = 3.3 mo). For children with autism and Down syndrome, regression occurred significantly later. The mean age of language loss was 61.8 mo (SD = 22.9 mo) (p = 0.0003). Mean age for loss of other socio-communitive skills was 44.3 mo (SD = 26.6 mo) (p = 0.04).

Conclusion: In children with Down syndrome who experience autistic regression, this regression appears to occur much later than in children with autism without Down syndrome. Regression may be more related to stage of brain development than to chronologic age.

Sponsor: Charlotte W. Schmidlapp Foundation

PS2.25
CO-REGULATED EXPRESSION OF EARLY GROWTH RESPONSE GENE 2 (EGR2) AND MECP2 Susan E. Swanberg, Janine M. LaSalle, Department of Medical Microbiology and Immunology, University of California, Davis

Background: MECP2 mutations or expression defects are found in Rett syndrome and a subset of autism-spectrum cases. MeCP2 is essential for normal brain development and may be involved in developmentally-regulated chromatin remodeling. EGR2 encodes a transcription factor identified as a potential MeCP2 target and binding sites for EGR2 are located in the region upstream of MECP2; all of which suggests that MeCP2 and EGR2 have the potential to co-regulate. EGR2 is involved in long term potentiation and also plays an important role in the transient formation of hindbrain developmental compartments or rhombomeres, from which most serotonegic neurons are derived. Therefore, MECP2 defects have the potential to disrupt both synaptic plasticity and hindbrain-mediated behaviors by dysregulating EGR2. During differentiation both EGR2 and MeCP2 expression are induced, with EGR2 expression increasing rapidly and transiently and MeCP2 expression increasing more slowly to the high levels which constitute a hallmark of the mature neuron.

Objectives: To identify possible relationships between MECP2 and EGR2 expression patterns by quantitating EGR2 in MeCP2-null and wildtype mouse brain and human SH-SY5Y cells.

Methods: Quantitative immunofluorescence of EGR2 protein was examined by laser scanning cytometry (LSC) in the brains of 4-week-old MeCP2-null and wildtype mice and in phorbol ester (PMA)-differentiated SH-SY5Y cells transfected with EGR2 siRNA.

Results: A statistically significant decrease in cytoplasmic and nuclear EGR2 protein was observed in brain of the MeCP2-null mice, including cerebellum and hindbrain. Twenty-four hours after transfection with EGR2 siRNA, EGR2 and MeCP2 were significantly down-regulated.

Conclusion: These preliminary findings are consistent with the hypothesis that EGR2 and MECP2 are reciprocally co-regulated during neurodevelopment.

Sponsor: NIH 5T32MH073124
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PS2.26
RETT SYNDROME OUT OF THE PDD SECTION? Ina van Berckelaer-Onnes, Josette Wulffhaert, Sanne Scheuierman, Marieke de Bree, Ilse Noens, Leiden University

Background: The placement of Rett syndrome in the DSM-IV-TR and ICD-10 PDD sections is debatable. Since the detection of the MECP2 mutations approximately 80% of the Rett patients can be identified genetically, Rett syndrome progresses through four stages.

Objective: To examine if autistic traits occur in Rett syndrome and, if so, in which of the four stages they are present.

Method: A group of 30 girls of different ages and in different stages of the disorder were assessed for autistic traits and behavior problems (Diagnostic Interview for Social and Communication Disorders, Developmental Behavior Checklist, Social Communication Questionnaire), adaptive functioning (Vineland Adaptive Behavior Scales), parental burden (Nijmegen Questionnaire for the Childrearing Situation), and parenting stress (Nijmegen Parental Stress Index).

Results: Preliminary results indicate that autistic traits, behavior problems, parental burden and parenting stress decrease during the course of the disorder.

Conclusions: Autistic traits are manifest in Rett syndrome but seem to be stage related. The preliminary results of this study do not support placement of Rett syndrome in the PDD section.
PS2.27
AUTDB: AN INTEGRATED RESOURCE FOR AUTISM RESEARCH Sharmila B. Basu, Ravi Kollu, Saumyendra N. Basu, Mindspec Inc.
Background: Genetic research of Autism Spectrum Disorders (ASD) indicate that a number of genes, possibly each with a minor contributory role, in conjunction with epigenetic and environmental factors underlie the etiology of this disorder.
Objective: To develop a publicly available, curated, searchable, web-portal for autism research with the focus on molecular genetics and biology of ASD.
Method: This resource is built from an exhaustive search of scientific literature in the PubMed database for genetic information on ASD. The data is extracted, organized, integrated, and stored in a format that is accessible and useful to the autism research community. The resource is implemented in a relational database management system.
Result: The genetic information includes data from linkage and association studies, together with genes related to syndromic autism, cytogenetic abnormalities, and single-gene mutations linked to ASD. The candidate genes are richly annotated for their relevance to autism, along with an in-depth, up-to-date view of their molecular function extracted from the current scientific literature with links to the abstracts of the source articles in PubMed database. A site-wide search engine that works across multiple datasets is provided to query the database.
Conclusion: AutDB is envisioned to provide the components for building and deciphering convergent gene networks underlying the pathophysiology of autism.

PS2.28
EVALUATION OF CHROMOSOMAL ABNORMALITIES ASSOCIATED WITH COGNITIVE IMPAIRMENTS IN SUBJECTS WITH AUTISM SPECTRUM DISORDERS Guiqing Cai, Lisa Edelmann, Juliet Goldsmith, Vivian Mitropoulou, Jennifer Reichert, Catalina Betancur, Joseph Buxbaum, Mount Sinai School of Medicine
Background: Microdeletions and microduplications in regions associated with cognitive impairment/mental retardation (MR) have been associated with autism spectrum disorders (ASDs) but this has not been extensively explored in subjects ascertained for ASDs.
Objectives: To determine whether microdeletions and microduplications in regions associated with MR contribute to ASD susceptibility in a large cohort ascertained for ASDs.
Methods: A total of 311-320 unrelated subjects with ASDs were screened using multiplex ligation-dependent probe amplification (MLPA) kits. IQ of subjects was representative of the typical autism cohort, with most patients affected with MR. FISH, quantitative PCR and/or direct sequencing were used to validate MLPA changes.

Results: MLPA screening with MR1, MR2, and MRX kits (MRC-Holland) identified nine instances of increased signal (potential microduplications) and six instances of decreased signal (potential microdeletions). Four unrelated subjects showed duplications in 15q11-q12 Prader-Willi/Angelman syndromes region by MLPA and FISH. Two unrelated subjects showed duplications involving the 3 Mb region in 22q11 deleted in DiGeorge syndrome. One subject carried a 12 Kb deletion in the ASPA gene (Canavan disease) but no mutation in the second allele. Decreased signal for a probe in CAB45 in 1p36.33 in two unrelated subjects did not appear to represent a 1p-deletion syndrome as no deletion was observed with FISH probes p56 and 1p tel. Other significantly changed signal by MLPA for additional probes are being analyzed further.
Conclusion: Microdeletions and microduplications that have previously been associated with MR syndromes can also be identified in autism, but such events are rare in the current sample.
Sponsor: the Seaver and Handler Foundations and the NIH

PS2.29
POSSIBLE INTERACTIONS IN AUTISM BETWEEN THE GENE ENCODING THE MET RECEPTOR TYROSINE KINASE AND GENES THAT REGULATE MET FUNCTION Daniel B. Campbell, James S. Sutcliffe, Antonio M. Persico, Pat Levitt, Vanderbilt Kennedy Center for Research on Human Development
Background: We recently described significant association of a functional genetic variant in the MET gene with autism spectrum disorder (ASD) (PNAS, 103: 16834). The ASD-associated variant lies in the promoter and alters the affinity of transcription factors that regulate MET gene expression. Decreased activity of MET receptor tyrosine kinase signaling contributes to disruption of neocortical and cerebellar development, immune responsiveness and gastrointestinal repair.
Objectives: To identify functional variants associated with ASD in genes that regulate MET transcription (SP1 and SUB1) and genes that participate in MET signaling (HGF and SERPINE1).
Methods: We screened all exons and key regulatory regions for variants in each of the four genes in 48 individuals with ASD. Identified variants were genotyped in 629 pedigrees using Taqman 5’ exonuclease assays. Family-based association test (FBAT) and haplotype-based association test (HBAT) analyses were used to determine association.
Results: Haplotype-based analyses of the SERPINE1 gene indicated global transmission disequilibrium (TD; P=0.003); FBAT analyses revealed weak association of the rs13238709 C allele (P=0.048). No evidence for association was observed for nine markers in the HGF gene. HBAT analyses of SP1 indicated significant global TD (P=0.00001), but no individual marker allele was associated with ASD. Similarly, HBAT analyses of SUB1 indicated significant global TD (P<0.000001), but no
SNPs are significantly associated with low... Potential gene-

association will be tested in future genetic and

biological studies.

Sponsors: NIMH MH65299; NICHD HD15052; Marino Autism Research Institute

PS2.30
A CANDIDATE GENE ASSOCIATION STUDY OF ASPERGER’S SYNDROME, AND FOUR MEASURES OF THE BROADER AUTISM PHENOTYPE Bhismadev Chakrabarti, Grant Hill-Cawthorne, Sally Wheelwright, Frank Dudbridge, Carrie Allison, Simon Baron-Cohen, University of Cambridge

BACKGROUND: To date there have been no candidate gene association studies of Asperger Syndrome (AS) or of related dimensional phenotypic measures.

OBJECTIVES: To identify Single Nucleotide Polymorphisms (SNPs) in candidate genes that are associated with:

1) Different allele frequencies between AS and controls.
2) Two phenotypic screening measures (the Autism Spectrum Quotient (AQ) and Empathy Quotient (EQ) in controls.
3) Two behavioural measures (the Eyes Task and the Embedded Figures Task (EFT)) in controls.

METHODS: DNA extracted from mouth swabs was genotyped for SNPs using standard PCR-based assays. SNPs with a minor allele frequency >0.2 were chosen from each candidate gene. 75 candidate genes were based mainly on linkage studies on autism and could be functionally grouped into 3 categories, i.e. those underlying (i) sex hormones and their receptors, (ii) neurotransmitter factors, and (iii) social-emotional behaviour in animals.

SAMPLES: Cases were n=175 participants with a clinical diagnosis of AS, recruited through our online database. Controls comprised n=359 students. All filled in the AQ and EQ, and a subset (n=96) completed the Eyes Task and the EFT. All phenotypic measures show familiality in first-degree relatives of probands.

RESULTS: Chi-square analysis was used for each SNP in the case-control analysis. ANOVAs were used to test for association with the phenotypic measures. Preliminary analysis showed 19 genes (including NLGN4X, GABRB3, CNR1 and OXTR) associated with one/more of the 4 phenotypic measures in controls. A partially overlapping set of 12 genes (including GABRB3, OXT) showed a difference in the case-control analysis.

CONCLUSION: The combination of a case-control association study and that of multiple phenotypic measures in controls revealed significantly associated SNPs in 24 genes from the 3 functional categories mentioned above. Future work should test if these same SNPs are significantly associated with low-functioning autism too.

PS2.31
AN ASSOCIATION ANALYSIS OF FUNCTIONAL SEROTONIN TRANSPORTER POLYMORPHISMS IN AUTISM SPECTRUM DISORDER Sarah Curran, Luca Pugliese, P Protsi, John Powell, Patrick Bolton, Institute of Psychiatry, King’s College, London

Genetic studies of the 5-HT system in ASD have been inconsistent, but suggest that further investigation is warranted. The 5-HT transporter gene (SLC6A4 on 17q) has been implicated by both linkage and association studies. The variable number tandem repeat (VNTR) polymorphism in the promoter region of SLC6A4 has been investigated in several studies as has the 17bp intron 2 repeat polymorphism. The promoter VNTR has two common alleles, short & long (S/L), the 17bp intronic polymorphism has two common and one rare allele. Both polymorphisms are thought to have functional effects. Several studies have reported significant transmission bias of HTTLPR alleles, but the studies with significant findings are almost equally divided between overtransmission of short and overtransmission of long alleles. It has been suggested that the inconsistency in results may derive from allelic heterogeneity at this locus (Sutcliffe et al 2005). We will report the results of an association study of these polymorphisms with autism spectrum disorder.

PS2.32
EVIDENCE FOR ASSOCIATION OF AUTISM WITH LOCI ENCODING UBE3A-REGULATED PROTEINS Ryan J. Delhanty, Lawrence T. Reiter, James S. Sutcliffe, Vanderbilt University

Evidence indicates a predominantly genetic etiology for autism, however locus heterogeneity confounds identification of genes broadly contributing to the idiopathic condition. Maternal duplication of 15q11-q13 is the most frequent chromosomal abnormality found in autism. Data indicate that dup(15) autism results from over-expression of contiguous loci including the maternally-expressed E6-AP ubiquitin ligase (UBE3A) gene. Maternal deficiency of UBE3A causes the severe neurodevelopmental disorder Angelman syndrome (AS), which shares some features with autism. UBE3A functions to ubiquitinylate other proteins for subsequent ubiquitin-dependent degradation. Altered expression of UBE3A is hypothesized to result in dysregulation of UBE3A substrates, which are ultimately responsible for the phenotypic consequences of UBE3A over- or under-expression. A proteomics strategy in Drosophila was employed to identify proteins affected by elevated UBE3A levels, with the aim of identifying candidates, altered regulation of which may contribute to autism spectrum phenotypes. Two neuronal proteins thus identified are the RhoGEP Pebble and the GTP-cyclohydrolase Punch. Mammalian orthologs of pebble (ECT2; 3q26.1) and punch (GCH1; 14q22.2) were identified and examined for the presence of autism-associated alleles. Using tag SNPs to detect common
alleles (>5%) at both loci, association analyses were performed in a sample of ~700 autism families. Association tests were conducted for six SNPs in ECT2 and eight in GCH1 using FBAT and calculating 'exact' P-values based on Monte Carlo simulations. One SNP in intron 22 of ECT2, ~10kb from the 3’ end showed significant association (P=0.02) to autism. Similarly for GCH1, one marker near the 5’ end in intron 1 showed significant transmission bias (P=0.02). These studies support a possible role for genes encoding UBE3A-regulated proteins in contributing to inherited susceptibility to autism.

**PS2.33**
**GENE EXPRESSION PROFILING OF LYMPHOBLASTOID CELLS FROM AUTISTIC-NONAFFECTED SIB PAIRS REVEALS ALTERED SIGNALING AND METABOLIC PATHWAYS RELEVANT TO NEURAL DEVELOPMENT** Valerie W. Hu, Kyung Soon Kim, Michele Scully, Yinglei Lai, John Quackenbush, Norman Lee, The George Washington University

Background: Despite the identification of numerous autism susceptibility genes, the pathobiology of autism remains unknown. The present case-control study takes a global approach to understanding the molecular bases of autism spectrum disorders based upon large-scale gene expression profiling.

Objective: To identify biochemical and signaling pathways which are differentially regulated in cells from autistic and nonautistic siblings.

Methods: DNA microarray analyses were conducted on lymphoblastoid cell lines from over 20 sib pairs in which one sibling had a diagnosis of autism and the other was not affected.

Results: Statistical and pathway analyses of the data from DNA microarray experiments revealed differential expression of genes in both signaling and metabolic pathways. Key signaling pathways implicated include those involved in axon guidance as well as integrin- and Wnt-catenin signaling. Functional analyses of gene expression patterns further suggested that alterations in cholesterol and androgen metabolism are associated with the autistic phenotype.

Conclusions: Collectively, these studies highlight pathways that may be affected in neural development as well as neurite extension and migration in autistic individuals. Moreover, the data suggest that these processes may be modulated by cholesterol/lipid metabolism, especially the levels of androgenic hormones, which have been implicated as possible factors influencing the susceptibility to autism, which affects ~4 times as many males as females.

Funded by the National Institute of Mental Health, R21 MH073393 (VWH)

**PS2.34**
**ASSOCIATION STUDY OF THE POLYMORPHISMS OF SLC6A4, DBH AND MAOA GENES IN THAI MALES WITH AUTISM: A PRELIMINARY REPORT** Pornprot Limprasert, Warapong Suwannarat, Nichara Ruangdaraganon, Tippawan Hansakunachai, Rawiwan Sothanayongkul, Tasanaw Somboontham, Thunya Sripo, Woratai Maisrikhaw, Verayuth Prapanpoj, Pornprot Limprasert

Background: Associations between several genes and autism have been reported. To the best of our knowledge, this is the first report of genetic association study in Thai autistic patients.

Objective: To study association between the polymorphism of SLC6A4, DBH and MAOA genes and Thai males with autism.

Methods: Autistic patients (cases, males < 16 years old) were recruited from two major hospitals of medical schools in Bangkok, Ramathibodi and Thammasat. The patients fulfilled the DSM-IV criteria for autistic disorder. Normal controls were collected from the same ethnic background. The study was reviewed and approved by the ethic committee. Affected children as well as normal controls were genotyped for three polymorphisms including 19 bp insertion/deletion (+ and - alleles) in the DBH, 30 bp repeats (3.5, 4.5 alleles) in the MAOA, and HTTLPR (L, S alleles) in the SLC6A4. Genotype frequencies of these polymorphisms were compared between autistic patients and normal controls using chi-square statistics.

Result: (C1 = cases; C2 = controls)
Genotypes of the DBH (C1 = 65, C2 = 99)
+/+ C1 = 20, C2 = 37; +/- C1 = 37, C2 = 47; -/- C1 = 8, C2 = 15
Genotypes of the SLC6A4 (C1 = 41, C2 =63)
L/L C1 = 8, C2 = 1; L/S C1 = 9, C2 = 11; S/S C1 = 24, C2 = 51
Genotypes of the MAOA (C1 = 68, C2 = 61)
(gene on chromosome X, no heterozygous in males)
4.5 C 1= 29, C2 = 28; 3.5 C1 = 39, C2 = 33

Preliminary analyses showed an association between autism and the HTTLPR polymorphism in SLC6A4 gene. Genotype with at least one long (L) allele were more common in cases than in controls (P = 0.0037). The other two polymorphisms did not show significant difference between cases and controls (P > 0.05).

Conclusion: Preliminary findings of this study support the previously reported association between the HTTLPR polymorphism of SLC6A4 and autism. However, further studies are being in progress to increase number of cases and controls.

**PS2.35**
**GENOMIC PROFILING OF CHILDREN WITH AUTISM** Lisa Lit, Jeffrey P. Gregg, Colin A. Baron, Irva Herz-Picciotto, Wynn Walker, Ryan A. Davis, Lisa A. Croen, Sally Ozonoff, Robin Hansen, Isaac N. Pessah, Frank R. Sharp, University of California Davis, Department of Neurology & M.I.N.D. Institute

Background: Gene expression in blood is used to identify biologically based subgroups within autism.

Objective: Compare blood gene expression profiles of children with autism to controls.

Methods: Children with autism and typically developing,
age and gender matched controls were evaluated through the UC Davis CHARGE study. Total blood RNA was processed on Affymetrix microarrays. Onset (early onset or regression) was determined with the ADI-R. Gene expression profiles of 18 children with regression (REGR) (16 M, 2 F, mean age 43.7 mo.) and 17 children with early onset autism (EO) (14 M, 3 F, mean age 43.8 mo.) were compared to 12 controls (9 M, 3 F, mean age 47.1 mo.).

Results: The data show dysregulated genes in leukocytes of both clinically defined groups of children with autism compared to controls. 7 genes significantly different between autism and control groups (fold change (FC) >= [1.5], p<.05, False Discovery Rate (FDR) =.05) and predominantly expressed in the Natural Killer Cell (NK) Mediated Cytotoxicity pathway were validated with RT-PCR. Using these genes as input to a Principal Components Analysis, a subgroup of 24 autistic children (15 EO, 9 REGR) and 1 control with upregulation of these genes was identified (HIGH NK). Direct comparison of HIGH NK to remaining 11 children with autism (2 EO, 9 REGR) yielded 640 regulated probes (FC >= [1.5], p<.05, FDR =.05), reflecting upregulation of an expanded group of NK and cytotoxic T-lymphocyte related probes. The HIGH NK group itself comprises 2 subgroups based on a second group of probes, representing genes for proliferation factors, which are downregulated in one subgroup of the HIGH NK cohort.

Conclusion: These data suggest biologically based subgroups within autism.

Sponsor: NIEHS 1 P01 ES11269-01 (IN Pessah), UC Davis M.I.N.D. Institute (JP Gregg, FR Sharp), & NINDS NS028167 & NS043252 (FR Sharp), a grant from Cure Autism Now (CAN, FR Sharp) & the CHARGE study (I Hertz-Picciotto).

PS2.36 METHYLATION ANALYSIS OF CANDIDATE GENES IN AUTISM Marwan Shinawi, Roxanne Zascavage, Diane Treadwell-Deering, Ping Fang, Arthur L. Beaudet, Baylor College of Medicine
The genetic predisposition to autism is thought to be substantial with an estimated heritability of more than 90%. However, genome-wide linkage studies have not shown strong evidence for major autism-related loci. While mutations in few genes have been found in a small number of families with autism, studies of larger series of patients indicate these are very rare causes of autism. The high male-to-female sex ratio in autism has been replicated and confirmed in several epidemiologic studies. We are testing the hypothesis that de novo or inherited epimutations of sex chromosome-linked genes is responsible for the disease in a subset of autistic individuals and contribute to male susceptibility to autism. Our focus is on sex chromosome-linked candidate genes that are: 1) expressed mainly in the brain or involved in neuronal function; 2) not subject to X-inactivation with or without a homologue on the Y chromosome; and/or 3) subject to sexual dimorphism. The methylation status is being analyzed by using gel-based radioactive bisulfite sequencing or Southern blot analysis in the CpG islands of the following genes: NLGN4X, NLGN4Y, PCDH11X, PCDH11Y, MAOA, and MAOB. Blood samples from 15 affected females, 30 affected males and 30 controls and brain samples from 9 autistic individuals and 5 controls are being examined and compared. The preliminary data on all brain samples and limited number of blood samples did not show significant differences between patients and controls. In all samples from males, the DNA was completely unmethylated. The data for the pairs NLGN4X/NLGN4Y and PCDH11X/PCDH11Y in females were consistent with the interpretation that the inactive and active X chromosomes are unmethylated. For the MAOA and MAOB the data were consistent with the interpretation that the inactive X chromosome was methylated and the active X unmethylated. Additional studies are underway to test more samples and to statistically evaluate the degree of DNA methylation.

PS2.37 FURTHER EVALUATIONS OF THE NLGN3 AND NLGN4 GENES INCLUDING A NOVEL BIOINFORMATICS APPROACH IN AUTISTIC FEMALES WITH X INACTIVATION SKEWNESS Zohreh Talebizadeh, Mariana F. Theodoro, Merlin G. Butler, Children’s Mercy Hospital, Kansas City, MO
Background: We previously reported two novel splice isoforms in X-linked neureligins, NLGN3 and NLGN4, with a potential role in the etiology of autism spectrum disorders (ASD).

Objectives: 1) to perform mutation screening for the NLGN3 and NLGN4 genes in additional autistic females with X inactivation skewness, and 2) to evaluate potential regulatory sequences in both genes that might influence mRNA splicing. A novel bioinformatics approach will be used to investigate mRNA splicing in these genes as well as identification of other candidate genes for ASD.

Methods: Autistic females were ascertained from the Autism Genetics Resource Exchange (AGRE). X inactivation status was determined using the polymorphic AR gene assay on genomic DNA from peripheral blood. In addition, cDNA from lymphoblastoid cell lines will be used for mutation screening of the NLGN3 and NLGN4 genes. Sequence alignments and a novel bioinformatics approach are being utilized to identify potential regulatory elements and additional candidate genes for ASD.

Results: X inactivation skewness was confirmed for a group of 10 autistic females and screening is underway using cDNA for the presence of any abnormal transcript in the NLGN3 and NLGN4 genes. Sequence alignments revealed the presence of highly conserved regions in the intronic sequences of these neureligin genes. In collaboration with Dr. Fedorov, a bioinformatics expert at the University of Ohio, we have designed and utilized a computer program, (snoTARGET) for finding sequences with complementarity to a group of non-coding RNAs involved in posttranscriptional modifications including alternative splicing. This novel approach can identify potential mRNAs targeting candidate genes for ASD.
Conclusions: Our data and recent functional studies performed by others suggest a role for the X-linked neuroligins in the etiology of ASD. Detailed description of our findings will be presented.
Sponsor: CAN Foundation; KBR-CMH Grant

PS2.38
GENETIC MARKERS FOR DEVELOPMENT OF AUTISTIC DISORDER BASED ON MULTIPLEX GENOTYPING Kristine C. Tvedegaard, Erik Parner, Jørn Attermann, Craig W. Hooper, Niels Gregersen, Mads Holtegaard, David Hougaard, Foul Thorsen, NANE

BACKGROUND: Autism spectrum disorder (ASD) has multiple causes which are both environmental and genetic. With Denmark’s unique combination of high quality national registries and biobanks, exceptional possibilities of carrying out genetic epidemiologic studies are present. There is an overlap between clinical symptoms in individuals with ASD and individuals with abnormal fatty acid and phospholipid-metabolism. We hypothesize that genetic factors are predisposing factors for neurological developmental deficiencies such as infantile autism. These genetic factors include:

a) hereditable enzyme defects in the fatty acid metabolism, and
b) variations in select neuropeptides and other biologically relevant biomarkers.

OBJECTIVE: To study the association between genetic factors and the development of infantile autism; a well defined subgroup of ASD.

METHODS: The study includes 450 individuals with infantile autism, born from 1990 through 1999, and identified in the Danish Psychiatric Central Research Registry. The 450 controls are selected from the Danish Civil Registration System, such that each case is matched with one control on sex, year of birth and county of birth. Whole genome amplified DNA from Guthrie cards from the biobank at Statens Serum Institut were used to estimate the prevalence of the selected single nucleotide polymorphisms (SNPs). Genotyping of 17 SNPs in candidate genes were based on Multi-Code® Multiplexed Analysis from EraGen and processed on Luminex®100® IS Total System.

RESULTS: In the case control study with 450 individuals with infantile autism and 450 controls, of the 17 SNPs analysed one SNP in the promoter region of the ATP10C gene (coding for phospholipid-transporting ATPase VA) were found statistical significant associated in the preliminary analysis.

CONCLUSION: Preliminary results support the hypothesis that one SNP in the promoter region in the ATP10C gene is associated with development of infantile autism.

PS2.39
PREGNATAL STRESS AND MATERNAL SEROTONIN TRANSPORTER PROTEIN POLYMORPHISMS IN AUTISM David Q. Beversdorf, Daniel J. Birmingham, Vignesh Arasu, Jessica K. Alexander, Heather L. Campbell, Catherine A. White, Ashleigh Hillier, Margaret L. Bauman, Department of Neurology, The Ohio State University Medical Center

Our previous work demonstrated that a history of prenatal stress peaking at 25-28 weeks gestation is associated with development of autism. Presence of the short allele of the 5-HTT promoter region polymorphism is associated with a greater response to stress. Presence of this same allele has sometimes been associated with autism, usually in studies without autistic sibling pairs and not in studies with autistic sibling pairs. All of these phenomena could be explained if this allele represents a maternal risk factor for elevated stress response that may affect fetal development. In order to begin to address this, we did a pilot study to determine whether a history of prenatal stress cosegregated with presence of the short allele of the 5-HTT promoter maternally for autistic children. Surveys for a history of prenatal stress as well as genotyping for presence of the long and short alleles of the 5-HTT promoters (from buccal swabs) were performed in 27 mothers of autistic children. Chi-square analysis was performed to determine whether presence of the short allele cosegregated with a history of prenatal stress.

PS2.40
HOW OFTEN ARE AUTISM SPECTRUM DISORDERS SPORADIC? REDEFINING SIMPLEX AND MULTIPLEX STATUS BY QUANTITATIVE CHARACTERIZATION OF AUTISTIC TRAITS AMONG CONSECUTIVELY-ASCERTAINED FAMILIES John N. Constantino, Washington University School of Medicine

Background: There are multiple genetic pathways to the development of autism spectrum disorders (ASD). The genetic causes of sporadic (simplex) ASD may be different and more varied than the genetic causes of ASD that occurs in multiple members of an affected family (multiplex autism).

Objectives: To determine the prevalence of simplex ASD among consecutively-ascertained subjects, using standardized quantitative characterization of autistic symptomatology in siblings to rule in or rule out simplex status.

Methods: Children with ASD and at least one male sib were consecutively-ascertained from Washington
University clinics. ASD was confirmed by ADI-r and ADOS. Siblings were assessed with the Social Responsiveness Scale (SRS-a quantitative measure of autistic traits) by both parent- and teacher-report. The proportion of families in which at least one sibling exhibited clinically-significant elevation in SRS score by both parent- and teacher-report was computed and compared with that observed in an epidemiologically-ascertained general population sample of siblings. Results: The proportion of ASD families in which no sibling exhibited clinically- significant elevation in SRS score was 0.40 in comparison with 0.89 in the general population (chi square =76.1; p<.0001).

Conclusion: Although sibling recurrence risk for categorically-defined autism is on the order of 10 per cent, 60 per cent of ASD subjects in this study had one or more siblings with sub threshold levels of ‘affectedness.’ Quantitative characterization of family members may avert misclassification of simplex versus multiplex status in genetic and neurobiologic research.

Sponsor: NICHD

**PS2.41**

**OXYTOCIN RECEPTOR GENE (OXTR) AND ASSOCIATIONS IN CAUCASIAN CHILDREN AND ADOLESCENTS WITH AUTISM**

Suma Jacob, Camille W. Brune, C. S. Carter, Bennett Leventhal, Catherine Lord, Edwin H. Cook, University of Illinois at Chicago

Background: There is growing interest in oxytocin (OT) because of its role in affiliation, social and repetitive behaviors. Evidence for linkage and association with autism for the oxytocin receptor gene (OXTR) exists. We investigated whether associated single nucleotide polymorphisms (SNPs) in the Chinese Han population are associated with autism in a Caucasian sample. We further examined the OXTR region with selected tagSNPs and resequencing.

Methods: Probands met clinical, ADI-R, and ADOS criteria for autism. We genotyped the two previously associated SNPs (rs2254298, rs53576) in 57 Caucasian autism trios. The SOC and REP scores were analyzed as quantitative traits with sex, AGP group, and age of ADI completion included as covariates.

Results: The heritabilities ranged from 23 to 25% for the SOC score, and from 51% to 60% for the REP score corresponding to different ASD diagnostic definitions. For the SOC score, the most significant QTL was on chr 6q22 (LOD score =2.90, p = 0.00013, closest SNP rs1414738) using the all ASD definition. Genome-wide significant QTL was found on chr 10p13 (rs2768365) with LOD score = 3.51 and p = 0.000029 for the REP score using the broad ASD definition.

Conclusion: The SOC and REP scores are heritable and the most significant QTLs for them may be different from the most significant loci linked to autism.

Sponsor: Autism Speaks and numerous agencies that fund each individual AGP group.

**PS2.42**

**GENOME-WIDE LINKAGE ANALYSIS OF ADI-R SOCIAL AND REPETITIVE BEHAVIOUR DOMAIN TOTAL SCORES**

Xiao-Qing Liu, Andrew D. Paterson, Peter Szatmari, The Autism Genome Project (AGP) Consortium, The Hospital for Sick Children

Background: To date, genome-wide linkage studies have not produced striking linkage results for autism. The genetic basis of the components of autism may be simpler.

Objectives: To estimate heritability and identify quantitative trait loci (QTL) underlying the ADI-R social interaction (SOC) and repetitive behaviour (REP) domain total scores.

Methods: Multiplex families from the AGP consortium were used, which includes 10 groups across North America and Europe. There were 517, 718 and 1150 families that met the 3 nested autism spectrum disorder (ASD) diagnostic definitions of narrow, broad and all, respectively. 

Results: The heritabilities ranged from 23 to 25% for the SOC score, and from 51% to 60% for the REP score corresponding to different ASD diagnostic definitions. For the SOC score, the most significant QTL was on chr 6q22 (LOD score =2.90, p = 0.00013, closest SNP rs1414738) using the all ASD definition. Genome-wide significant QTL was found on chr 10p13 (rs2768365) with LOD score = 3.51 and p = 0.000029 for the REP score using the broad ASD definition.

Conclusion: The SOC and REP scores are heritable and the most significant QTLs for them may be different from the most significant loci linked to autism.

Sponsor: Autism Speaks and numerous agencies that fund each individual AGP group.

**PS2.43**

**INTERACTION BETWEEN THE GAD1 GENE AND SPECIFIC SEROTONERGIC GENES CONTRIBUTES TO AUTISM ETIOLOGY AND PLATELET SEROTONIN DISTRIBUTION**

Madalena Cristina Martins, Ana M. Coutinho, Catarina Correia, António Carrais, Carla Marques, Assunção Ataíde, Teresa S. Miguel, Joana Almeida, Celeste Bento, Teresa Morgadinho, Luís Borges, Guiomar Oliveira, Astrid M. Vicente, Instituto Gulbenkian de Ciência & Instituto Nacional de Saúde Dr. Ricardo Jorge

Background: An important genetic basis of the components of autism may be simpler.

Objectives: To examine the glutamate decarboxylase 1 (GAD1) gene, which maps to 2q31, as a plausible
candidate gene for autism.

Methods: We examined five GAD1 SNPs (two in the 5'UTR, three intronic) for association with autism in a sample of 208 nuclear families.

Results: Transmission disequilibrium tests showed a significant association with autism of six specific haplotypes (0.009 < P < 0.0397), suggesting a contribution of GAD1 gene variants to autism pathogenesis. The effect of specific gene interactions between GAD1 and three genes from the serotonin system (SLC6A4, HTR5A and ITGB3) on autism etiology was assessed using the MDR method in 183 patients and 183 controls. We further evaluated whether the effect of gene interactions associated with autism etiology might be mediated by their influence on serotonin levels, using the RPM, in a sample of 100 autistic children. We report a significant three-locus model comprising a synergistic interaction between the SLC6A4, HTR5A and GAD1 genes in association with autism (P < 0.001). The most significant interactions contributing to 5-HT distribution were found between SLC6A4 haplotypes and the GAD1 marker rs3749034 (P = 0.002) and HTR5A marker rs1800883 and GAD1 marker rs3828275 (P = 0.006).

Conclusions: The overall results implicate an independent main effect of the GAD1 and HTR5A genes in autism etiology. Interaction among the SLC6A4, HTR5A and GAD1 genes contribute to autism and serotonin level determination, suggesting that the impact of the GAD1 gene in autism etiology may be mediated by an interaction between the glutamergic and serotonergic systems.

Sources of funding: This work was supported by a Portuguese grant from the Fundação para a Ciência e a Tecnologia (FCT) (POCTI/39636/ESP/2001). Madalena Martins was supported by a grant from FCT (SFRH/BPD/14965/2004).

PS2.44
A FAMILY HISTORY STUDY OF AUTISM IN A POPULATION ISOLATE: EVIDENCE FOR GENETIC HETEROGENEITY ASSOCIATED WITH MR
L. Alison McInnes, Luz Ospina, Susan K Service, Elina R Manghi, Avi Reichenberg, James Schmeidler, Marcela Esquivel, Patricia Jimenez, Marietha Fallas, Silvia Monge, Pamela Bondy, Mount Sinai School of Medicine

BACKGROUND: It has been hypothesized that autism with MR may have a distinct genetic etiology. To test this hypothesis, we examined familial loading for psychiatric disorders and MR in 100 cases of autism stratified according to the presence of MR. METHODS: We consecutively ascertained autism cases and systematically recorded details of psychiatric, medical and neurological disorders in first degree relatives. Parental self-report information was confirmed by reviewing medical records or in consultation with treating physicians. All cases were cleared, to the best of our ability, for known medical causes of autism such as fragile X and cytogenetic abnormalities. The number of 1st degree relatives with a given condition was modeled as a function of IQ (dichotomized as <70=AUT+MR or >70=AUT) or the Vineland Adaptive Behavioral Scales using Poisson regression. RESULTS: The male to female ratio in the LFA probands was substantially lower than in the HFA probands, 6:1 versus 13:1, although this difference did not achieve statistical significance. Rates of Attention deficit hyperactivity disorder (ADHD), the broad autism phenotype (BAP) and all psychiatric disorders were significantly higher in the 1st degree relatives of HFA cases and there was also a trend towards an increase in obsessive-compulsive disorder. Elevated rates of MR were not observed in the 1st degree relatives of AUT+MR cases. There was no significant relationship between the VABS of the proband and the rate of any condition in 1st degree relatives. CONCLUSION: This is the first study to demonstrate increased familial loading for the BAP and ADHD in AUT versus AUT+MR probands. The increased rate of psychiatric disorders and the BAP in 1st degree relatives of AUT cases as well as the decreased gender ratio among AUT+MR cases, supports the notion that a different genetic and/or epigenetic mechanism may differentiate AUT from AUT+MR.

PS2.45
THE IMPACT OF FAMILY HISTORY OF ADHD OR BIPOLAR DISORDER ON SEVERITY OF AUTISM IN MULTIPLEX AND SINGLETON FAMILIES
Raun D. Melmed, Sharman E. Ober-Reynolds, R. Curtis Bay, Josh J. Jones, Susan M. Stephens, Sarah E. Brautigam, Janet E. Kirwan, Theresa A. Grebe, Southwest Autism Research & Resource Center (SARRC)

Background: Studies of autism reveal a high incidence of psychiatric and learning disorders in family members, suggesting clinical and genetic overlap. The occurrence of these disorders in family members would likely impact the severity of autism symptoms.

Objectives: To measure autism severity in children from multiplex and singleton families with a history of ADHD or Bipolar Disorder.

Methods: ADI-R and ADOS subscale scores were utilized to compare autism severity in the children of 18 multiplex and 20 singleton families who reported a history of ADHD or Bipolar Disorder on a four-generation pedigree. RESULTS: Using independent-sample t-tests, two-tailed, the severity of autism was greater in children of multiplex families with a history of ADHD or Bipolar Disorder as compared to children in singleton families with a similar family history (p = 0.05). In families with a history of Bipolar Disorder, children in multiplex families showed greater impairments in ADOS subscales related to Communication (p < 0.001), Imagination/Creativity (p < 0.001), and Overactivity (p = 0.001) as compared to children from singleton families. Also, children in multiplex families with a history of ADHD showed greater impairments in ADOS subscale scores related to Reciprocal Social Interaction (p < 0.001), and Imagination/Creativity (p = 0.001) as compared to singleton families.

Conclusion: Among families with a history of ADHD or
Bipolar Disorder, ADI-R and ADOS scores indicate increased severity of autism symptoms among children in multiplex as compared to children in singleton families. Sponsor: SARRC

**PS2.46**

PREVALENCE OF PSYCHIATRIC AND LEARNING DISORDERS IN MULTIPEX, ONLY-CHILD, SINGLETON, AND CONTROL FAMILIES  
Background: While specific genes have been implicated in the etiology of autism, a history of psychiatric and learning disorders (psych/LD) in family members may increase a child’s vulnerability to autism as well as these disorders.  
Objectives: To compare the family history of psych/LD disorders in four groups: multiplex families, families whose only child has autism (only-child), families with one child with autism as well as unaffected children (singleton) and control families.  
Methods: The prevalence of self-reported psych/LD was calculated using data from 1081 families who completed the SARRC Parent Questionnaire. Families were compared on reported history of the following: bipolar disorder, anxiety, depression, obsessive/compulsive disorder, ADHD, and learning disorders.  
Results: Of the families, 52(4.8%) were multiplex, 131(12.1%) only-child, 584(54%) singleton, and 308(29.0%) controls. Prevalence of each psych/LD disorder differed across family type (chi-square exact tests, two-tailed), all p<0.001. The trend for prevalence was identical for all disorders analyzed; multiplex families reported the greatest prevalence (by family history) of each disorder followed by only-child families, singleton families, then control families.  
Conclusion: Reported family history of psychiatric and learning disorders occurs most frequently in multiplex families and least in control families suggesting a genetic vulnerability which may predispose an individual to a spectrum of disorders, including autism.  
Sponsor: SARRC

**PS2.47**

SEX DIFFERENCES IN AUTISM ENDOGENOTYPES Jennifer A. Varley, Annette Estes, Geraldine Dawson, University of Washington  
Background: The ratio of males to females with autism spectrum disorders (ASD) is approximately 3:1. Despite this well-documented sex difference, there is limited research examining whether the pattern of ASD symptoms differs between boys and girls. Recent linkage studies have found genetic differences between ASD families with only affected males (MO; Male Only) and families containing at least one affected female (FC; Female Containing). Examining endophenotypes, in contrast to diagnostic status, may increase the likelihood of identifying phenotypic differences in MO versus FC families because endophenotypes are influenced by fewer genetic and environmental risk factors than diagnostic status.  
Objectives: This study investigates sex differences in selected endophenotypes between affected males from MO multiplex families, males from FC multiplex families, and females from FC multiplex families with ASD. Endophenotypes include language processing, executive functioning, memory, IQ, and psychiatric history.  
Methods: 308 multiplex families with at least 2 children diagnosed with ASD were included in analyses. Diagnostic assessment (ADOS, ADI, DSM-IV) and an age-appropriate intelligence assessment (Wechsler or Mullen Scales) was administered to all probands. Parent report of psychiatric symptoms was also obtained. For probands with adequate language abilities, neuropsychological assessment (CTOPP and CANTAB) was conducted.  
Results: Data are available from 205 MO families (425 affected males) and 103 FC families (97 affected males, 124 affected females). Preliminary analyses revealed lower IQs in female probands (M = 72.09, SD = 25.21) than male probands from both MO families (M = 76.93, SD = 26.71) and FC families (M = 77.28, SD = 29.30).  
Conclusion: Preliminary findings suggest FC females have lower IQs than both MO and FC males. Further analyses will examine potential differences in other measures of autism endophenotypes.  
Sponsor: NICHD

**PS2.48**

ERPs TO FACES IN ADULTS WITH ASD, WITH AND WITHOUT FACE MEMORY IMPAIRMENTS  
Kristen Merkle, Sara Jane Webb, Michael Murias, Rebecca Groen, Elizabeth Aylward, Geraldine Dawson, University of Washington Autism Center  
Background: McPartland et al. (2005) found that adults with ASD have a delayed N170 to faces compared to objects and slower speed of processing of faces was correlated with better performance on face memory tasks. This study replicates and extends the previous study by utilizing a larger and more narrowly defined sample of adults with ASD.  
Objectives: This study examines the ERP responses to faces and objects in adults with ASD versus matched controls. Participants were further divided by their performance on the Weschler Memory Scale (WMS) face memory subtest. Groups included adults with ASD with average face memory scores, adults with ASD with below average face memory scores, and matched controls.  
Methods: The WMS face recognition subtest was administered to determine face memory abilities; a standard score below 7 was defined as below average. ERPs to faces and objects were collected on the same subjects.  
Results: Preliminary analyses suggest a high degree of overlap in the two ASD groups in the speed of early stage ERP components to upright faces. While few differences were found to faces, further analyses will investigate
potentially more sensitive ERP measures.

Conclusions: High functioning adults with autism may have a more heterogeneous pattern of performance on face processing and face memory tasks than previous reports suggest. These findings have implications for face-training interventions for adults.

Funding source: NICHD (U19HD34565) and NIMH (U54MH066399)

PS2.49
ATTENUATED PRIMARY AUDITORY CORTEX ACTIVATION IN TODDLERS WITH AUTISM SPECTRUM DISORDERS: EVIDENCE FROM HIGH-DENSITY MIDDLE LATENCY AEPS
Clifford D. Sarson, David M. Horton, Susan M. Rivera, Tracy DeBoer, Margarita Beransky, Costanza Colombi, University of California at Davis

We recorded 60-channel auditory evoked potentials (AEPs) elicited by 50 ms complex tones presented at 50, 60, 70, and 80 dBSPL via headphones to four 3-4 year-old typically developing (TD) and 9 age-matched children diagnosed with autism spectrum disorder (ASD). Diagnostic criteria were based on ADOS, ADI-R, DSM-IV and clinician assessments. 1000 stimuli were delivered in random order, (ISI = 1-2s), as participants passively listened to them and watched a quiet video. AEPs for each intensity level were quantified using animated displays of topographic mapping of spherical spline interpolation of scalp current density.

For all children, AEPs in the latency range of 80 - 150 ms showed separable bilateral temporal and lateral frontal activations to 70 and 80 dB stimuli. TD children generally had more well-defined AEP waveforms, and their peak amplitude tended to have a shorter onset, sharper rising and falling edges, and exhibited stimulus intensity dependency, as opposed to ASD AEP peaks, which showed longer onsets, undefined edges, and were generally amplitude independent except for the 80 dB stimuli.

The pattern for children with autism was markedly different than that of the TD children in the middle latency (ML) range (~30-50 ms). In contrast to intensity dependent TD peak ML SCD amplitudes, ASD ML responses were largely nonexistent or irregular across stimulus intensities. Furthermore, in the ML range, notable ASD interindividual differences distinguished them from TD children, who showed similar and well-defined, bilateral peak ML activations.

These data suggest that early acoustic processing differences are present in some children with autism, raising questions about relations between such differences and atypical responses to auditory stimuli seen in some persons with autism. Data collection is ongoing as part of a large study aimed at multi-leveled characterization of the autistic phenotype.

Sponsor: UC Davis M.I.N.D. Institute Autism Phenome Project.

PS2.50
ERROR MONITORING IN AUTISM SPECTRUM

DISORDERS: AN EVENT-RELATED POTENTIAL STUDY
Jan Roelf Wiersema, Ruth Raymaekers, Herbert Roeyers, Ghent University, Department of Experimental Clinical and Health Psychology, Research Group Developmental Disorders

Background: Recent empirical findings have demonstrated connections between disturbances in functions of the anterior cingulate cortex (ACC) and autism spectrum disorders (ASD). There is some evidence that neural activity in the ACC and associated frontal cortex may predict variations in patterns of social symptom presentation among children with ASD.

Objectives: The major aim of this study is to gain more insight into the role of the ACC in ASD by measuring an event-related brain potentials index of error monitoring, the error-related negativity (ERN).

Methods: A group of children with high functioning autism (HFA) and a group of age, gender, and IQ matched control children completed a fast Go/No-Go task. In addition, children were instructed to monitor errors made by others, using a task based on Miltner et al. (2004).

Results: Preliminary analyses indicate that groups differ in the pattern of brain activity underlying error monitoring. Analyses of error observation are currently in progress.

Conclusions: These preliminary findings suggest that children with HFA are deviant in monitoring their own errors, in agreement with the hypothesis of a deviant development of ACC functioning. The role of the ACC in ASD and its relation with other functional neural systems will be discussed.

Sponsor: Ghent University Research Fund
ABSTRACTS

SLC25A12 GENE ASSOCIATED WITH AUTISM-SPECTRUM DISORDERS IN FRENCH PATIENTS
Nicolas Ramoz, Diane Dubroca, Fabrice Laroche, Célia Fortin, Bérangère Rousselot, Anne Philippe, Laurence Colleaux, Bernard Golse, Michel Simonneau, Philip Gorwood, Laurence Robel, INSERM U675
Astridm Vicente, Ana M. Coutinho, Ínes Sousa, Madalena C. Martins, Catarina A. Correia, Teresa Morgadinho, Celeste Bento, Carla Marques, Assunção Ataíde, Teresa S. Miguel, Jason H. Moore, Guiomar Oliveira, Instituto Nacional de Saude Dr. Ricardo Jorge
Thomas H. Wassink, Kacie J. Meyer, Edwin M. Stone, Val C. Sheffield, Autism Genome Project, University of Iowa Carver College of Medicine
The Autism Genome Project Consortium, Veterans Affairs Medical Center
Juthamas Wirojanan, Jennifer Yuhas, Susan Harris, Kylee Cook, Beth L. Goodlin-Jones, Randi J. Hagerman, Medical Investigation of Neurodevelopmental Disorders (M.I.N.D.) Institute, University of California Davis Health System, Sacramento, California

Sponsor: Fédération pour la Recherche sur le Cerveau.
EVIDENCE FOR EPISTASIS BETWEEN SLC6A4 AND ITGB3 IN AUTISM ETIOLOGY AND IN THE DETERMINATION OF PLATELET SEROTONIN LEVELS


BACKGROUND: The consistent finding of hyperserotonemia in some autistic patients and its heritability suggests a role of serotonergic genes in this disorder, with gene interactions likely contributing to the phenotype.

OBJECTIVES: 1) To assess the role of candidate genes in the serotonin metabolic and neurotransmission pathways, and mapping to linkage regions, in autism etiology; 2) to understand if the association of specific gene variants or gene interactions with autism is mediated by their impact on serotonin levels.

METHODS: Functional polymorphisms in candidate genes SLC6A4, HTR1A, HTR1D, HTR2A, HTR5A, TPH1 and ITGB3 were analyzed in 186 nuclear families. Gene interactions were assessed using the Multifactor-Dimensionality Reduction method in 186 patients and 181 controls. The effect of specific gene variants or interactions on serotonin levels was tested using the Quantitative Transmission Disequilibrium Test (QTDT) and the Restricted Partition Method (RPM), in a sample of 109 autistic children.

RESULTS: We report a significant main effect of the HTR5A gene in autism (P=0.0088), and a significant three-locus model comprising a synergistic interaction between the ITGB3 and SLC6A4 genes with an additive effect of HTR5A (P<0.0010). In addition to the previously reported contribution of SLC6A4, we found significant associations of ITGB3 haplotypes with serotonin level distribution (P=0.0163). The most significant models contributing to serotonin distribution were found for interactions between TPH1 rs4537731 and SLC6A4 haplotypes (P=0.002) and between HTR1D rs6300 and SLC6A4 haplotypes (P=0.013). In addition to the significant independent effects, evidence for interaction between SLC6A4 and ITGB3 markers was also found.

CONCLUSIONS: The results implicate SLC6A4 and ITGB3 gene interactions in autism etiology and in serotonin level determination, providing evidence for a common underlying genetic mechanism.

Funding: Fundação para a Ciência e a Tecnologia

A NRXN1 PATERNAL GERM-LINE MUTATION CAUSING AUTISM IN TWO FEMALE SIBLINGS

Thomas H. Wassink, Kacie J. Meyer, Edwin M. Stone, Val C. Sheffield, Autism Genome Project, University of Iowa Carver College of Medicine

BACKGROUND: The AGP performed a 10k SNP screen on 1496 multiplex autism families. Examination of the SNP data for genomic copy number variation revealed a deletion in the Neurexin 1 gene (NRXN1) in two female siblings with autism.

OBJECTIVES: 1) Characterize the NRXN1 deletion; 2) Screen a large sample of individuals with autism for NRXN1 mutations; 3) Test the AGP data for evidence of linkage disequilibrium (LD) at NRXN1.

METHODS: 1) qPCR and genotyping of polymorphic markers was performed in the deletion family. 2) 400 individuals with autism were screened for mutations in NRXN1-b using SSCP analysis. Gel shifts were sequenced, and novel variants were sequenced in the entire families in which they were found. 3) Four NRXN1 SNPs were tested for LD in the AGP families with the FBAT empirical statistic.

RESULTS: 1) qPCR confirmed the NRXN1 deletions in the siblings. Polymorphic markers showed no transmission of paternal alleles, indicating a germ-line mutation as the causative event. The deletion interval was narrowed to ~450 kb that includes the midsection of NRXN1-a and the promoter region and exons 1 and 2 of NRXN1-b. 2) No novel missense or nonsense variants were found. A number of novel synonymous and non-coding variants were identified that are of unclear significance. 3) Biased transmission was noted under a dominant model of inheritance for rs1363036 (p=0.0091) and rs930752 (p=0.025); rs930752 also showed biased transmission under an additive model (p=0.014). These intronic SNPs are in modest LD (r2=0.048).

CONCLUSIONS: Paternal germ-line mosaicism of NRXN1 appears to cause autism in the deletion family, though similar causative mutations are likely to be rare. More common NRXN1 variants, however, may contribute to autism susceptibility. This finding is of interest given recent data implicating germ-line mosaicism and mutations of cortical excitatory synapse genes (e.g., NLGN and SHANK) in the etiology of autism.

SPONSOR: Autism Speaks, NIH
COPY NUMBER VARIATION AND LINKAGE ANALYSIS OF MULTIPLEX AUTISM FAMILIES
The Autism Genome Project Consortium, Veterans Affairs Medical Center

Background: Autism risk is strongly influenced by inheritance. Autism genetics are complex and the genes responsible for this disorder have not been identified.

Objectives: To identify autism genes using a combined linkage and copy number variation (CNV) approach.

Methods: We genotyped 1496 multiplex families using the Affymetrix 10K SNP array. Genotype data were used in linkage analysis. Signal intensity from the arrays was used to detect CNV's.

Results: In the initial linkage analysis, one site at 11p12-p13 yielded a signal surpassing suggestive evidence for linkage. Initial CNV analysis yielded 2788 putative CNVs from 1109 sampled from 715 families. Using a variety of methods to refine signal interpretation, we detected 254 high-confidence CNVs in 196 autism cases from 173 families. Sites included 10 de novo CNVs, 18 CNVs in locations coincident with autism chromosomal rearrangements, and 126 CNVs with recurrent or overlapping boundaries suggesting non-random events. Sites of specific interest included 2 sibs with a de novo 300 kb loss that included some exons of neurexin 1, a recurrent 1.1 Mb CNV gain at 1q21 in 3 families, either a de novo gain (1 family), or an inherited loss (2 families) of the 17p21 Charcot-Marie-Tooth region, and 22q11.2 duplications in 2 families. Since autism caused by CNVs could add to heterogeneity, we removed families with one or more affected subjects with a CNV. The result was that a second region at 15q23-25.3 suggestive criteria for linkage analysis. When only female-containing families without CNVs were considered, evidence for linkage to 11p12-13 increased to 4.03 and approached genome-wide significance (4.10).

Conclusion: A multifaceted approach is needed to resolve autism genetics. By combining CNV and linkage analysis, we identified 2 regions of interest (11p12 and 15q23) for autism loci. CNV analyses suggest that neurexins are autism candidate genes.

Sponsor: Autism Speaks, NIH, CIHR, NIH, MRC

ARE TICS IN FRAGILE X SYNDROME RELATED TO AUTISM?
Juthamas Wirojanan, Jennifer Yuhas, Susan Harris, Kylee Cook, Beth L. Goodlin-Jones, Randi J. Hagerman, Medical Investigation of Neurodevelopmental Disorders (M.I.N.D.) Institute, University of California Davis Health System, Sacramento, California

Background: About 25% to 40% of children with fragile X syndrome (FXS) meet criteria for diagnosis of autism. Tic disorder and Tourette syndrome (TS) associated with obsessive compulsive behavior which can add to the number of autism symptoms of those with FXS. Our clinical impression was that individuals with FXS and tics often have autism.

Objective: To determine the correlation between tics and autism in patients with FXS.

Method: Medical records of patients with FXS ages 5 and older were reviewed. Autism and pervasive developmental disorder (PDD-NOS) were diagnosed by a team of developmental pediatricians and psychologists after a thorough assessment which included the Autism Diagnostic Observation Schedule (ADOS) and/or Autism Diagnostic Interview-Revised (ADI-R).

Results: One hundred and forty one patients, 106 males (78.7%) 35 females (21.3%) between the ages of 5 and 42 years old (10.9 years, + 5.7) were included. History of motor and/or vocal tics or TS was found in 25 patients (17.7 %), 21 males and 4 females. Nineteen of those patients (76%) also had autistic spectrum disorder (ASD) (either PDD-NOS or autism), which was higher than the prevalence of ASD in patients with FXS who did not have tics or TS (76 % vs 50.9 %, p=0.022). This association was found significant among females (75% vs 12.9%, p= 0.019) but not in males (76.2% vs 64.7%, p = 6.316).

Conclusions: These preliminary results suggest a significant association between tics and autism in females with FXS. Perhaps the additional genetic load related to tics is additive to the full mutation in females to increase the risk of autism.

Sponsor: NICHD
Oral Session #5
Neurophysiology and neuropsychology

Chair: Sara Webb

Speakers:
Boutheina Jemel, Daniel Mimeault, Anthony Hosein, Dave Saint-Amour, Laurent Mottron, Fernand Seguin Res. Cent., University of Montreal
Wouter Bastiaan Groen, Linda Van Orsouw, Marcel Zwiers, Rutger Jan Van der Gaag, Sophie Swinkels, Jan Buitelaar, Department of Psychiatry, Radboud University Nijmegen Medical Centre
Yael Adini, Yoram S Bonneh, Yoram Levanon, Omrit Dean-Pardo, Lan Lossos, The Weizmann Institute of Science
Mayada Elsabbagh, Agnes Volein, Karla Holmboe, Leslie Tucker, Gergely Csibra, Simon Baron-Cohen, Patrick Bolton, Tony Charman, Gillian Baird, Mark Johnson, Centre for Brain and Cognitive Development, Finland
Herbert Roeyers, Sylvie Verté, Dieter Baeyens, Vicky Samyn, Ghent University

ABSTRACTS

VEP RESPONSES TO PHASE REVERSAL GRATINGS REVEAL FUNCTIONAL ATYPICALITIES IN EARLY VISUAL PATHWAYS IN AUTISM Boutheina Jemel, Daniel Mimeault, Anthony Hosein, Dave Saint-Amour, Laurent Mottron, Fernand Seguin Res. Cent., University of Montreal

Background: Individuals with autism (ASD) demonstrate outstanding abilities in various low-level visual tasks, potentially implicating atypical functioning of early visual processing streams: magnocellular (M) and parvocellular (P) systems. Visual evoked potentials (VEP) reflect differential involvement of the M and P systems: the N80 is typically tuned to high spatial frequencies (HSF) and to high contrasts thus reflecting processing of the P-pathway, while P1 shows a low spatial frequency (LSF) tuning and sensitivity to low contrasts, thus mirroring the cells’ responses in the M-pathway.

Objective: Evaluate the integrity of early M and P processing systems in ASD using VEP measures.

Methods: VEP responses were recorded in adults with ASD (N=11, age=23.7y) and in age- and IQ-matched controls (N=10, age=25.6y) using a 59 EEG montage. The stimuli were vertical luminance-contrast sine-wave gratings, the phase of which was reversed at a temporal frequency of 1Hz. Phase reversing gratings were presented at low (LSF: 0.8 c/deg-1), medium (MSF: 2.8 c/deg-1) and high spatial frequencies (HSF: 8.0 c/deg-1), crossed with 4 contrast levels (4, 8, 32, and 90%).

Results: Occipital P1 was elicited at all SF gratings, and exhibited a characteristic magnocellular contrast response in the LSF condition: its amplitude increased with increasing contrast, and saturated at medium contrasts (8–32%) in controls but not in ASD. An additional early negative peak (N80-like peak) was elicited to LSF in ASD. At HSFs, a N80 was predominantly present in the VEPs of controls and ASD and showed a parvocellular contrast response: its amplitude increased gradually with increasing contrast. At MSFs, the N80 emerged at lower contrast levels (at 32%) in ASD than in controls (at 90%).

Conclusion: Our results suggest an increased sensitivity of the P-visual pathway in autism, which represents one of the first neurobiological markers of locally oriented visual processing in autism.
DIMINISHED NEURO-INTEGRATIVE FUNCTIONING OF AUDITORY PERCEPTION IN AUTISM
Wouter Bastiaan Groen, Linda Van Orsouw, Marcel Zwiers, Rutger Jan Van der Gaag, Sophie Swinkels, Jan Buitelaar, Department of Psychiatry, Radboud University Nijmegen Medical Centre

Background: Neurodevelopmental models of autism concerning atypical connectivity and excitatory-inhibitory imbalance have been proposed to explain the dichotic visual perceptual pattern in autism. The dichotic perceptual pattern (enhanced first order but diminished second order perceptual abilities) may also be present in the auditory domain since pitch discrimination (first order) is known to be superior in autism.

Objectives: To test whether the model of underconnectivity predicts perception in a complex second order auditory disembedding task in autism.

Methods: Two groups with normal hearing thresholds across audiometric frequencies participated in the study: 23 children with high functioning autism (ADI-R confirmed; age 12-18) and 23 healthy controls matched on age and IQ. Participants were presented with simple two-syllable words and a superimposed background noise to assess speech-in-noise-reception thresholds. Four background noises were used: pink noise, ripple noise, and pink and ripple noise convolved with a 10 Hz sine function yielding coarse temporal dips in the noise.

Results: Statistical analysis (MANOVA with repeated measures) showed that the overall group effect was not significant (p=0.849), indicating no overall hearing differences between both groups. However, the group-by-noise-by-dip interaction term was significant (p=0.012) and descriptive statistics showed that the gain in signal perception of pink noise with temporal dips relative to pink noise without temporal dips was significantly greater in controls (p=0.008). In the ripple noise condition, gain in perception was equal for both groups. Thus, as predicted by the underconnectivity theory, the autism group was less able to integrate auditory information present in temporal dips in the noise.

Conclusion: This study represents the first behavioral demonstration of diminished neuro-integrative functioning in autism in the auditory domain.

Sponsor: none.

ABNORMAL SPEECH SPECTRUM IN YOUNG AUTISTIC CHILDREN
Yael Adini, Yoram S. Bonneh, Yoram Levanon, Omrit Dean-Pardo, Lan Lossos, The Weizmann Inst. of Science

Background: Children with autism spectrum disorder who can speak often show abnormal voice quality and speech prosody. The underlying abnormal mechanisms are currently unknown and it is yet unclear if they stem from a high-level deficit in communication or alternatively related to basic speech mechanisms such as involved in controlling its spectral content.

Objectives: compare and analyze the speech spectra of young autistic children and normal controls and investigate their differences.

Methods: we recorded 82 children (41 autistic, 41 controls) ages 4 to 6 years (mean 5) while naming a sequence of daily life pictures pointed by the experimenter for 60 sec in a quite room in their preschools. We computed the power spectra of the speech recordings, averaged across time and normalized for each child in the range of 40 to 2000 Hz.

Results: The group averages of the spectra of autistic children and controls differed significantly in three spectral regions, around 300 Hz (N>A), 400 Hz (A>N) and 1100 Hz (A>N; p<0.006 in all cases). In addition, the autistic spectra were more uniform and less fluctuating, which we quantified by spectral analysis of the speech spectra curves for each child. We found that high frequency component of this analysis was higher in the controls and could predict if the child is autistic by ~85% correct using a simple threshold. No difference was found between boys and girls but the high functioning autistics differed from the other autistics.

Conclusion: The speech spectrum of young autistic children differs from that of normal controls. The more uniform spectrum we observed is in agreement with the often observed monotonic or machine-like speech in autism. Since the development of non-uniform speech spectrum is likely to involve auditory feedback, this could imply abnormal interaction between speech reception and production in autism. Further work is needed to develop the speech spectrum as a tool for early diagnosis.

Sponsor: CAN
NEURAL CORRELATES OF EYE GAZE PROCESSING IN THE EARLY AUTISM PHENOTYPE
Mayada Elsabbagh, Agnes Volein, Karla Holmboe, Leslie Tucker, Gergely Csibra, Simon Baron-Cohen, Patrick Bolton, Tony Charman, Gillian Baird, Mark Johnson, Centre for Brain and Cognitive Development

BACKGROUND: A growing number of studies with infant siblings of children diagnosed with ASD have revealed early behavioural differences in the broader autism phenotype, allowing for a prospective approach to the study of the emergence of autism in infancy.

OBJECTIVE: In view of previous findings of abnormal eye gaze processing in children and adults with autism, the aim of this study was to examine the early autism phenotype in infant siblings of children diagnosed with ASD (Sibs-ASD) compared to controls (Sibs-TD), focusing on the neural correlates of direct gaze compared to averted gaze.

METHODS: A group of 19 sibs-ASD (mean age = 9.7 months) was compared to a group of 16 controls (mean age = 9.9 months). Event-related potentials were recorded while infants viewed static photographs of females displaying direct or averted gaze.

RESULTS: Relative to sibs-TD, the sibs-ASD group showed increased latency of the occipital P2 component in response to direct gaze as compared to averted gaze (p=0.007). The groups did not differ in the earlier occipital P1 and N1 components.

CONCLUSIONS: As a group, infant siblings of children with ASD show abnormal neural processing of direct gaze as compared to averted gaze. This indicates that an extended autism phenotype is manifest early in infancy, and is likely to combine with other risk factors resulting in a diagnosis of autism for some individuals.

Sponsor: Medical Research Council, UK & Autism Speaks

INHIBITION AND WORKING MEMORY IN CHILDREN WITH AUTISM
Herbert Roeyers, Sylvie Verté, Dieter Baeyens, Vicky Samyn, Ghent University

Background: Comprehensive studies of working memory and inhibition in autism are limited and findings are inconsistent. A problem with most studies is that they investigate working memory and inhibition as unitary constructs. A distinction between different modalities is often not made. Moreover, the different working memory loads of the inhibition tasks used are usually not taken into account.

Objectives: To investigate the relationship between working memory and inhibition of prepotent responses in children with autism, compared with children with ADHD and normally developing controls, using different modalities.

Methods: Participants were 70 children with autism, 57 children with ADHD and 53 controls. Four different n-back and go/no-go tasks were used: two auditory-verbal versions (digits and letters), a visual (Japanese symbols) and a spatial version (boxes). Relative frequency of targets and working memory load were manipulated in the go/no-go tasks.

Results: Preliminary analyses suggest that children with autism are better than children with ADHD on the n-back tasks. On the go/no-go tasks, they make more errors of commission on the visual version than control children. They have faster reaction times than the two other groups in the digit and spatial modality. Differences are most pronounced in the high inhibition-high working memory load condition.

Conclusions: Task modality and complexity clearly have an influence on the performance of children with autism. Results show a correlation between working memory and inhibition which may imply that a common pool of executive resources is tapped by both processes. Theoretical and practical implications will be discussed.

Sponsor: Ghent University Research Fund
**Oral Session #6**  
**Diagnosis and screening**

Chair: Wendy Stone

Speakers:
Yoko Kamio, Naoko Inada, National Institute of Mental Health, National Center of Neurology and Psychiatry  
Claudine Dietz, Sophie Swinkels, Emma van Daalen, Jan Buitelaar, Herman van Engeland, Rudolf Magnus Institute of Neuroscience the Netherlands  
Sally Ozonoff, Stacy Goldring, Gregory S. Young, Laura Greiss-Hess, Joel Steele, Suzanne Macari, Adriana Herrera, Sally J. Rogers, MIND Institute, UC Davis  
Pauline A. Filipek, Kara L. Thorsen, Laurie A. Lennon, Catherine Devine, Jennifer Phan, University of California, Irvine, School of Medicine  
Marcia Nadine Gragg, Samantha Starr Scapinello, Irene Elizabeth Baert, Varakini Parameswaran, Andrea Corinne Cooper, Lisa Natalie Barzotto, University of Windsor, Department of Psychology

**ABSTRACTS**

**EARLY DETECTION OF AUTISM SPECTRUM DISORDERS USING THE JAPANESE VERSION OF THE MODIFIED CHECKLIST FOR TODDLERS WITH AUTISM (M-CHAT) IN JAPAN: FROM 18 MONTHS TO 36 MONTHS**  
Yoko Kamio, Naoko Inada, National Institute of Mental Health, National Center of Neurology and Psychiatry

Background: Although early detection of Autism Spectrum Disorders (ASD) of children with developmental or speech delay has been improved, it remains difficult to identify children with ASD without speech delay at 18 months of age.

Objectives: To examine whether the Modified Checklist for Toddlers with Autism (M-CHAT) is useful to children at 18 months of age in Japan at regular health check-up on a community basis similarly as for 24-month-olds in the U.S.

Methods: 1400 children who visited the 18-month health check-up were screened using the Japanese version of the M-CHAT with a 2-stage procedure. Screen-positive cases were evaluated at age 2, using the Childhood Autism Rating Scale Tokyo-Version, DSM-e-TR, and IQ/DQ tests. Then, children who suspected to have ASD were invited again for re-evaluations at age 3.

Results: Twenty-four children were screen-positive by both the 1st and 2nd screening. Among them, 19 children were identified as ASD and 5 children were found to be non-ASD at 2 years of age, resulting in a PPV of 79.2%. 83.3% of children diagnosed as ASD at age 2 stayed within a broad ASD diagnostic category. The items which differentiate ASD children from the others covered varied behaviors: social interest, imitation, joint attention, social reference and symbolic functions.

Conclusions: With a few modifications of threshold criteria, the M-CHAT screening can successfully differentiate children with ASD from non-ASD children at 18 months of age in Japan.

Sponsor: RISTEX (Research Institute of Science and Technology for Society)

**PARENTAL COMPLIANCE AFTER SCREENING SOCIAL DEVELOPMENT IN TODDLERS**  
Claudine Dietz, Sophie Swinkels, Emma van Daalen, Jan Buitelaar, Herman van Engeland, Rudolf Magnus Institute of Neuroscience the Netherlands

Background: The effectiveness of screening in terms of the willingness to accept a professional advice after a positive screening, is much ignored in literature.

Objectives: To examine the prevalence of compliance with follow-up measurements of parents after their child tested positive at a screening to assess problems in social development. To find demographic, screening related and child specific factors associated with parental compliance.
Methods: A random population of 31,724 children were screened at well-baby clinics at age 14 to 15 months (screen I). 364 children received screen II, i.e. 255 children who scored positive at screen I (population screening), and 109 children below 36 months who were identified by surveillance because of suspected problems in their social development. Compliance with recommendations of having either a second screening (after screen I) or clinical evaluation (after screen II) was measured.

Results: Of 370 children that tested positive at screen I, parents of 255 children (69%) complied with screen II. Three groups were distinguished after screen II (N=173): early-compliance (clinical evaluation within 6 months, 68%), late-compliance (clinical evaluation after 6 months, 14%), and non-compliance (no clinical evaluation, 18%). Late- and non-compliance was more common in parents of younger children and children who were identified via population screening. Parents of children with either relatively high cognitive skills and/or low scores on screening measures were less inclined to comply.

Conclusion: Study results suggest higher effectiveness of screening in terms of compliance after surveillance over population screening. Screening may well be applied as a second step after surveillance to identify children that need further clinical evaluation.

Sponsor: This study was supported by grants 940-38-045 and 940-38-014 (Chronic Disease Program).

**MOTOR DEVELOPMENT AND EARLY IDENTIFICATION OF AUTISM** Sally Ozonoff, Stacy Goldring, Gregory S. Young, Laura Greiss-Hess, Joel Steele, Suzanne Macari, Adriana Herrera, Sally J. Rogers, MIND Institute, UC Davis

Background: Motor difficulties are apparent in children with autism, but it is not known when they begin during development. It has been suggested that motor atypicalities in the first years of life may assist in early identification of autism (Teitelbaum et al., 1998).

Objective: Test the hypothesis that delayed or atypical early motor development can predict which children will develop autism.

Methods: Home movies of 26 children with early onset autism, 28 children with regressive autism, 25 children with mixed developmental delays (DD), and 24 children with typical development were collected and coded for motor behavior between birth and 24 months of age. The coding system examined the maturity of 6 motor behaviors (supine, prone, rolling, sitting, crawling, walking), as well as atypicalities in these behaviors (e.g., asymmetries, lack of protective reflexes, low muscle tone, log rolls, and, when present after 6 months of age, persistent asymmetric tonic neck reflex). Across all subjects, over 27,000 examples of motor behavior were coded. High reliability was maintained for all variables (mean ICC = .90, range = .86 for sit to .94 for roll). All coders were blind to group membership.

Results: No group differences were found for mean motor maturity in prone, rolling, sitting, crawling, and walking in either the first or second year of life. A main effect of group found for lying in supine was accounted for by significantly lower maturity in the DD group. The frequency of atypical motor behavior was low and there were no group differences in atypicality for any motor behavior.

Conclusion: Analysis of data from home movies taken between birth and 24 months of age does not support the hypothesis that children who later develop autism can be distinguished by delayed or atypical early motor development in the first years of life.

Sponsor: NIDCD

**YOUNGER SIBLINGS CAN SHOW DEFICITS AS EARLY AS 6 MONTHS OF AGE** Pauline A. Filipek, Kara L. Thorsen, Laurie A. Lennon, Catherine Devine, Jennifer Phan, University of California, Irvine, School of Medicine

Background: Younger siblings of children with autism are at greater risk of ASD than typical children. Early identification of aberrant behaviors is key for very early intervention.

Objectives: To evaluate the sensitivity to early ASD of screening questionnaires, observation tools, and standardized assessments commonly used for infant developmental evaluations.

Methods: Infant siblings of children with ASD (N=27) were recruited from For OC Kids at UC Irvine, enrolled at 6-15 mos (mean 8.25 + 6.24) and followed through 30 mos of age. Language, cognition, adaptive skills, play, social communication, autism screening measures, and parent questionnaires were assessed every 3 months. The ADOS was administered at 18 and 24 mos.

Results: All of the siblings showed delays or atypical behaviors in one or more areas of development. None of the conventional testing instruments of language and cognition as a whole, such as the Mullen or Preschool Language Scale, were sensitive to the qualitative deficits seen in
these infants, and produced ‘normal’ scores. As early as 6 mos of age, specific items from the Rossetti Infant-Toddler Language Scale and the Communication & Symbolic Behavior Scales were consistently sensitive to qualitative impairments in reciprocal communication, gesture development, symbolic play and social communicative behaviors, such as receptive and non-echoed expressive language, vocalizations directed at others, unusual eye gaze, showing to share, and functional play.

Conclusions: Contrary to recent reports, this study demonstrates that infant siblings can show deficits as early as 6 mos of age. Conventional assessment instruments are not sensitive to these deficits. Certain instruments and individual items from conventional assessment instruments are sensitive to such early deficits, and may be ultimately used to form an Infant Autism Screen.

Sponsors: Larry & Helen Hoag Foundation; Children & Families Commission of Orange County.

AUTISM: COUNT US IN! PARENT TELEPHONE HOTLINE FOR COMMUNITY SCREENING FOR AUTISM SPECTRUM DISORDERS Marcia Nadine Gragg, Samantha Starr Scapinello, Irene Elizabeth Baert, Varakini Parameswaran, Andrea Corinne Cooper, Lisa Natalie Barzotto, University of Windsor, Department of Psychology

Background: Parents express distress at delays in obtaining ASD diagnoses for their children, and at community professionals who often reassure and wait rather than refer.

Objectives: Explore utility of telephone screening through community hotline accessible directly by parents.

Methods: Telephone ASD screening using SCQ and M-CHAT for children born between 1999 and 2003 was provided for 14 months in Windsor/Essex County, Ont. Screening was promoted by 40,000 brochures, 35 community events, 5 newspaper articles, 2 school boards, 17 organizations, websites and online parent forums. Letters with results were provided to parents on request.

Results: 76 parents of children (mean age=48 mo.; range=21 to 81 mo.) completed screening. 86.8% of children were male. 61.8% of children had no previous diagnosis. 52 children screened at risk for ASD (68.4% of total; 63.8% of undiagnosed children). These 52 children represent 38 to 83% of children with ASD expected in this geographic area (22,744 children born between 1999 and 2003), at an expected ASD rate of 27.5-60 per 10,000. Average age at parents' first concern was 19.8 mo. (range=1 to 60 mo.). For diagnosed children, age at first diagnosis was 36.6 mo. (range=12 to 75 mo.). 20% of children received Early Intensive Behaviour Intervention. 56.6% of children received Speech Language therapy. Most parents heard about ASD screening through brochures (42.2%) and word of mouth (32.9%), with less than 8% each through the media, community events and websites. Parents provided additional information about services received and lacking for themselves, their children and their families.

Conclusion: Telephone screening for ASD is a low-cost community strategy well accepted by parents that may help reduce delays in obtaining ASD diagnoses for preschool children. Follow-up is proceeding.

Sponsors: Angels of Autism, Autism Ontario Windsor/Essex, Autism Services Inc., Summit Centre for Preschool Children with Autism Board
Invited Educational Symposium #3
Medical aspects of autism spectrum disorders

Chair: Margaret Bauman

Speakers:
Timothy Buie, Massachusetts General Hospital
Daniel Glaze, Baylor College of Medicine
Robert D. Steiner, Oregon Health & Science University
Margaret L. Bauman, Massachusetts General Hospital

The Autism Spectrum Disorders (ASD) are behaviorally defined disorders associated with impaired social interaction, delayed and disordered language and isolated areas of interest. Although the cause of ASD remains largely unknown, there is much that can be done to improve the developmental outcomes and quality of life for those affected. Over the past several years, it has become increasingly apparent that many ASD individuals can and do experience a number of health-related disorders, similar to those affecting typically developing children. However, these often go undiagnosed and untreated, most especially in non-verbal, behaviorally challenging children. While the disorders may not be causative, their presence can have a negative effect on developmental progress and family life. In addition, identification and inclusion of some of these disorders in the clinical characterization of ASD individuals may further contribute to our understanding of the neurobiology of the disorder and potentially to improved identification of genetically related subgroups. In this symposium, Dr. Timothy Buie will present a review of the literature pertaining to gastrointestinal disorders reported in association with autism and will discuss his preliminary data regarding some of these disorders and their clinical implications. He will be followed by Dr. Daniel Glaze who will discuss disturbances of sleep in autism, their potential causes, impact on developmental progress and directions for future research. The third presentation will be by Dr. Robert Steiner who will review metabolic disorders and autism with a particular emphasis on cholesterol disorders and published reports along with his preliminary data supporting a role for cholesterol in the etiology of autism. Dr. Margaret Bauman, will conclude this session by discussing future directions in the identification, evaluation and treatment of associated medical conditions in autism and the potential impact these disorders may have on developmental outcomes, quality of life and our understanding of some of the neurobiological mechanisms that may underlie and/or contribute to some of the clinical features of autism.

Timothy Buie, M.D.
Massachusetts General Hospital, Boston, Massachusetts
Gastrointestinal Disorders and Autism

Daniel Glaze, M.D.
Baylor College of Medicine, Houston, Texas
The challenge of sleep disorders and the autism spectrum disorders

Robert D. Steiner, M.D.
Oregon Health & Science University, Portland, Oregon
Metabolic conditions and autism – clues to etiology?

Margaret L. Bauman, M.D.
Massachusetts General Hospital, Boston, Massachusetts
Directions for future research
Invited Educational Symposium #4
Genetic approaches to autism: Complex methods to a complex disorder

Chairs: Gerard Schellenberg and John Constantino

Speakers:
Gerard Schellenberg, University of Washington
John Constantino, Washington University School of Medicine
Matthew State, Yale University
Ellen Wijsman, University of Washington

In this symposium, which is intended for researchers and students in all areas of autism research, we will review and discuss the prevailing array of scientific approaches to identifying susceptibility genes for autism. First, we will cover the strengths and limitations of traditional linkage analysis, ways in which it has advanced and failed autism research, and prospects for applying new methods, including whole genome association and studies of copy number variation, to samples previously collected for linkage analysis. Next we will present principles of quantitative trait analysis, and the importance of precise characterization of the autistic phenotype for genetic, neurobiologic, and neuropsychologic studies of autism. Finally, the prospects for exploring the unique genetic determinants of rare autistic syndromes will be discussed, especially with respect to how they might lead us to new insights into the neurobiology of all autism spectrum disorders. Throughout the symposium, presenters will review the tradeoffs inherent in adopting various approaches, and how to identify cases, families, and samples in all areas of autism research that might be particularly informative if included in molecular genetic data collection.

Gerard Schellenberg, Ph.D.
University of Washington
Molecular Genetic Approaches to Gene Identification in Autism

John Constantino, M.D.
Washington University School of Medicine
Endophenotypes – Inherited Quantitative Components of the Autistic Syndrome – in Multiplex versus Simplex Families

Matthew State, M.D., Ph.D.
Yale University
Rare Genetic Variants and Autism Spectrum Disorders

Ellen Wijsman, Ph.D.
University of Washington
Statistical Genetic Approaches for Analysis of Autism and Autism Endophenotypes
PS3.1
DIAGNOSIS IN AUTISM: PARENTAL SATISFACTION WITH DIAGNOSTIC PROCESS
Lorraine Book, Amy M. Wetherby, Allison M. Plumb, Florida State University
Background: The importance of early detection and intervention in autism spectrum disorder (ASD) is well documented. However, many children do not receive an early definitive diagnosis, which can be a major source of stress and dissatisfaction for parents, hindering parent/professional relationships.
Objectives: This study investigated the experience of parents in receiving a diagnosis of an ASD for their children. The purpose of this study was to ascertain initial parental concerns, average age of diagnosis, amount of time needed to obtain a diagnosis, and how these relate to overall parental satisfaction with the diagnostic process.
Methods: A survey designed to gather information about the diagnostic process was mailed to 374 parents of children age 2 to 12 years who are clients of the FSU Center for Autism and Related Disabilities. Returned questionnaires were anonymous.
Results: Based on the return of 55 surveys, the average age of the children was 79 months and the average age that parents first reported becoming aware of developmental problems was 21 months. The most common first concerns reported were: delay in first words (69%); rituals/obsessions/object attachments (52%); lack of eye gaze to people (42%); no pretend play (40%); no gesturing (39%) and repetitive movements (39%). The average reported age of diagnosis was 43 months for autism, 41 months for PDD-NOS, and 63 months for Asperger disorder. Parents reported an average 9-month delay in seeking help after their initial concerns and 13 additional months to obtain a diagnosis. There was no significant correlation between age of diagnosis or length of delay and overall satisfaction with the diagnostic process. Conclusion: The average age of diagnosis for the ASDs and initial parental concerns were consistent with previous research. Lengthy delays in obtaining a diagnosis were evident which underscores the need to reduce the time between initial concern and diagnosis.
Sponsor: CDC

PS3.2
THE RELATIONSHIP BETWEEN COGNITIVE FUNCTIONING AND SOCIOECONOMIC STATUS ON THE DIAGNOSIS OF AN AUTISM SPECTRUM DISORDER (ASD). Sally M. Brocksen, Kimberly K. Powell, Jon Baio, Centers for Disease Control and Prevention
Background: Early identification is critical in providing better developmental outcomes for children with an autism spectrum disorder (ASD). Since the ASDs are behaviorally-defined disorders, there may be multiple associated conditions and sociodemographic features that influence whether a child is identified with an ASD diagnosis or not.
Objectives: To evaluate if the identification of an ASD diagnosis by community providers differs among children by socioeconomic status (SES) and the presence of co-morbid mental retardation.
Methods: The Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP) is an active, ongoing surveillance project of multiple developmental disabilities. MADDSP identifies children with an ASD using a multiple source, record review methodology. Children identified with ASD in the 2000 MADDSP study year were linked with the 2000 census data to analyze socioeconomic status (SES) by tertiles (low, medium, and high). A community-level measure of SES based on a validated method using block group census data was created using principal component analysis. Bivariate and logistic regression was used to examine the relationship of demographic factors and identification of an ASD.
Results: Of children identified in MADDSP as having an ASD (n=285), 59.6% did not have a previous clinical diagnosis of ASD (n=170). Among children who did have a previous diagnosis, only 19.6% had the ASD diagnosis before the age of 5. A child having ASD with co-morbid MR is associated with being in the lowest SES tertile (crude OR = 2.1 95% CI 1.1, 3.9). A relationship was seen between co-morbid MR and having a previous clinical diagnosis (crude OR = 1.6 95% CI 1.0, 2.6) although not statistically significant at ± < 0.05. Conclusion: The presence of co-morbid mental retardation in children with ASD is associated with low SES and may play a role in clinical diagnosis.

PS3.3
REPLICABILITY OF DIAGNOSTIC APPROACHES TO ASPERGER SYNDROME
Elizabeth Christine Buvinger, Kaite Gotham, Susan Risi, Shanping Qiu, Edwin H. Cook, Catherine Lord, University of Michigan
Background: Early definitive diagnosis, which can be a major source of stress and dissatisfaction for parents, hindering parent/professional relationships.
Objectives: To try to replicate the results of Klin et al. (2005), looking at three diagnostic approaches to AS, with a New System providing the best separation between AS, autism, and PDD-NOS. Also, we will try to compare results to those of Szatmari et al. (submitted) who looked...
at the effect of changing the order of diagnostic criteria on the resulting grouping of those with AS, autism, and PDD-NOS and found that the algorithms tended to overdiagnose autism and to underdiagnose AS and PDD-NOS, but this was minimized if the algorithm diagnosed children with AS first, before autism.

Methods: Participants were recruited from the data bank of the UMACC which consists of consecutive referrals to several different autism clinics. Only individuals with full cases will be used for analysis. Full cases for a clinic visit consist of the ADOS, ADI, IQ, the VABS and a clinical best estimate diagnosis. Selection criteria include diagnosis on the autism spectrum, VIQ and NVIQ e70, and CA e 60 months.

Results: With these criteria, 314 cases (84% male) resulted with a mean age of 9.7 years, an average VIQ of 99.74, and an average NVIQ of 101.97. Using strict DSM-IV diagnostic criteria, the entire sample consisted of the following best estimate diagnoses: 37.3% autism, 55.7% PDD-NOS, and 3.5% AS. Analysis of alternate hypotheses about the most valid way to group individuals with ASD who have fluent language are still in progress.

Conclusions: If results mimic those of previous studies, these findings suggests the need for a new diagnostic scheme for AS - one that is widely disseminated and used by researchers and clinicians alike so as to assure comparability of those diagnosed with the disorder.

Sponsor: NIMH, NICHD

**PS3.4**

**SCREENING TOOL FOR AUTISM IN TWO-YEAR-OLDS- TAIWAN VERSION (T-STAT): DEVELOPMENT AND PRELIMINARY DATA**

Chung-Hsin Chiang, Chin-Chin Wu, Yuh-Ming Hou, Jian-Horng Liu, Department of Psychology, National Chung Cheng University

Background: The STAT is a twelve-item interactive screening measure for autism, which has been investigated and demonstrated strong psychometric properties and shows promising utility as a Level 2 screening measures for autism in the Western society. However, no study was used STAT for young children with autism in the Eastern culture. A modified T-STAT developed from the original STAT was used in the study.

Objective: The purpose of current study was to examine whether the T-STAT is a validated screening tool for the young children with autism in Taiwan.

Methods: The participants were forty 30-month-olds (range = 24-36 months) children with autism and 13 28-month-olds (range = 24-36 months) children with non-autism spectrum disorder. All of participants were recruited from one local hospital in Taiwan and assessed and diagnosed by multidisciplinary team. ADOS-G was administered independently by the first author. The Mullen Scales of Early Learning was administered to get several indexes of mental age for the two groups; however, the current analyses were used by unmatched sample. For developing new T-STAT, three items were substituted and held the nine items from the original STAT.

Results: Using the same algorithm and cutoff of original STAT, yields T-STAT’s sensitivity and specificity. Based on the diagnosis of ADOS-G, the sensitivity and specificity are .85 and .85, respectively. Based on the diagnosis of clinical judgment, the sensitivity and specificity are .86 and .72, respectively. Comparing the three areas of T-STAT in two groups based on ADOS-G classification, there were significant differences in areas of play and both types of communication, but not in the area of imitation.

Conclusions: Results of this study demonstrated that the preliminary data of T-STAT is quite good tool to differentiate the typical autism and non-autism spectrum disorder. Further studies are needed to recruit more subjects and demonstrate the psychometric properties.

**PS3.5**

**SYMPTOM DOMAIN SPECIFICITY IN AUTISM SPECTRUM DISORDERS (ASD)**

Katherine Oberle Gotham, Somer Lauren Bishop, Catherine Lord, University of Michigan

Background: The "Insistence on Sameness" factor (IS) of the Restricted Repetitive Behaviors (RRB) domain of the ADI-R, as opposed to the "Repetitive Sensory-motor Behaviors" factor (RSMB), has been found to correlate to ADI-R communication domain symptoms and to exhibit familial aggregation. It therefore has been suggested as a means to define separate ASD phenotypes.

Objectives: To examine the specificity of the IS factor to the autism spectrum, in comparison with a sample of children with fetal alcohol spectrum disorders (FASD).

Methods: Participants were 27 children with FASD and 60 children with ASD group-matched on age, gender, and full scale IQ. Individuals in the FASD sample ranged from 3-11 years of age and had been diagnosed by an experienced physician. Participants with ASD were drawn from an existing database of individuals seen for clinical or research assessments. Children from each diagnostic group contributed ADI-R, Autism Diagnostic Observation Schedule (ADOS), and Differential Ability Scales (DAS) data.

Results: In a comparison of ADI-R "ever" scores for RSMB-loading items, the autism sample had significantly higher mean totals than the PDD-NOS sample (p<.01) and the FASD sample (p<.001), though the latter two samples did not differ significantly. For the IS factor, no significant differences were found in the mean total scores of the three diagnostic groups (AUT-FASD, p=.72; AUTPDD-NOS, p=.99; PDD-NOS-FASD, p=.82). The same patterns of results were found when the total number of RSMB and IS symptoms (i.e., items with non-zero scores) were compared between diagnostic groups.

Conclusion: Though the IS factor may be useful in differentiating children with ASD from certain non-spectrum disorders, this study suggests that IS behaviors are not specific to the autism spectrum.

Sponsor: NIMH, NIAAA
**PS3.6**  
**AGREEMENT RATE BETWEEN CLINICAL DIAGNOSIS AND PSYCHOLOGICAL MEASUREMENTS IN TAIWANESE TODDLERS WITH AUTISM**  
*Yuh Ming Hou, Juan- Horng Liu, Chung-Hsin Chiang, Chin-Chin Wu, Chiayi Christian Hospital, Taiwan*  

**Background:** Early diagnosis of autism in toddlers now is possible. But the stability of diagnosis and the correlation between clinical diagnosis and different psychological measurements still need further research.  

**Objectives:** Compare the agreement rates in clinical diagnosis and ADOS-G and STAT in Taiwanese toddlers with autism spectrum disorders.  

**Methods:** Patients were recruited from the Developmental Assessment Clinic of the Chiayi Christian Hospital. Patients aged between 24-36 months were assessed with the ADOS-G and STAT. Then two child psychiatrists blind to the result of psychological measurements made the clinical diagnosis through interaction with the children and semi-structure interview with their caregivers.  

**Results:** 50 children (mean age=29.3 months) were recruited. By clinical diagnoses, the children were divided into autism group (N=20, 17 males and 3 females), PDDNOS group (N=10, 8 males and 2 females) and delayed group (N=20, 15 males and 5 females). We compare the result of ADOS-G and STAT of these 3 groups. By ADOG-G, for autism group, 16 children were autism, 3 PDDNOS and 1 delayed; for PDDNOS group, 8 children were autism, 1 PDDNOS and 1 delayed; and for delayed group, 6 children were autism, 7 PDDNOS and 7 delayed. By STAT, for autism and PDDNOS groups, 24 children were classified as autism and 6 non-autism; and for delayed group, 8 children were autism and 12 non-autism.  

**Conclusion:** For toddlers with autism spectrum disorders the agreement rate is good. However for the toddlers with delayed development, the findings became variable. Further studies and long term follow up studies are needed.  

**Sponsor:** National Science Council in Taiwan

**PS3.7**  
**EXECUTIVE FUNCTIONS IN ASPERGER’S DISORDER AND HIGH-FUNCTIONING AUTISM: TAXONOMICAL VALIDATION AND RELATIONSHIP TO OTHER VARIABLES.**  
*Adam W. McCrimmon, Vicki Schwean, Don Saklofske, Janine Montgomery, Danielle Dyke, Candace Cohan, Yvonne Hindes, Keoma Thorne, Joanne Burt, University of Calgary*  

A body of research has investigated the taxonomical validation of Asperger Syndrome (AS) and high-functioning autism (HFA). One construct used in this effort is Executive Functioning (EF). While this research has shown that these two populations perform significantly below typically-developing matched controls on EF measures, results of investigations of performance between them are mixed (Calhoun, 2006; Hill, 2004). This is likely due to the use of inconsistent diagnostic criteria leading to incomparable studies (Klin, Pauls, Schultz & Volkmar, 2005). The present study investigated EF in AS and HFA using a bottom-up method whereby several EF measures were administered to a mixed group of adolescents with either AS or HFA and performance was analyzed using cluster analysis to empirically derive subgroups. Diagnostic composition of these subgroups was then determined to provide empirically-based external validation of the nosology. Based on research demonstrating differential performance of modality on measures of cognitive intelligence (Klin et al., 1995) and executive functioning (Kleinhaus, Akshoomoff & Delis, 2005), it is expected that subgroup(s) demonstrating high verbal and low non-verbal EF performance will be comprised primarily of individuals with AS. Conversely, it is expected that subgroup(s) demonstrating high non-verbal and low verbal EF performance will be comprised primarily of individuals with HFA. This study also investigated EF in these populations and its relationships to cognitive intelligence (IQ), emotional intelligence (EI) and severity of symptoms (SS). It is expected that IQ and EI will be positively correlated with EF performance, while SS will be negatively correlated. Results will be discussed in terms of empirical validation of the differentiation of AS and HFA in the research literature and clinical practice.

**PS3.8**  
**AGREEMENT BETWEEN ADOS-G AND ADI-R ON SENSORY INTEREST AND REPETITIVE BEHAVIOR ITEMS**  
*Jenna Mendelson, Agata Rozga, Angeline Dijamco, Michael Siller, Ted Hutman, Marian Sigman, UCLA*  

**Background:** The ADI-R and the ADOS-G both probe for unusual sensory interests and repetitive behaviors as concurrent with a diagnosis of autism.  

**Objectives:** To examine concurrence between the ADOS-G and the ADI-R on items relating to repetitive behaviors and sensory interests, and to look for possible correlates of disagreement between the two assessments.  

**Methods:** The repetitive behavior and sensory interest items on the ADOS-G and ADI-R of 37 children diagnosed with autism were compared using the Chi-square method. For each measure, scores of 0 (no sensory behaviors or repetitive interests) were compared to scores of 1, 2, or 3 (some repetitive behaviors or sensory interests).  

**Results:** Scores on the ADOS-G and the ADI-R were significantly related for repetitive behavior [X²(1, N = 34) = 9.95, p = .002], but not for sensory interests [X²(1, N = 37) = 2.47, p = .116]. There were 17 (46%) disagreements between the ADOS-G and the ADI-R on the sensory interest item and 16 of these were in the direction of a score of 0 on the ADOS-G but a score of 1, 2, or 3 on the ADI-R. Importantly, 14 of these disagreements were scores of 0 on the ADOS-G and a score of 1 on the ADI-R.  

**Conclusions:** While generally there is agreement between the ADOS-G and the ADI-R on scores on repetitive behavior and sensory interest items, milder sensory
interests reported on the ADI-R may not manifest during ADOS-G administration. Further analyses will be conducted, incorporating data from an additional 65 subjects, to examine the child’s level of language and parental education as correlates of disagreement between the ADOS-G and ADI-R.

Funding: CPEA Grant HD-DCD35470

PS3.9
PARENTS’ EXPERIENCE OF THE DISCLOSURE OF THEIR CHILD’S DIAGNOSIS OF AUTISM
Daniel W Mracek, Laura B Silverman, Robert T Peyton, Melissa Mueller, Elizabeth Beazley, Elizabeth Baltus Hebert, Tamara Hoffritz, T. M. Abrams, Jacalyn T Yingling, University of Rochester Medical Center

Background: Successful disclosure of an autism diagnosis can promote effective and timely understanding of the disorder, prognosis, and intervention options, as well as promote family well-being. Previous research suggests that factors associated with greater parent satisfaction include interpersonal style, quality of presented information, written materials, and opportunity for questions. More information about these and other areas is needed in order to successfully support families at time of diagnosis.

Objectives: To use qualitative methodology to characterize parent perceptions of the disclosure of their child’s autism as one step in the development of best practice guidelines for clinicians.

Method: Participants were 45 toddlers who received a developmental evaluation because they failed an autism screen. Most children were identified by early intervention providers. Evaluations consisted of child and parent measures. Children were classified as ASD or non-ASD by CJ and the ADOS, and autism or non-autism on the CARS and ADI-R.

Results: The mean age at time of assessment was 26 months. Thirty-six children were classified as ASD based on CJ. Agreement between the ADI-R and CARS improved when the behavioral domain was excluded, k = .328, p = .021. Similarly, agreement improved when comparing the ADI-R and CJ, k = 3.48, p = .019. However, results found little improvement between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. With CJ considered the gold standard, the sensitivity of the ADI-R was improved when the behavioral domain was excluded (.89 versus .53), although specificity was compromised (.44 versus .67).

Conclusion: Excluding the ADI-R behavioral domain improves agreement between the ADI-R and CARS and CJ; this suggests that stereotyped interests and behaviors may not be as relevant as other diagnostic criteria when evaluating young children for ASD. Agreement did not improve between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. This latter finding suggests that both child and parent measures are important components of an ASD evaluation.

Sponsor: R01 HD39961

PS3.11
AN INVESTIGATION OF RESILIENCY IN YOUTH WITH ASPERGER SYNDROME AND HIGH-FUNCTIONING AUTISM
Keoma J. Thorne, Vicki L. Schwean, Don H. Saklofske, Adam W. McCrimmon, Janine M. Montgomery, Danielle I. Dyke, Candace S. Kohut, JoAnne G. Burt, Yvonne L. Hindes, University of Calgary

Many youth grow up with the challenges of ongoing adversity, which can threaten various areas of development. Resilience (successful adaptation in spite of exposure to risk) can mitigate the effects of adverse life events and stressors through internal and external protective factors (Olsson et al., 2003). Current research suggests that youth with difficulties in communication and social interaction are at increased risk for maladaptive outcomes (Tantam, 2000). Asperger syndrome (AS) and high-functioning autism (HFA) are characterized by the presence of atypical social interaction, language, and communication, and these youth face significant threats to between the Autism Diagnostic Interview-Revised (ADI-R) and three observation-based methods: Autism Diagnostic Observation Schedule (ADOS), Childhood Autism Rating Scale (CARS), and clinical judgment (CJ) when evaluating toddlers (Ventola et al., 2006), although agreement between the ADOS, CARS, and CJ was high. Specifically, the ADI-R under-identifies autism.

Objective: To examine whether exclusion of the ADI-R behavioral domain results in improved diagnostic agreement when evaluating young children.

Method: Participants were 45 toddlers who received a developmental evaluation because they failed an autism screen. Most children were identified by early intervention providers. Evaluations consisted of child and parent measures. Children were classified as ASD or non-ASD by CJ and the ADOS, and autism or non-autism on the CARS and ADI-R.

Results: The mean age at time of assessment was 26 months. Thirty-six children were classified as ASD based on CJ. Agreement between the ADI-R and CARS improved when the behavioral domain was excluded, k = .328, p = .021. Similarly, agreement improved when comparing the ADI-R and CJ, k = 3.48, p = .019. However, results found little improvement between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. With CJ considered the gold standard, the sensitivity of the ADI-R was improved when the behavioral domain was excluded (.89 versus .53), although specificity was compromised (.44 versus .67).

Conclusion: Excluding the ADI-R behavioral domain improves agreement between the ADI-R and CARS and CJ; this suggests that stereotyped interests and behaviors may not be as relevant as other diagnostic criteria when evaluating young children for ASD. Agreement did not improve between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. This latter finding suggests that both child and parent measures are important components of an ASD evaluation.

Sponsor: R01 HD39961

PS3.10
EXCLUDING THE ADI-R BEHAVIORAL DOMAIN IMPROVES DIAGNOSTIC AGREEMENT WITH OBSERVATION-BASED METHODS IN TODDLER EVALUATIONS
Diana L. Robins, Lisa D. Wiggins, Georgia State University

Background: Past research suggests poor agreement between the Autism Diagnostic Interview-Revised (ADI-R) and three observation-based methods: Autism Diagnostic Observation Schedule (ADOS), Childhood Autism Rating Scale (CARS), and clinical judgment (CJ) when evaluating toddlers (Ventola et al., 2006), although agreement between the ADOS, CARS, and CJ was high. Specifically, the ADI-R under-identifies autism.

Objective: To examine whether exclusion of the ADI-R behavioral domain results in improved diagnostic agreement when evaluating young children.

Method: Participants were 45 toddlers who received a developmental evaluation because they failed an autism screen. Most children were identified by early intervention providers. Evaluations consisted of child and parent measures. Children were classified as ASD or non-ASD by CJ and the ADOS, and autism or non-autism on the CARS and ADI-R.

Results: The mean age at time of assessment was 26 months. Thirty-six children were classified as ASD based on CJ. Agreement between the ADI-R and CARS improved when the behavioral domain was excluded, k = .328, p = .021. Similarly, agreement improved when comparing the ADI-R and CJ, k = 3.48, p = .019. However, results found little improvement between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. With CJ considered the gold standard, the sensitivity of the ADI-R was improved when the behavioral domain was excluded (.89 versus .53), although specificity was compromised (.44 versus .67).

Conclusion: Excluding the ADI-R behavioral domain improves agreement between the ADI-R and CARS and CJ; this suggests that stereotyped interests and behaviors may not be as relevant as other diagnostic criteria when evaluating young children for ASD. Agreement did not improve between the ADI-R and ADOS when the ADI-R behavioral domain was excluded. This latter finding suggests that both child and parent measures are important components of an ASD evaluation.

Sponsor: R01 HD39961
development due to these impairments. Although differentiations are often made between AS and HFA, research has failed to find consistent evidence to support this division (Macintosh & Dissanayake, 2004). The purposes of this study were 1) to determine if performance on measures of resiliency differentiates youth with AS from those with HFA and 2) to investigate the factors promoting resiliency in this population.

Measures of resiliency, intellectual abilities, socioemotional skills, subjective well-being, and severity of autistic symptoms were administered to youth (17 to 21 years) with AS and HFA. A cluster analysis was used to derive subgroups based on performance on resiliency measures. The relationship between factors that promote resiliency and how these relationships differ in youth with AS versus HFA are discussed. Lastly, empirical validation for the proposed differentiation of AS and HFA is also explored.

**Sponsor:** Alberta Centre for Child, Family & Community Research

**PS3.12**  
**PSYCHOSIS IN AUTISM** Felicia Widjaja, Safen Chiu, Jeremy Blank, Gerald Voelbel, Gahan Pandina, Danh Nguyen, Marsha Bates, Robert Hendren, University of California, Davis MIND Institute

**Background:** Early symptoms suggesting psychosis in children with autism (ASD) can be unclear in their usefulness in guiding the development of treatment plans. Objectives: Review symptoms of early psychosis in children with autism to determine which have face validity for clinical usefulness guiding intervention and future research.

**METHODS:** 76 children with ASD were assessed with the Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS), Wisconsin Card Sorting Test (WCST), and Conners’ Continuous Performance Test (CPT). These tests were chosen based on their demonstrated association with prodromal psychosis. Patients are divided into two groups: 1) ASD who met subthreshold symptoms of a schizophrenia spectrum disorder (SSS) as a proxy for psychosis risk and 2) ASD who did not meet subthreshold criteria for a SSS. Eighteen psychosis-like symptoms from the K-SADS were selected. The two groups were compared for symptom presence and neuropsychological test scores. Results: Mean age=9.91 ±2.08 years from 69 males and 7 females. Out of the eighteen symptoms, eight were significantly different (p<0.022) for the ASD+SSS group compared to the ASD-SSS group. For executive function and attention, no significance was found between the ASD+SSS group and the ASD-SSS group based on the WCST and CPT (p>0.05).

**Discussion:** The lack of significant differences in impaired attention and executive function between ASD+SSS and ASD-SSS supports the difference between psychotic-like symptoms in ASD and the progressive psychosis of schizophrenia where attention and executive function is impaired.

**Conclusion:** Symptoms associated with psychotic disorders in some children with ASD may be associated with ASD and not with an independently-developing psychotic disorder.

**Sponsor:** New Jersey Governor’s Council on Autism; Stanley Foundation Research Award; National Institute of Alcohol Abuse and Alcoholism.

**PS3.13**  
**MOTOR AND COGNITIVE DEVELOPMENT OF INFANTS AT RISK FOR AUTISM AND LOW RISK TYPICALLY DEVELOPING INFANTS** Anjana N. Bhat, Julie Rusyniak, Rebecca Landa, Center for Autism and Related Disorders, Kennedy Krieger Institute

**INTRODUCTION:** Infant siblings of children with autism (ASD) have an elevated recurrence risk for autism. Our motor development study suggests that ASD siblings showed gross- and fine-motor delays in the first two years of life. In the present study we conducted an in-depth analysis of visual attention, affect, learning, and motor coordination within a novel contingency learning paradigm.

**METHODS:** 20 ASD siblings and 20 typically developing (TD) infants received two 12-minute sessions of contingency learning on two consecutive days at 3 and 6 months. During the learning period of the test, infants’ right arm was tied to a string that pulled on a joystick to activate a colorful, musical toy. Infant’s caregiver intermittently reinforced the infant through verbal input. 3 and 6 month old TD infants learn such cause and effect relationships within 1-2 sessions (Rovee-Collier, 2000). An 18-month outcome for general motor and cognitive development as well as diagnose for autism (ADOS) will be obtained.

**RESULTS:** Preliminary results showed that both groups learned the contingent relationship between their arm movements and toy activations. However, ASD siblings lacked variation in affective responses and visual attention spans of TD infants including fewer looks to their caregivers. In addition, ASD siblings showed greater use of leg kicking for toy activation vs. reaching for the joystick observed in TD infants.

**CONCLUSION:** Our results suggest that during a learning paradigm, ASD siblings lack variation in affective responses and attention indicative of a ‘flat affect’ and ‘sticky attention’ as well as reduced frequency of coordinated arm movements. Overall, it appears that early on, ASD siblings lack effective exploration of their environment, visually and manually. This may hinder their ability to communicate experiences to their caregivers; which in turn leads to further gestural and verbal communication delays in the second year of life.

**FUNDING:** Cure Autism Now and NIH

**PS3.14**  
**EARLY COGNITIVE FUNCTIONING IN INFANTS SUBSEQUENTLY DIAGNOSED WITH AUTISM** Irene Drmic, Jessica Brian, Caroline Roncadin, Wendy Roberts, Susan Bryson, Isabel Smith, Peter Szatmari, Lonnie Zwaigenbaum, York University
Objective: To better understand early development in autism, we initiated a prospective study of high-risk infants, each with an affected older sibling (infant sibs). The goal was to explore early cognitive profiles of infant sibs subsequently diagnosed with Autism or ASD, relative to unaffected sibs and controls. Methods: Participants included 109 infant sibs and 52 control infants. The Mullen Scales of Early Learning or Bayley Scales of Infant Development-II were administered at 12, 24 and 36 months of age. The Mullen Early Learning Composite and Bayley Mental Development Index were considered equivalent. An independent (blind) diagnostic assessment for Autism/ASD was conducted at 36 months. Results: Of the 109 infant sibs, 7 received an Autism diagnosis and 4 an ASD diagnosis. At 12 months, the Autism group had significantly lower cognitive scores (mean=85.9) than unaffected sibs (104.9) and controls (111.5), F(3,314)=12.07, p<.001; post-hoc p s<.001, but did not differ from the ASD group (99.0). At 24 months, the Autism group (61.0) was outperformed by all 3 comparison groups (ASD= 94.8; unaffected sibs=105.2; controls=117.3). Also, the control group had a higher mean score than both the ASD sibs and unaffected sibs (p s<.001), who did not differ. At 36 months, all groups differed significantly: controls (121.7) > unaffected sibs (108.9) > ASD (82.2) > Autism (58.4). For all groups, scores did not differ significantly across the 3 time points. Conclusions: As early as 12 months, cognitive performance can distinguish infant sibs who subsequently receive a diagnosis of Autism; those with ASD had differences as early as 24 months. Despite failing to reach statistical significance, we note the clinically relevant decline in IQ for the group with autism, and to a lesser extent for the ASD group. Although unaffected sibs had lower cognitive scores than controls at 24 and 36 months, they were within the Average range. Variability in cognitive profiles will be explored.

PS3.15
EARLY COMMUNICATION ABNORMALITIES IN VERY YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS
Amy Nell Esler, Somer Lauren Bishop, Catherine Lord, Mia Coffing, University of Michigan Autism and Communication Disorders Center

Background: Early diagnosis of ASD is complicated by a reliance on negative symptoms, or absence of skills, which can fail to differentiate ASD from other disorders. Identifying positive, or abnormal, communication behaviors specific to ASD may improve accuracy of early diagnosis. Particularly for children who have not yet developed phrase speech, data are limited on the prevalence of communication abnormalities.

Objectives: To describe the prevalence of communication abnormalities in very young children with ASD that may serve as predictors of later ASD diagnosis.

Methods: Participants were 25 children in the First Words and Toddlers Projects, which are longitudinal studies on early development of children with ASD. Children are being seen monthly or every 6 months. Diagnostic groups were defined based on most recent diagnosis (ASD vs. non-ASD) after age 30 months.

Results: Preliminary analyses suggested communication abnormalities were reliably present in children under 18 months who received diagnoses of ASD. Unusual prosody (intonation, rhythm, rate) and frequency of undirected vocalizations were present in the majority of children with ASD. Unusual prosody emerged before 18 months for children with ASD. Frequency of undirected vocalizations occurred at similar rates in ASD and non-ASD groups under 18 months, but from 19 to 30 months, prevalence remained high in the ASD group and decreased significantly in the non-ASD group. Use of other's body as a tool was rare in both groups, but those who demonstrated this behavior were more likely to have ASD.

Conclusion: Positive communication symptoms of ASD are detectable before 18 months of age.

Sponsor: Department of Education and Simons Foundation

PS3.16
MOVEMENT IN INFANTS WITH AUTISM SPECTRUM DISORDER: THE ANALYSIS OF LYING
Gianluca Esposito, Paola Venuti, Fabio Apicella, Sandra Maestro, Filippo Muratori, DiSCoF, University of Trento

Background: Early identification of children with autism spectrum disorders (ASD) has recognized as a critical aspect of their medical management and treatment. Movement disorders are considered one of the first signs which probably precede social or linguistic abnormalities. Objectives: Our study aims to verify, through observational methods, the possibility of distinguishing infants with ASD from infants with typical development or with mental retardation by movement.

Methods: the Eshkol-Wachman Movement Analysis System which analyses static and dynamical symmetry during lying, was applied to retrospective home videos, regarding the first five months of life, of children with ASD (18), Typical Development (18), or with Mental Retardation (12).

Results: data shows significant differences between ASD and the two control groups (p<.05). Our data also highlight differences within ASD group, revealing two types of ASD infants characterised by high or low levels of symmetry.

Conclusion: movement disorders cannot be considered as a possible sign in early diagnosis of ASD. We suggest that different pattern of motor functioning probably relate to different pathways to ASD. We hypothesise that the low levels of symmetry since the first months of life could be related to the loss of the Purkinje cells described in ASD.

PS3.17
DOES PERFORMANCE ON THE EARLY SOCIAL COMMUNICATION SCALES DIFFERENTIATE BETWEEN TODDLERS WITH ASD AND TODDLERS WITHOUT ASD?
Lama K. Farran, Diana L. Robins, Lisa D. Wiggins, Kimberly B. Oliver, Georgia
Objective: To investigate whether performance on the Early Social Communication Scales (ESCS; Mundy et al., 2003) differentiates between toddlers with and without autism spectrum disorders (ASD, nonASD).

Method: Participants were part of a metro-Atlanta screening study using the Modified Checklist for Autism in Toddlers (M-CHAT). Eighteen participants (3 controls; 15 with ASD risk) were administered the ESCS (nonverbal social-communication measure in toddlers) and on another day, a diagnostic evaluation (mean age = 23 months; age range = 16-27 months; 10 nonASD, 5 PDD-NOS, and 3 Autistic Disorder [AD]).

Results: Significant differences were observed between groups on three of four ESCS subscales. Rank sum scores for the PDD-NOS group fell consistently between scores of nonASD and AD groups. Groups differed in Response to Joint Attention (RJA), Kruskal-Wallis Test Statistic (KW) (df = 2) = 9.41, p < .01; Initiating Behavioral Requests (IBR), KW (df = 2) = 6.97, p < .05; and Responding to Social Interaction (RSI), KW (df = 2) = 7.86, p < .05, but not Initiating Joint Attention (IJA).

Follow-up pairwise comparisons revealed a significant difference between nonASD and AD groups on RJA, IBR, and RSI. However, this difference was only significant on RSI between PDD-NOS and AD and on RJA between PDD-NOS and nonASD. When PDD-NOS and AD groups were combined (ASD; n=8), nonparametric (Mann-Whitney) and parametric (t-test) results indicated a significant difference between sociocommunicative behaviors of ASD and those of nonASD group, z = 3.06, p = .001 and t = 3.98, p = .001, respectively.

Conclusion: Toddlers' performance on the ESCS was indicative of severity of autistic symptomatology. Given the significant differences between the sociocommunicative behaviors of ASD and nonASD toddlers, cutoff scores may be developed once a larger sample is ascertained, to indicate risk for autism. The ESCS may be a useful Level 2 screening instrument for ASD early detection.

PS3.18
QUANTIFYING SOCIAL RECIPROCITY: A MICROANALYSIS OF HOME VIDEOS OF TRIPLET INFANTS, ONE OF WHOM WAS LATER DIAGNOSED WITH ASD Jennifer Gerwing, Mary Anne Leason, David Batstone, University of Victoria

Background: Diagnosis of ASD in infancy could lead to earlier intervention and better outcomes. Family home videos have provided a retrospective means of analyzing manifestations of ASD in infancy. However, variability inherent in home videos has made comparisons between groups problematic. Also, past analyses of social behaviors have tended to abstract those behaviors from their immediate social context.

Objective: We developed a method for systematically investigating infants' social responsiveness in order to compare the responsiveness of an infant later diagnosed with ASD to his same-age siblings.

Method: Our participants were a set of triplets, one of whom had been diagnosed at age 3 years with Autistic Disorder, while the other two were functioning within the normal range, based on standardized assessment (Vineland Adaptive Behaviour Scales-Survey Form; ADOS; ADI-R). Our data were 23 minutes of video excerpts (infants' age 11-16 months) from home videos. We reliably quantified each infant's social responsiveness, which we operationalized as the number of each infant's responses over the total number of parent-initiated social overtures directed towards that infant. Microanalysis of the interactions allowed us to closely examine the temporal relationships between parent overtures and infant responses. Analysts were "blind" as to the identity of the infant later diagnosed with ASD.

Results: As early as age 11 months, the infant with ASD exhibited measurably reduced social responsiveness compared to his two typically-developing siblings. He did, however, respond to about a third of the overtures that he received.

Conclusion: A dyadic, social approach to the analysis of infant behaviors is possible, and the infant with ASD was less responsive. A close examination of the context of his responses could lead to targeted social interventions.

Sponsor: Vancouver Island Health Authority, Child Youth and Family Health Program, Research Advisory Committee

PS3.19
COMMUNICATIVE AND LANGUAGE DEVELOPMENT IN INFANT SIBLINGS OF CHILDREN WITH AUTISM Jana M. Iverson, Robert H. Wozniak, University of Pittsburgh

Background: Language and communicative impairments, well documented in older children with autism spectrum disorders (ASD), may be ideal candidates for early indicators of later ASD diagnosis.

Objectives: To examine the course of communicative and language development in infants at heightened risk for ASD (the later-born siblings of children with autism; Infant Siblings) in comparison to children with no family history of ASD (the No-Risk, NR, group).

Method: Participants were 21 Infant Siblings and 18 NR infants selected from a larger sample to include only later-borns. Relevant data collection began when infants were 5 months old and continued monthly to 14 months, then at 3-month intervals from 18 to 24 months. At each visit, infants and caregivers were videotaped in spontaneous interaction and, beginning at 8 months, caregivers completed the MacArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 1993). This presentation will focus on the CDI data.

Results: Relative to NR infants, Infant Siblings were consistently reported to produce fewer gestures (particularly social gestures, e.g., pointing, showing) and to both understand (from 10-24 months) and produce (from 18-24 months) fewer words. At 18 months, 47% of Infant Siblings scored below the 5th percentile on the CDI; and although this percentage declined somewhat by 24 months, it remained high (33%). Two Infant Siblings
subsequently receiving an ASD diagnosis were consistently at the bottom of the distribution on all three scales.

Conclusion: Even in the absence of obvious ASD symptomatology, Infant Siblings are more likely to exhibit patterns of delay in early communicative and language development. This is discussed in terms to the extent to which resolution vs. persistence of delay may be predicted by earlier infant behavior and the extent to which particular profiles of delay may be indicative of emerging ASD.

Sponsor: Autism Speaks, NIH

**PS3.20**

**LISTENING PREFERENCES IN TODDLERS WITH AUTISM: THE PLAYTEST AS AN EARLY SCREENING DEVICE**

*Ami Klin, Judith Danovitch, Warren Jones, Yale University School of Medicine*

Background: There is evidence that young children with autism lack the very early emerging preference for listening to speech sounds. This symptom is a robust early predictor of a diagnosis of autism at age 2.

Objectives: To develop a potential diagnostic device based on listening preferences that can identify vulnerabilities in early socialization known to be present in young children with autism.

Methods: Participants were recruited from the Yale Developmental Disabilities Clinic and were assessed using the Playtest device. The Playtest is a toy with two large touch buttons, each of which triggers either a speech sound or a control environmental sound. The device measures children’s listening preferences by recording the frequency and duration of button presses. Children played with the device during a 10 minute session in the lab or over a 3 day period in their home.

Results: Initial analyses with children ages 18 to 48 months reveal that children with autism exhibit either no preference or a preference for environmental sounds when interacting with the Playtest. In contrast, typically developing children show an overwhelming preference for speech sounds. Further investigation is planned to examine the relationship between children’s Playtest listening preferences and diagnostic measures such as ADOS, ADI and Vineland scores.

Conclusion: The Playtest is a promising means of measuring young children’s listening preferences that could potentially be used to screen children for one early sign of autism.

Sponsor: Autism Speaks

**PS3.21**

**SOCIAL AND COMMUNICTION DEVELOPMENT IN TODDLERS WITH EARLY AND LATER DIAGNOSIS OF AUTISM SPECTRUM DISORDERS**

*Rebecca J. Landa, Katherine C. Holman, Elizabeth Garrett-Mayer, Allison O’Neill, Julie Rusyniak, Kennedy Krieger Institute*

Background: No prospective studies of the developmental course of early and later diagnosis of autism spectrum disorders from 14 months of age exist.

Objective: Examine patterns of social, communication, and play development from 14 to 24 months in children with early and later diagnosis of autism spectrum disorders.

Methods: A prospective, longitudinal design; 125 infants at high and low risk for autism tested from 14 -36 months. Comprehensive standardized assessments included measures of social, communication, and play behavior. Testing occurred at a major medical and research institution as part of a large, ongoing longitudinal study. Participants included Low Risk Controls (n=18); Siblings of children with autism grouped based on outcome diagnostic classification at 30 or 36 months: Autism Spectrum Disorders (early diagnosis, n=16; later diagnosis, n=14), Broader Autism Phenotype (n=19), and Non-Broader Autism Phenotype (n=58). The main outcome measures of social, communication, affective, and symbolic abilities were assessed using the Communication and Symbolic Behavior Scales Developmental Profile. Outcome diagnoses were made by clinicians blind to recruitment group using clinical research data.

Results: Social, communication, and play behavior in the early diagnosis group differed from all other groups by 14 months of age. By 24 months, the later diagnosis group differed from the non-autism spectrum disorder groups in social and communication behavior, but not from the early diagnosis group. Examination of growth trajectories suggests that autism may involve developmental arrest, slowing, or even regression.

Conclusion: This study provides insight into different patterns of social communication development of children with early versus later diagnosis of autism spectrum disorders.

Funding Source: MH59630, 154MH066417, RO1 MH 59630-05

**PS3.22**

**EARLY SCREENING FOR SOCIAL AND COMMUNICATIVE DEFICITS: A DAYCARE SETTING STUDY**

*Karine Morasse, Elsa Gilbert, Andrée-Anne Marcoux, Sandra Pouliot, Leila BenAmor, Marie-Eve Gauvin, Hôtel-Dieu de Lévis, Service de pédiatrie*

Background: Social and communicative deficits are central symptoms in ASD. Early detection of these deficits is crucial to optimal intervention. A screening procedure easy to apply in daycare settings, would be an important tool for early deficit detection in preschoolers.

Objectives: To assess the efficacy of a new experimental screening procedure in rapidly identifying social-communicative deficits as compared to classic environmental procedure screening.

Methods: 23 children aged 2 to 4 years-old were recruited in two public childcare services. Social and communication skills were assessed with environmental questionnaires completed by parents (Age & Stages Questionnaire-ASQ, Infant-Toddler Social and Emotional Assessment-ITSEA) and caregivers (Brief-Infant-Toddler Social-Emotional Assessment-BITSEA), as well as
Experimental tasks measuring imitation and joint attention.

Results: Children who showed significant difficulties on the questionnaires also demonstrated more problems in the imitation and joint attention tasks: less competent children on the BITSEA tend to show lower performance on imitation tasks, and children who showed multiple difficulties on the questionnaires seem to present specific problems on both imitation and joint attention tasks.

Conclusions: The experimental tasks would be a useful and objective procedure to identify children who have social and communicative difficulties and may be at risk for ASD. Future analyses are needed to specify the role of these measures in identifying different types of social-communicative problems.

Funded by HDL, CRULRG.

**PS3.23**

**SCREENING DIFFERENCES BETWEEN YOUNGER AND OLDER TODDLERS USING THE MODIFIED CHECKLIST FOR AUTISM IN TODDLERS (M-CHAT)**

Juhi Pandey, Alyssa D. Verbalis, Hilary Boorstein, Leandra Wilson, Emma Esser, Saasha Sutera, Michael Rosenthal, Molly Helt, Eva Troyb, Ashley Maltempo, Sarah Hodgson, Thyde Dumont-Mathieu, Marianne Barton, Deborah Fein, University of Connecticut

The American Academy of Pediatrics (AAP) released a policy statement (July, 2006) of a recommended algorithm for the developmental surveillance and screening of children during their 9-, 18-, and 24- or 30-month well-child pediatric visits in order to allow for the earlier diagnosis of developmental disorders, thereby maximizing access to necessary early intervention services. The current study examined a subset of the children screened through the larger M-CHAT study to explore the question of the appropriate age of toddler screening. The Modified Checklist for Autism in Toddlers (M-CHAT; Robins, et.al, 2001), is a 23-item parent-report developmental screener designed to detect Autism Spectrum Disorders in 16-33 month old children and has been suggested by the AAP as one of the developmental screeners to be used at these specific time points.

Participating toddlers were split into two age groups: younger (16 through 23 months, mean age of 18.92 months) and older (24 through 33 months, mean age of 25.66 months). The children were also designated to be high-risk (screened by early intervention providers) or low-risk (pediatric general screening), resulting in four participant groups: younger/high-risk (n= 319, mean age = 20.8 months), younger/low-risk (n= 3,503, mean age = 18.7 months), older/high-risk (n= 403, mean age = 27.5 months), older/low-risk (n= 1,484, mean age = 24.9 months). After accounting for the confirmatory telephone interview follow-up, screening results indicate the positive predictive power by group to be as follows: younger/high-risk (.49), younger/low-risk (.09), older/high-risk (.43), older/low-risk (.17). Results suggest that positive predictive power is lowest with the younger/low-risk children, perhaps because some of them have mild developmental delays that quickly resolve. The pros and cons of earlier versus later screening will be discussed.

Funded by NICHD and MCH

**PS3.24**

**DOES TRAINING PROVIDERS ON EFFECTIVE DEVELOPMENTAL SCREENING METHODS RESULT IN AN INCREASE IN EARLY INTERVENTION REFERRALS?**

Jennifer Anne Pinto-Martin, Lusine Poghosyan, Lisa Young, Brenda Eaton, Nancy Wiseman, David Mandell, PA-CADDRE, University of Pennsylvania School of Nursing, Center of Autism and Developmental Disabilities Research and Epidemiology

Background: Use of standardized developmental screening tools can improve early identification of children with autism spectrum disorder and others in need of early intervention (EI). There is little evidence, however, on the effect of training professionals on referral practices.

Objectives: To evaluate the effect of ‘First Signs’ training for Pennsylvania childhood educators and pediatric healthcare providers on referrals to EI services.

Methods: Trainings took place between April and November 2005. The Pennsylvania Department of Education provided total monthly EI referrals for the 46 counties. Because of seasonal fluctuations, linear regression was used to examine the association between the number of providers trained in each county and the number of EI referrals in March 2006, controlling for the county census of children less than 5 years of age and the number of EI referrals in March 2005. The exponentiated coefficients minus one can be interpreted as the percent change in referrals associated with each unit increase in the independent variables.

Results: 7 trainings included 651 attendees: 84% developmental specialists and 16% primary care providers. 31 of the 46 county units in Pennsylvania had at least one practitioner who received training. Among counties with trained practitioners, the range was from 1 to 58, the median was 5 and the mean was 8.6. The proportion of children referred to EI ranged from 0.09% to 0.84% in March 2005 and 0.16% to 0.70% in March 2006, with a mean of 0.29% in both months. Controlling for the under 5 census and the number of EI referrals in March 2005. The exponentiated coefficients minus one can be interpreted as the percent change in referrals associated with each unit increase in the independent variables.

Conclusion: This ecological study provides preliminary evidence that didactic training on standardized screening for developmental delay results in increased referrals of children identified as needing early intervention.

Sponsor: CDC

**PS3.25**

**VOCALIZATIONS IN AUTISM SPECTRUM DISORDERS BETWEEN 18 AND 24 MONTHS**

Allison M. Plumb, Angie Barber, Amy M. Wetherby, Stacy Shumway, Sally Kahn, Lorraine Book, David McCoy,
Methods: Videotapes of CSBS Behavior Samples for 125 children with a mean age of 21.1 months (50 ASD, 25 DD, and 50 TD) were analyzed using the Noldus Observer Pro 5.0 to obtain precise measures of vocalizations within and outside communicative acts. Vocalizations were coded as transcribable (TV) or nontranscribable (NTV). Communicative acts were coded for the functions of behavior regulation (BR), social interaction (SI), and joint attention (JA). Social, speech, and symbolic composites were obtained from the CSBS. Verbal developmental quotients (VDQ) were obtained from the Mullen at a mean age of 36.9 months.

Results: Children with ASD produced significantly fewer TV within and outside communicative acts than children with TD; no differences were found with DD. The ASD group produced a lower proportion of TV within acts for BR than the DD and TD groups, and a lower proportion of TV within total acts than the TD group. Moderate to large significant correlations between proportion of total TV within communicative acts produced by children with ASD were observed with all three CSBS composites and the VDQ.

Conclusion: Building on previous findings that communication for BR is a strength for children with ASD, these results indicate that children with ASD rely less on vocalizations for this function than children with DD and TD. Vocalizations in children with ASD late in the 2nd year were predictive of language abilities in the 3rd year. These findings contribute to profiling communicative abilities and improving early identification of young children with ASD.

Sponsor: NIH/NIDCD; USDOE/OSERS

PS3.26
USEFULNESS OF A PRAGMATIC SKILLS QUESTIONNAIRE IN DETECTING AND DESCRIBING TODDLERS WITH AN AUTISM SPECTRUM DISORDER Inge Schietecate, Herbert Roeyers, Ghent University
Background: The need for early detection of autism spectrum disorders (ASD) in order to improve outcome through early intervention, is widely accepted. However, it remains difficult to detect ASD at a very young age. Moreover, not all DSM-IV-TR criteria are equally useful for detection in very young children. It might be useful to shift the focus towards pragmatic skills, which seem to be among the earliest signs of ASD.
Objectives: Investigate the usefulness of a pragmatic skills questionnaire to discriminate children with ASD from other children.
Methods: The Dutch questionnaire based on the ‘The Pragmatics Profile of Everyday Communication Skills in Children’ (Dewart & Summers, 1995) was completed by parents of children with a normal development, a developmental delay and ASD, between 16 and 38 months of age. The questionnaire covers a detailed description of pragmatic skills, divided into communicative functions, response to communication, interaction and contextual variation.

Results: As expected, children with ASD had a significantly lower pragmatic score than other children. They used less communicative functions, responded less to communication and participated less in social interactions. Also the way children communicate differed: children with ASD used significantly less eye contact to communicate and used less emotional actions, gestures and words than children with a normal development.

Conclusion: The questionnaire seems to be a useful indicator of pragmatic skills and is able to discriminate children with ASD from other children. It has the potential to become a useful instrument to evaluate interventions.

Sponsor: Research Foundation Flanders
did not perform as well. Both screens appear to more accurately classify children with PDDs who have lower intellectual and adaptive functioning.

Sponsor: Organization for Autism Research

**PS3.28**

**AN EXPLORATORY EXAMINATION OF DEVELOPMENTAL AND DIAGNOSTIC EVALUATION DIFFERENCES OF CHILDREN SCREENED AT A YOUNGER VERSUS OLDER AGE**

Alyssa D. Verbalis, Juhi Pandey, Leandra Wilson, Hilary Boorstein, Emma Esser, Saasha Sutera, Michael Rosenthal, Molly Helt, Eva Troyb, Ashley Maltempo, Sarah Hodgson, Thyde Dumont-Mathieu, Marianne Barton, Deborah Fein, University of Connecticut

Research indicates that the earlier diagnosis of ASD allows children on the autism spectrum access to much needed intervention services (Sallows & Graupner, 2005), necessitating screening and evaluation at younger ages. The current study explores possible differences in functioning for a subset of children who were initially screened with the Modified Checklist for Autism in Toddlers (M-CHAT; Robins, et al., 2001) at either the approximate age of 18 or 24 months and evaluated through the M-CHAT Study. Developmental and diagnostic evaluation data is presented for 203 children diagnosed with ASD through the current study; of which 103 children were screened at the approximate age of 18 months (designated the ‘younger’ group; mean age = 20.5 months) and 100 children who were screened at the approximate age of 24 months (designated the ‘older’ group; mean age = 27.6 months). The diagnostic evaluations included an assessment of cognitive functioning (Mullen Scales of Early Learning), adaptive functioning (Vineland Adaptive Behavior Scales), autism classification as measured by the Childhood Autism Rating Scale (CARS), Autism Diagnostic Observation Schedule (ADOS), and Autism Diagnostic Interview (ADI), and DSM-IV symptomatology. Younger and older toddlers were similar in severity of autism, and in the total number of M-CHAT items failed (mean = 10 of 23) and the number of critical questions failed (mean = 3 of 6). However, the younger age group scored as higher functioning than the older group in cognitive development (Mullen Visual Reception and Fine Motor) and all domains of adaptive functioning (Vineland Communication, Socialization, Daily Living, and Motor domains). This may be due to artifacts in the measurement tools, which allow lower standard scores for older children. Results suggest that older and younger toddlers detected by autism screening have a similar degree of symptomatology, which is sufficient for diagnosis at either age.

Funded by NICHD and MCH

**PS3.29**

**AGE OF FIRST EVALUATION AND DIAGNOSIS OF AN AUTISM SPECTRUM DISORDER (ASD) IN MULTIPLE AREAS OF THE UNITED STATES**

Anita Washington, Jon Baio, Catherine Rice, Kim Van

**Naarden Braun, Nancy Doernberg, Battelle Memorial Institute**

Background: Despite increases in the numbers of children with an ASD identified for services, there is little information on the age of first evaluation and diagnosis of children with ASDs in the United States.

Objective: Determine the age at which children with an ASD are first evaluated for developmental concerns and the age they are given a diagnosis of ASD.

Methods: Children with an ASD were identified through screening and abstraction of evaluation records, representing a combined population of 407,578 8-year-old children from 14 sites in the United States in 2002.

Results: Most children were receiving special education services at age 8 years (range: 61.3% in Maryland to 97.8% in New Jersey) and most had a documented history of concerns regarding their development prior to 3 years of age (range: 51.0% in West Virginia to 91.4% in Alabama); however, the median age of earliest documented ASD diagnosis was much later (range: 49 months in Utah to 66 months in Alabama). The proportion of children meeting criteria for an ASD who had a previously documented ASD classification varied across sites ranging from 2.1 per 1000 (Alabama) to 7.5 per 1000 (New Jersey).

Conclusion: Results from the largest U.S. multisite collaboration to monitor the ASDs showed consistency in the age of children receiving special education services and in documentation of a history of concerns at an early age across the 14 sites. These data affirm that considerable work needs to be done to improve the early diagnosis of many children with these conditions.

Sponsor: CDC

**PS3.30**

**ACADEMIC IMPROVEMENTS OF CHILDREN WITH AUTISM PARTICIPATING IN A DIRECT ACADEMIC TEACHING PROGRAM: INTERRELATIONSHIPS AMONG IQ, LANGUAGE SKILLS, BEHAVIOR, AND MOTIVATION**

Stephanny F.N. Freeman, Tanya Paparella, Connie S. Wong, Kristen Hayashida, UCLA

Background: Although school-aged high functioning children with autism (HFA) generally show average academic achievement, the most noticeable academic difficulties have been found to be listening comprehension, writing and composition skills, and problem solving and critical thinking. Little research examines young elementary aged children and correlates of progress.

Objectives: To assess academic change in children with HFA participating in the ECCHP, a 12 week (30 hour/week) comprehensive treatment program that used a mixed direct instruction/ABA approach to academic skills. To identify the factors that influence growth in academic achievement with other variables held constant (e.g. hours of therapy).

Methods: Children entered ECCHP with an autism diagnosis. Children were assessed with the Woodcock Johnson III Tests of Achievement and administered
standard assessments of language and IQ. Parents were administered CBCL and nonstandardized assessments of individual reinforcements and maladaptive behaviors. Results: Data are presented for 50 children, mean age of 69 mos. A 2 time (Time1/2) by 2 Group VIQ (High/Low) ANOVA was conducted. For Applied Problems, Writing Samples, and Sound Awareness significant main effects were found for Treatment and Group but no interaction effects. All children improved over time regardless of high or low VIQ. AP main effect treatment F(1,44)= 34.56, p<.001, main effect VIQ:17.83, p<.001, SA main effect treatment F(1,44)= 41.31, p<.001, main effect VIQ:18.67, p<.001. WS main effect treatment F (1,41)= 7.64, p<.01, main effect VIQ:8.22, p<.01. Further results using PPVT, reinforcement and behavioral scores will be presented in relation to treatment effects. Conclusion: Children demonstrated significant development in their academic skills, even in areas that are historically more difficult to intervene upon using a combined approach. Progress was unrelated to behavior difficulties but possibly mediated by language skills.

PS3.31
EFFECTIVENESS OF AN EDUCATIONAL PROGRAM ON CHILD DEVELOPMENT AND AUTISM SPECTRUM DISORDERS
Lusine Poghosyan, Lisa Young, Anne Marie McKnight, Brenda Eaton, Nancy Wiseman, Jennifer Pinto-Martin, PA-CADDRE, University of Pennsylvania School of Nursing, Center of Autism and Developmental Disabilities Research and Epidemiology
Background: Effective early developmental screening will alert clinicians to those children who show signs of developmental delay. These children may be observed more closely and referred for comprehensive developmental evaluation and intervention. Earlier intervention leads to positive outcomes for the children and families.
Objectives: To evaluate the effectiveness of a training session for childhood educators, therapists and pediatric health care providers in terms of knowledge gained about child development, developmental delay and autism spectrum disorders and effective screening strategies.
Methods: The sample consists of educators, developmental and health care professionals with direct responsibility for assessments of children between the ages of 15 and 30 months. All providers were recruited from the State of Pennsylvania and participated in a University of Pennsylvania First Signs CME certified training sessions. The study used a pre/post test design to evaluate the effectiveness of training sessions.
Results: Pennsylvania First Signs Regional trainings included 651 attendees in 7 training sessions. The majority (84%) were developmental specialists and others (administrators, educators, therapists); the remainder (16%) were primary care providers. The post-tests demonstrated: 15% increase in knowledge about the early warning signs of developmental disorders, 21% increase in knowledge about the most accurate way to obtain information about a child’s development, 49% increase in knowledge about eligibility for early intervention services in PA and 61% increase in knowledge about the minimum accuracy for a good developmental screening tool.
Conclusion: The findings of this study demonstrate that didactic training can improve short-term knowledge about developmental screening among primary care providers. Ongoing work will assess the long-term changes associated with attending the training.
Sponsor: CDC

PS3.32
THE STATUS OF RESEARCH ON INTERVENTIONS FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS
Brian Reichow, Erin E. Barton, Fred R. Volkmar, Domenic V. Cicchetti, Vanderbilt University
Background: Recent legislation mandates all educational practices should be based on scientific evidence. For interventions to be considered evidence-based practices, the studies demonstrating their effectiveness must meet high methodological standards.
Objectives: The rubric from The Determination of Evidence-Based Practices for Individuals with Autism (Reichow, Volkmar, & Cicchetti, 2006) was used to assess the methodological elements of the research on educational interventions for children with autism published between 2001 and 2005.
Methods: Over 130 studies were located using the PsychINFO and MEDLINE databases using the following criteria: (a) publication in English in a peer-reviewed journal between 2001 and 2005, (b) at least 50% of the participants must have been less than 8-years-old, and (c) utilization of an experimental design. These studies were independently rated by two individuals who had established good to excellent reliability in using the rubric. Descriptive analysis will be conducted to analyze (a) the overall strength of the research, (b) the strength of the methodological elements examined by the rubric.
Results: Preliminary analyses suggest (a) descriptions of the dependent measures and independent variables were strong across studies, (b) greater specificity is needed in descriptions of participants, and (c) procedural or treatment fidelity has been infrequently measured. Final results of the descriptive analyses outlined above will be presented at the conference.
Conclusion: Conclusions about the state of the research on educational interventions for young children with autism will be made, and suggestions for future research will be outlined.

PS3.33
A STUDY OF THE USABILITY OF VIRTUAL REALITY TECHNOLOGY TO TEACH CHILDREN WITH AUTISM SPECTRUM DISORDERS
Katy Renshaw, Heather Dilks, Sahil Suleman, Catherine Sebastian, Anthony Bailey, Simon Wallace, University of Oxford
Background: Virtual reality technology (VRT) has great potential as a way of teaching children with ASD, but to date there has been little assessment of its usefulness.
Methods: Teenage children with ASD and IQ matched typically developing (TD) children sat at a desktop computer to explore a secure online virtual world. A psychologist seated in a different room acted as a virtual experimenter and also played the role of computerised characters. The child wore a headset to communicate. Each child passed a training stage before entering and exploring the virtual world. Participants then met two computerised characters, one of whom was friendly and the other who was not. After a break the child visited virtual galleries and recognised facial expressions that appeared on the walls. After 40 minutes in the virtual world each child completed questionnaire measures of presence (the feeling of being ‘there’ inside the virtual world), co-presence (the feeling of being ‘there’ with another person) and social attraction (how socially receptive each computer character was).

Results: There were no significant group differences in ratings of feelings of presence or co-presence. TD children rated the unfriendly greeting as significantly less socially attractive than the friendly greeting, whereas children with ASD did not. Children with ASD were less able than TD children at recognising facial expressions from the virtual gallery.

Conclusions: The findings suggest that children with ASD have typical responses to the content of the virtual world, whereas the measures of social attractiveness and facial expression recognition highlight the usefulness of VRT to assess atypical social and cognitive responses.

PS3.34
ANALYSIS OF INDIVIDUAL EDUCATION PLANS FOR YOUNG CHILDREN WITH AUTISM Lisa A. Ruble, Nancy J. Dalrymple, John H. McGrew, Melissa A. Brown, Andrea R. Cartwright, University of Louisville Background: U.S. public schools serve more than 120,000 children within the category of autism (GAO, 2005). The costs for educating a child with autism is more than 3 times the expenditure for a typical child and among the highest for children with disabilities (GAO, 2005). Each child with autism has an Individualized Education Plan (IEP) required by federal law (IDEIA, 2004). The IEP is the keystone of a successful educational program; yet, despite its importance, very little is known about the content, effectiveness, and outcomes of IEPs.

Objectives: Describe the quality and content of IEPs of young children with autism and compare results to recommendations described in the National Research Council’s report (2001)

Methods: An IEP evaluation form was developed based on indicators described by the National Research Council (2001) and requirements listed in IDEIA (2004). The form consists of 129 indicators. Ratings are made using a 3-point Likert scale. Raters will be trained using the form until an interrater reliability of 80% is established. Twenty four IEPs will be analyzed for content and quality.

Results: The presence of goals related to the acquisition of core skills related to autism (e.g., social skills; communication skills; play skills; etc.) as well as for the quality of goals/objects (measurable, objective, etc) will be reported.

Conclusion: Recommendations will be provided for preservice and school based personnel.

PS3.35
NARRATIVE COLLABORATION OF A CHILD WITH AUTISM WITH A HUMAN PEER AND WITH A VIRTUAL PEER Andrea Tartaro, Justine Cassell, Northwestern University Background: Children with Autism Spectrum Disorder (ASD) often lack reciprocal social interaction skills that lay the groundwork for academic and social achievement. However, these same children may spend hours interacting with computer games. We hypothesize that interactions with virtual peers (VPs), 3D life-sized animated characters that look like children and are capable of interacting and responding to children’s input, can scaffold communication and reciprocal social interaction in children with ASD.

Objectives: Investigate how a child with ASD differs from typically developing children in his collaborative storytelling, how he tells stories with real and virtual children, and how these results suggest ways to improve interventions for ASD through the use of VP technology.

Methods: An 11-year-old boy with Asperger syndrome first told stories with Sam, a VP, and then with his 14-year-old sister. A dollhouse and figurines were available for use as props in the stories. The stories were videotaped, transcribed and analyzed for features of collaborative narrative.

Results: The child actively engaged in collaborative narrative with both his sister and the VP. He used narrative gestures with the props, and was able to take on the role of a character in the story. However, he had some difficulty with reciprocal social interaction and narrative construction. We found that over the course of his interaction with the VP, his use of language that makes meaning for an audience increased (p<.05); no such relationship was found with his human peer. In addition, the narrative structure of his stories (p<.001) and the narrative function of his gestures (p<.01) were better when he interacted with the VP than with the human peer.

Conclusion: These preliminary results are informing the design of a new system using VP technology to scaffold children with ASD in developing language and social interaction skills.

Funding: Cure Autism Now, Autism Speaks

PS3.36
THE ROLE OF SELF-REGULATION AND AFFECT ON SUSTAINED PHYSICAL ACTIVITY OF ADOLESCENTS WITH AUTISM Teri A. Todd, Gregory Reid, McGill University

Background: Participation in sustained physical activity is a challenge for most people with autism but is important to physical and psychological well-being. Positive affect, based on a sense of personal capacity developed through self-regulation increases engagement in activities (Bandura et al., 2005).
Objectives: To promote sustained physical activity for adolescents and young adults with autism. To understand the affective experience of the participants; this will enable a comprehensive evaluation of the intervention.

Methods: For three years a walk/jog or cycle activity was offered at a high school for students with moderately to profoundly disabilities; 12 to 16 weeks each year. Each year 3-6 students with autism, 15-21 years old participated, a total of 11 students. Some students attended the program for 2 consecutive years. All students were non-verbal. Strategies were based on self-regulation skills including self-monitoring, goal-setting, and self-reinforcement. Concurrent with the physical activity program visual methodologies, an adaptation of photovoice (Wang & Burris, 1994) and photo albums (Mitchell & Allnutt, in press) were used to understand the affective experience of the participants.

Results: Data of physical performance were compared with the results of the visual methodologies using a mixed method design. Results showed that over the three programs participants experienced an increase in positive affect and physical activity. Our definition of engagement, walking, jogging, or cycling, during the activity was challenged by understanding the variables the students attended to.

Conclusion: The use of visual methodologies provided information on ways to adapt our strategy during each program. This resulted in a strategy used during the final year which resulted in 30 minutes of cycling 3 times per week. Visual methodologies may be one way to ‘hear’ the voices of individuals with ASD and severe communication challenges.

PS3.37 OUTCOMES OF A COMMUNITY CENTER-BASED EARLY INTERVENTION PROGRAM FOR TODDLERS WITH AUTISM Connie Wong, Mark Akstinas, Cleveland State University

Background: There is little research examining outcomes of center-based early intervention programs in the community for young children with autism. Objectives: To examine outcome assessment scores of toddlers attending IAC, a center-based assessment and intensive early intervention program in the community for children who have a diagnosis of, or are suspected of an autism spectrum disorder.

Methods: School records were examined from IAC (a 20 hours/week comprehensive program utilizing various instruction methodologies including behavioral instruction with a 5:7 staff to child ratio and a parent training/support component). Standard scores from the Bayley Scales of Infant Development II, Preschool Language Scale-4th Edition, and Scales of Independent Behavior-Revised were used to investigate cognitive, language, and social development.

Results: Data were collected on 74 toddlers (mean age=27.6 months; range=21.0 months to 32.8 months). Children (51 male, 23 female) attended IAC for a period of 3.2 to 15 months with an average of 8.4 months. Preliminary results indicate significant positive differences between entry and exit assessment scores on measures of cognition, language, and social behavior. On average, children gained 15.4 points on the Bayley MDI, 19.8 points on the auditory comprehension domain of the PLS-4, 12.8 points on the expressive communication domain of the PLS-4, and 13.6 points on the Social Communication and Interaction domain of the SIB-R.

Conclusion: Preliminary findings of this study indicate that children attending a community-based early intervention program can make significant developmental gains in cognition, language, and social behavior.

PS3.38 BELIEFS AND ATTITUDES ABOUT AUTISM SPECTRUM DISORDER AS REFLECTED ACROSS PROFESSIONS IN TURKEY: A PILOT STUDY Gunes Yucel, Jane Wera, John R. Brown, Department of Psychiatry and Behavioral Sciences and the M.I.N.D. Institute

Culture impacts behavior by helping to shape the belief and attitudes that determine them. One’s profession can be thought of as contributing to this effect. Turkey is a country in which programs focusing on autism have been limited in the past. Recently there has been an increased focus on autism and considerable progress has been made in providing autism programs.

This study explored beliefs and attitudes about autism spectrum disorders (ASD) across 3 professions, namely, psychiatrists, psychologists, and special education teachers (SET), in Turkey to determine if these professionals showed uniform or varying beliefs and attitudes about ASD. Surveys were given these professionals in different autism organizations and at an autism conference held in Istanbul, Turkey.

Data was collected on 47 subjects. Survey questions were divided into 6 categories: perceptions about ASD, perceptions about social roles, perceptions about marriage and family issues, behavior of individuals with ASD, education of individuals with ASD, and feelings about having a child with ASD. Results showed that there were similarities and differences in responses across professions. For example, most professionals endorsed similar beliefs and attitudes about having a child with ASD and agreed with the statement ‘&suffer from its symptoms throughout their life’. Psychiatrists and SET endorsed similar and positive attitudes and beliefs about social roles, but psychologists tended to be less optimistic. Responses on marriage and family life showed that psychiatrists expressed more positive beliefs and attitudes about one’s capacity to negotiate marriage and family life while psychologists and SET expressed less optimistic beliefs and attitudes.

While findings showed that different professionals have varying beliefs and attitudes about autism in Turkey, more research is needed to determine if beliefs and attitudes impact programmatic decisions and treatment of individuals diagnosed with ASD.
**PS3.39**

**THE EFFECTIVENESS OF THE SOCIAL SKILLS TRAINING FOR CHILDREN WITH HIGH-FUNCTIONING AUTISM MOTIVATED BY LEARNING COMPUTERS:** Sayo Okuno, Keiko Notomi, Department of Special Education, Fukuoka University of Education

**Background**

There are several social skills training programs for children with high-functioning autism (HFA). However, the generalization of improved social skills is difficult.

**Objectives**

The current preliminary study was conducted to examine the effectiveness of a new social skills training program and its ability to generalize skills in natural settings.

**Methods**

Four children with HFA (4 boys), aged 8-10 years, with FIQ (WISC-b) from 88 to 110, were involved in the study. SMILE (Okuno and Notomi, 2007 in print) is a new structured social skills training program that teaches students to write seasonal greeting cards on computers. This program based Ozonoff, Dawson, and McPartland's (2000) basic principles for teaching social skills that capitalize on children's strengths. The training was offered in 6 weekly 60 min sessions, and the goal of the training was to improve basic social skills (i.e., taking turns, engaging, listening to others, and asking for help). The Japanese version of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990) was rated by the children themselves and their classroom teachers. The Japanese version of the Social Maturity Scale (based on Vineland Social Maturity Scale) was rated by parents. These measures and several other qualitative investigations were administered before and after the training.

**Results**

Children learned to use the targeted basic social skills. The total scores of student-rated SSRS (maximum =116) improved by 6-10 points in three children. The total scores of teacher-rated SSRS also increased 2-4 points. The parent interview after the training showed that the children began to interact with peers in natural settings.

**Conclusion**

This program (SMILE) led to the improvement in social skills of children with HFA and some generalization of the learned social skills was observed in non-training settings. In addition, all the participants found that social interactions can be enjoyable.

**Sponsor**

Non

**PS3.40**

**ASSESING ANXIETY SYMPTOMS IN CHILDREN WITH AN AUTISM SPECTRUM DISORDER:**

**PARENT-CHILD AGREEMENT**

Audrey Blakeley-Smith, Judy Reaven, Susan Hepburn, University of Colorado at Denver and Health Sciences Center

**Background**

Prevalence rates of anxiety disorders in children with autism spectrum disorders (ASD) are high. A common method of assessing symptoms of anxiety is through the use of self-report questionnaires. There is no research to date, however, on the agreement of ratings of anxiety between parents and children with ASD.

**Objectives**

The purpose of the present study was to examine parent-child agreement on the Screen for Child Anxiety Related Emotional Disorders (SCARED) which has five dimensional scores: Generalized Anxiety, Separation Anxiety, Social Anxiety, School Avoidance, and Panic Disorder.

**Method**

Thirty-two children with ASD, ages 8-14, with verbal IQs of 80 or higher participated in the study. Children and parents completed the SCARED independent of one another. Child and parent ratings were then compared using bivariate correlations.

**Results**

Correlations between child and parent ratings for Generalized Anxiety (rs (25) = .19, p = .34), Panic Disorder (rs (25) = .39, p = .18), and Total Score (rs (25) = .24, p = .25) were not significant, indicating that children and parents did not agree on the symptom level/expression for these disorders. In contrast, the correlations between parent and child ratings of Separation Anxiety [rs (25) = .52, p = .01], Social Anxiety [rs (25) = .50 p = .01], and School Avoidance [rs (25) = .43, p = .03] were significant, indicting strong parent-child agreement on these disorders.

**Conclusion**

Results indicate that parent-child agreement on the SCARED is moderate for anxiety disorders that have more externalizing indicators and poor for anxiety disorders that are more internalizing. Results are compared to parent/child agreement derived from typical populations. Implications discussed in terms of accuracy of self-report.

**Sponsors**

Organization for Autism Research (OAR), Doug Flutie Foundation, Cure Autism Now (CAN)

**PS3.41**

**PARENTS’ PERCEPTIONS OF CIRCUMSCRIBED INTERESTS**

Neil Cummings, Marjorie Solomon, UC Davis MIND Institute

**Background**

Circumscribed Interests (CI) are common among individuals with an ASD. Paradoxically these interests are at once highly useful as reinforcers, and potentially disruptive to social functioning. Relatively little research has been done to describe CIs.

**Objective**

Examine differences in the intense interests between typically developing (TD) subjects and subjects with an ASD.

**Methods**

20 subjects with an ASD and 20 subjects with typical development between the ages of 8 and 18 were matched on age, gender, and IQ. All reported having a special interest pursued for at least 2 ½ hours/week for at least 3 months. Patients were qualified with the ADOS-G, the Social Communication Questionnaire, and a DSM-IV-TR checklist. Participants were administered the Yale Special Interests Interview (YSII) and a parent interview developed to assess both the positive and detrimental attributes of special interests.

**Results**

Findings from previous studies including that the severity of interests in ASD subjects increases over time; and that sports is a prevalent interest in TD subjects were replicated. On the parent interview, significant group
differences were observed in age appropriateness; disruption caused at home and school; tendency to monologue; and degree to which interests are pursued in a solitary way. Although the parents of children with an ASD reported their children’s CIs were significantly less useful in the real world functioning, reports of the usefulness of interests for future vocations did not differ for the groups.

Conclusion: Behavioral manifestations of special interests were significantly different between TD subjects and those with ASDs. The interests of both groups may provide a foundation for future vocations.

Source of Funding: U. C. Davis Health Service Research Award

PS3.42
CAREGIVER EVALUATION OF QUALITY OF LIFE (CEQOL) FOR COMMUNICATIVELY HANDICAPPED INDIVIDUALS WITH NEURODEVELOPMENTAL DISORDERS Alan J Lincoln, Jennifer Stender, Emily Meier Alliant International University

Quality of life (QL), a multidimensional construct, consists of several domains: interpersonal relations, social inclusion, personal development, physical well-being, emotional well-being, self-determination, material well-being, safety/security and material well-being (Schalock, 2004). QL is best assessed when an individual can directly provide objective and subjective information about their state of being. However, when individuals have significant communication deficits self-report may not be possible, and information then has to be obtained from informants that are knowledgeable about the individual. There is little research focusing on the quality of life of persons with autism or their families. An initial set of items was generated. This original set of items was then sent to other professionals knowledgeable about autism for review of content validity. After the focus group review of the questionnaire, items were changed, deleted or added based on the feedback given. This resulted in the first version of the Caregiver Evaluation of Quality of Life (CEQOL). The initial questionnaire was then administered to 120 families having a family member diagnosed with autism or other neurodevelopmental disorder. The questionnaire assessed domains of a child’s quality of life as reported by a parent or caregiver and included the child’s level of independence, communication skills and social skills. Family adjustment questions focused on family adjustment to the level of care required by the proband, interference with regular family activities, and the availability of appropriate resources within the community. Caregiver burden questions focused on caregiver stress, worry, the ability to manage negative behaviors, and life satisfaction. From the original scale three separate scales were created and included: a child scale, family adjustment scale, and caregiver burden scale. Reliability and validity data for each of the three scales will be presented.

PS3.43
THE INCIDENCE RATE OF ASD IN THE CORRECTIONS POPULATION Alicia V. Hall, Donna Schwartz-Watts, Ruth K. Abramson, University of South Carolina School of Public Health

Background: The literature indicates that persons with ASDs are more likely to become involved in the criminal justice system than persons without disabilities (National Research Council, 2001a). Although a person with ASD is more likely to be a victim of a crime, he can also be the perpetrator of a crime. However, very little is known about the prevalence of ASDs in the correctional setting.

Aims: The purpose of this study is to determine the prevalence of ASD in the South Carolina prison population.

Design/Methods: Participants (1,000) were ascertained from the SCDC Reception and Evaluation (R&E) Center. Over a 30 day period in the fall of 2006, all inmates, males and females, 18 years or older underwent a routine educational and psychiatric screen that included the AQ (Baron-Cohen, et.al. 2001). The AQ consists of 50 questions (scale agree to disagree). A total score of 32 or more is used to distinguish individuals who have clinically significant levels of autistic traits.

Results: Of the 1000 inmates screened, 4.7% of them screened positive for ASD at the R&E Center. Of the inmates that had a positive screen for ASD, the sample was male (100%) and mostly African-American (57.4%). The types of offenses that the individuals were adjudicated guilty were as follows: drug offenses (25.5%), theft/burglary (21.1%), violent (21.1%), sex (5.3%), and miscellaneous non-violent offenses, such as failure to stop for an officer, resisting and officer and stalking (27%).

Conclusions: This preliminary study reveals that 4.7 % of adults in a South Carolina prison screen positive for ASDs. Further study is needed to determine how many of these individuals would actually meet DSM-IV criteria for an ASD. However, these preliminary results are important because very little attention is being paid to criminal justice issues and ASD. These results also increase awareness of ASDs in the criminal justice community.

PS3.44
SENSORY REACTIVITY IN CHILDREN WITH AUTISM: A CROSS MEASURE COMPARISON Cynthia Zierhut, Sally Rogers, David Hessl, Cherie Green, Carolyn McCormick, UC Davis M.I.N.D. Institute

Background: Children with autism are often described as having abnormal sensory reactions. Methods of measurement of sensory responses have most often involved parent report and behavioral observations. Recently, a reliable laboratory paradigm has been established for examining reactions and habituation to sensory stimuli (Miller et al., 1999) in atypical populations.

Methods: Children were participants in this pilot study as part of the larger Autism Phenome Project, conducted at the UC Davis M.I.N.D. Institute. Children’s diagnoses
were confirmed with the ADI and ADOS-G. Children were accompanied by a parent and were seated in a quiet room and electrophysiological applications were made to the child’s foot. Five trials of an auditory probe (i.e., siren played at 90 db) were delivered with 10 second delays between each trial. The session was videotaped and children’s affect and startle responses were coded independently. Parents completed the Short Sensory Profile (SSP).

Results: Data has been collected on 13 children with autism to date (mean 43.8 months, age range = 29 - 65 months, 12 boys and 1 girl). In examining the relationships between the electrophysiological responses, the SSP scores and behavioral coding of child affect and startle, it was found that children who were most reactive overall to the siren were described by their parents to show a high tendency toward covering his/her ears in response to loud sounds (r =-.610, p=.03). Patterns suggestive of associations are found electrophysiological data and the SSP subdomains and the degree of negative affect and startle response displayed by the children (r=.451, p=.12).

Conclusion: Preliminary findings support the use of this methodology in objective measurement of sensory reactivity in children with autism and demonstrate consistency across several types of measures: physiological, behavioral, and parent report. Supported by funds from the UC Davis M.I.N.D. Institute Autism Phenome Project.

**PS3.45**

**INCREASED MOTOR CORTEX WHITE MATTER VOLUME PREDICTS MOTOR DYSFUNCTION**

*Melanie P. Burgess, Jennifer C. Gidley Larson, Stewart H. Mostofsky, Kennedy Krieger Institute*

Background: Motor abnormalities, such as those documented in autism, are highly quantifiable and reproducible and can serve as markers for deficits in parallel systems important for socialization and communication. Correlations of motor signs with anatomic MRI measures therefore offer an important means of investigating brain abnormalities contributing to autism.

Objective: In this study we examined whether motor cortex volumes predict impaired motor performance in children with autism.

Methods: Subjects were 20 children with autism and 36 typically developing controls, 8-12 years old. Regional tissue volumes were measured using an automated tissue classification algorithm followed by a semi-automated parcellation method. Motor performance was assessed using the Physical and Neurologic Examination of Subtle Signs (PANESS), with higher scores indicating poorer performance.

Results: Children with autism showed significant motor impairment with total PANESS scores higher than those of controls (p<0.0001). There were no significant group differences in motor cortex volumes of white or gray matter. Independent linear regression analyses revealed that for controls there was a significant negative correlation between total PANESS score and left motor cortex white matter volume (R2=0.15, p=0.02). In contrast, children with autism showed a robust positive correlation between total PANESS score and left motor cortex white matter volume (R2=0.60, p<0.0001), such that increased white matter volume predicts poorer motor performance.

Conclusion: The findings for the first time demonstrate an association between increasing radiate white matter volume and functional impairment in children with autism, in this case basic motor skill development. The observed association may be representative of global patterns of brain abnormality in autism that also contribute to deficits in socialization and communication.

Sponsors: NIH & NAAR

**PS3.46**

**VALIDATION OF A NOVEL TASK FOR ASSESSING IMITATIVE MOTOR LEARNING:**

*Bronwen Evans, Stephanie Powell, Daniel Simmonds, Jennifer Gidley Larson, Stewart Mostofsky, Kennedy Krieger Institute*

Background: Difficulty with motor imitation has been hypothesized to be a core deficit in autism, contributing to impairments in socialization. Given the developmental nature of autism, examination of motor (procedural) learning mechanisms linked to imitation (‘imitative motor learning’) could provide insight into the brain basis of the disorder.

Objectives: To devise a task that examines motor learning associated with imitation (imitative motor learning).

Methods: Motor sequence learning was assessed using a standard serial reaction time task (SRTT) and a modified ‘Imitation SRTT’ in which subjects used the fingers of their right hand to push one of four buttons in imitation of a video of a left hand facing the subject. Both tasks included 7 blocks of 80 trials; blocks 2-5 and 7 comprised an implicit 10-trial repeated sequence; blocks 1 and 6 were random. The tasks were piloted in twelve typically developing children, ages of 8-12 years, with task order counterbalanced.

Results: Repeated measures ANOVA of blocks 2 through 5 revealed a significant main effect of block (p=.01), with a decrease in reaction time (RT) across the blocks of trials. The (block x task) interaction was not significant, (p=.9), indicating equivalent learning occurred in both tasks. Further, for both tasks, paired t-tests revealed significant increases in RT from block 5 to 6 (standard, p=.02; imitative, p=.01) and significant decreases from blocks 6 to 7 (standard, p=.025, imitative p=.001), indicating retention of the implicitly learned motor sequence for both tasks.

Conclusions: The results provide evidence that the Imitation SRTT is a valid tool for assessment of imitative motor learning. This will be useful for examining the basis of impaired development of motor, social, and communicative skills in children with autism; data from such investigations will also be presented.

Sponsor: NIH K02NS44850, R01NS048527 and the National Alliance for Autism Research
**PS3.47**

**INTACT LOCOMOTOR ADAPTATION IN CHILDREN WITH HIGH-FUNCTIONING AUTISM**  
Jennifer C. Gidley Larson, Anjana Bhat, Stewart H. Mostofsky, Amy J. Bastian, Kennedy Krieger Institute

**Background:** Cerebellar abnormalities, including reduced number of Purkinje cells, are consistently reported on postmortem examination of individuals with autism. We have previously shown children with autism show normal adaptation of arm movements dependent on lateral regions of the anterior cerebellum (Mostofsky et al., 2004).

**Objectives:** We used a split-belt treadmill to test midline cerebellar contributions to two forms of locomotor adaptation in children with autism: feedback driven and feedforward adaptation. Consistent with studies of limb movement, we hypothesized that children with autism would demonstrate normal gait adaptation.

**Methods:** 15 children with high-functioning autism (HFA) and 15 typically developing (TD) children walked on a custom-built split-belt treadmill. Baseline involved ‘slow’ (0.6 m/s) and ‘fast’ (1.2 m/s) walking with ‘belts tied’ for 2 minutes each. During the adaptation period one treadmill belt was set at the slow speed, whereas the other was set at the fast speed for 8-10 minutes. In the post-adaptation period, the belts returned to the ‘tied slow’ speeds for 2 minutes. Foot and ankle positions, footswitch, and treadmill velocity data were recorded. Feedback parameters were stride length and percent time in stance and feedforward parameters were step length and percent time in double limb support.

**Results:** There were no group differences between children with HFA and TD children for both forms of adaptation. For instance, on feedforward parameters such as step length, children with autism responded typically to the split-belt perturbation and showed post-adaptation after-effects.

**Conclusion:** These results confirm previous findings of normal motor adaptation in children with HFA. Difficulty learning complex sequences of movements, possibly due to dysfunction across a frontal/parietal-subcortical network, may better explain anomalous motor development in autism.

**Sponsor:** NAAR, NIHK02NS44850, R01NS048527, RO1HD048741

**PS3.48**

**HOW WILL I REACH THAT TARGET? Cheryl M. Glazebrook, David Gonzalez, Digby Elliott, McMaster University**

**Background:** Movement is an essential part of interacting with the environment. Previously we found persons with autism took considerably more time to initiate and execute their movements.

**Objectives:** In E1 we conducted a detailed analysis of upper limb aiming movements to explore why movements took longer to perform. In E2 we removed visual feedback during the execution phase to ascertain reliance on visual feedback.

**Methods:** In E1 participants performed right or leftward aiming movements to 1 or 2 cm targets that were 16 or 32 cm away. Targets were projected onto a table and participants initiated movements when one of the two targets turned red. In E2 participants also performed horizontal aiming movements, except now movements were performed to real buttons and vision was occluded after movement initiation. Participants knew in advance which target they were moving to for half the trials. For the remainder the target occurred randomly on the right or left (like E1).

**Results:** In E1 and E2 participants with autism took significantly longer to initiate and execute movements. Analysis of E1 revealed participants with autism were equally accurate reaching the target, however, they exhibited significantly more spatial and temporal variability during the first half of the movement. When vision was removed in E2 participants with autism were still able to land on the target. Unlike E1, without vision proportionally more time was spent in movement deceleration.

**Conclusion:** It takes persons with autism longer to perform the movements, however, they are able to achieve the same endpoint accuracy. Individuals with autism appear to use visual feedback to compensate for the initial variability. E2 demonstrates they are also able to make use of kinaesthetic feedback.

**Sponsers:** Autism Ontario, CRC, NSERC

**PS3.49**

**CHILDREN WITH AUTISM SHOW IMPAIRED MOTOR SEQUENCE LEARNING BUT SPARED MOTOR ADAPTATION**  
Stewart H. Mostofsky, Jennifer C. Gidley Larson, Opher Donchin, Reza Shadmehr, Amy J. Bastain, Kennedy Krieger Institute

**Background:** Motor impairment is a consistent finding in autism. Given the developmental nature of autism, deficits in motor learning might help explain impaired acquisition of motor skills.

**Objective:** To investigate this hypothesis, we examined motor adaptation and motor sequence learning in the same group of children with autism.

**Methods:** Motor learning was examined in 12 high-functioning children with autism (HFA) and 13 typically-developing children, using both tests of motor adaptation and motor sequence learning. Motor sequence learning was assessed using a Rotary Pursuit task consisting of four blocks of four 20-second trials, with learning measured as change in time-on-target across successive blocks of trials. Motor adaptation was assessed using: 1) Prism Adaptation, in which subjects were instructed to throw a ball while wearing prism goggles, and 2) Reaching Adaptation in which subjects moved a planar two-joint manipulandum to a visually-displayed target, with either a force or visual perturbation applied. For all adaptation tasks, dependent measures included adaptation rates, learning indices, and post-adaptation after-effects.

**Results:** For Rotary Pursuit, repeated measure ANOVA indicated a significant ‘diagnosis x block’ interaction (p=0.05) with the HFA group showing less improvement...
PS3.50 AUTOBIOGRAPHICAL WRITINGS BY AUTISTIC PERSONS: A SYSTEMATIC STUDY Brigitte Chamak, Béatrice Bonniau, Emmanuel Jaunay, David Cohen, CESAMES (INSERM-CNRS-Université Paris 5)
Background: Since the modifications of the international classification of diseases in the early 1990s, the number of autobiographical writings by autistic persons has increased, thus providing a useful data base for a comprehensive analysis.
Objectives: The aim of this study is to highlight the socio-demographic characteristics of persons with autism spectrum disorder (ASD) who have published biographical writings, to point out their own views on autism, and to compare their personal experiences to scientific and medical knowledge and representations.
Methods: Adopting an anthropological approach, we analyzed fifteen autobiographical writings (18 books) and three first-hand web page accounts by persons with ASD. We systematically screened this material and explored socio-demographic characteristics, cognitive skills and interests. We also focused on unusual sensory perceptual experiences, emotional reactivity, consequences of autism discovery for themselves, personal definition of autism and etiological theories, hopes and claims regarding autism.
Results: The authors’ ages (22 to 74 years), their countries (N=7) and backgrounds were varied, and most of them were high-functioning individuals with autism or Asperger syndrome. Unusual perceptions and/or information processing, as well as impairments in emotional regulation, were stressed by all of them. Although two authors considered autism as a handicap, most of them defined autism as merely a way of being. They often struggle against discrimination and request to be regarded in a more positive way.
Conclusion: Perception and sensitivity peculiarities, as well as emotional reactivity have been pointed out as the core symptoms of autism by self reports, initial clinical reports, parents’ report and studies in cognitive science. However, the international and American classifications do not mention them.
Sponsor: Fondation de France

PS3.51 HYPER- AND HYPO-RESPONSIVENESS TO SENSORY STIMULI IN CHILDREN WITH AUTISM Grace T. Baranek, Linda R. Watson, Brian B. Boyd, Michele Poe, Heather Miller, University of North Carolina at Chapel Hill
Background: Hyper- and hypo-responsiveness to sensory stimuli are common symptoms described in personal accounts and parent-report studies of autism; however, observational measures have not been used to confirm the presence, development, or specificity of these features.
Objectives: Identify the developmental nature and specificity of hypo- and hyperresponsive features in children with autistic disorder (AD) compared with children with developmental delay (DD) and typically-developing children (TD) using an observational measure, the Sensory Processing Assessment (SPA).
Methods: 139 children, ages 1-7 years (AD=56, DD=30, TD=53) participated. Diagnostic (ADI-R/ADOS) and developmental (Mullen Scales; Vineland) assessments were used to confirm diagnostic groupings. The SPA, a play-based assessment, quantified levels of hyper- (i.e., avoidance/aversion to multi-sensory toys), and hypo-responsiveness (i.e., orienting to novel auditory, tactile, & visual stimuli). Mixed model regression analyses were used to analyze cross-sectional developmental changes and group differences.
Results: Although both clinical groups manifested higher levels of hyper- and hypo-responsiveness than typically-developing children, increasing mental age was associated with decreasing sensory features in all groups. Hypo-responsiveness was more specific to autism, whereas hyper-responsiveness was a more general feature of developmental delay.
Conclusion: These findings confirm parent-report studies and elucidate developmental influences and specificity of sensory features in autism versus DD. Our findings have implications for understanding pathogenic mechanisms as well as treatment planning.
Sponsor: NICHD (Sensory Experiences Project - HD42168)

PS3.52 CATEGORICAL PERCEPTION OF FACIAL EXPRESSIONS IN AUTISM, ASPERGER SYNDROME, AND TYPICAL POPULATION Jessica Bertrand-Rivest, Isabelle Soulères, Laurent Mottron, Bouthïna Jemel, Université de Montréal
Background: Categorical perception occurs when the perceived similarity between stimuli is modulated by the category to which they belong. Indications of subtle differences in categorization in autistic individuals (e.g. slower learning of category, Bott et al, 2006; non-mandatory categorization, Soulhières et al., in press) predict atypical categorical perception in PDDs.
Objectives: We compared categorical perception in autistics (n=13), Asperger (n=13) and Wechsler FSIQ-, gender- and age-matched controls (n=14), to test the hypothesis of a reduced influence of categories on perceptual mechanisms in PDDs.
Methods: Stimuli were 15 morphs of facial expressions, from anger to fear to happiness. In an ABX discrimination task, three stimuli were presented successively and participants had to decide whether the third one was identical to the first or second stimulus. In a consecutive categorization task, stimuli were presented individually and participants had to classify them as representing anger, fear or happiness.

Results: Participants from the three groups categorized the stimuli similarly, with sharp discontinuity between categories. Boundary locations were identical in the three groups. Overall discrimination performance was similar in the three groups. Increase in discrimination performance is observed at the boundaries between categories in all groups.

Conclusion: Autistic and Asperger individuals show a categorical perception of facial expressions, to the same extent as control individuals. Despite indications of slower learning of categories in other studies, well learned categories such as facial expressions exert the same influence on discrimination mechanisms in PDDs.

Sponsor: CIHR, Autism Speaks

PS3.54
USING A FULLY IMMERSIVE VIRTUAL ENVIRONMENT TO INVESTIGATE THE PATHOGENESIS OF REPETITIVE BEHAVIOURS IN AUTISM

Jocelyn Faubert, Laurent Mottron, Armando Bertone, Université de Montréal

Background: The present pilot project employs fully immersive virtual environment (FIVE) technology to investigate the pathogenesis of repetitive behaviors in autism. Lateral glance is a frequent type of exploratory behavior in autism. Viewing information laterally can result in a degradation of visual information where some complex visual attributes such as stereopsis are eliminated simplifying the visual input.

Objectives: It is hypothesized that lateral glance behavior may be due to regulatory actions where the child adopts these behaviors to ease perceptual processing and/or suppresses discomfort. A main objective here is to demonstrate how such a question can be addressed with FIVE technology.

Methods: This working hypothesis could be addressed in proposed studies by systematically manipulating the complexity of the environment experienced by the children while measuring autonomic and motor responses to such perceptual changes. If an association between the complexity of the perceived environment and level of physiological response is evidenced, the argument can be made that the pathogenesis of repetitive behaviors in autism may result from atypical information processing in autism.

Results: As the study is still in the development stages, we will show the different immersive environments and scenarios that we have created to address the present questions, along with some preliminary results and we will discuss the potential of FIVE technology for research and intervention in autism.

Sponsor: NIPi

PS3.55
VOICE PROCESSING IN AUTISM REVISITED

Krista Leigh Hyde, Pascal Belin, Alan C. Evans, Fabienne Samson, Cyril Pernet, Bénédicte Hubert, Anna Bonnel, Laurent Mottron, McConnell Brain Imaging Centre, Montreal Neurological Institute, McGill University

Background: Atypical voice processing may contribute to the social phenotype reported in autism. Support for this claim comes from atypical orientation to human vocal sounds, and brain abnormalities in temporal-lobe regions implicated in human voice processing, in autistics with a
addition of a mask allows us to examine whether displays and Experiment 2 involved masked displays. The reported whether or not they detected the presence of the was presented as coherent or scrambled. Par data. In a blocked design, the point moving tractor were constructed from motion capture PDD. Point ADOS motion in these groups.

**Objectives:** To assess the visual perception of human movement in autistic and normal young adults. To compare the visual analysis of human motion and movement in autistic and normal young adults. To

Visual perception is a primary input to social processes. Rutter University

**Background:** Social impairments are diagnostic of autism. Visual perception is a primary input to social processes. That is, in order to interact with another person, an observer must accurately perceive and rapidly interpret their social partner's bodily and facial movements. While recent evidence has found deficits in face processing in individuals with autism, little work has been done on how this population perceives people's body movements. 

**Objectives:** To assess the visual perception of human movement in autistic and normal young adults. To compare the visual analysis of human motion and object motion in these groups.

**Methods:** Participants were assessed with the ADI and ADOS-G, resulting in a confirmed diagnosis of Autism/ PDD. Point-light displays of a walking person and of a moving tractor were constructed from motion capture data. In a blocked design, the point-light person or tractor was presented as coherent or scrambled. Participants reported whether or not they detected the presence of the person or tractor. Experiment 1 contained unmasked displays and Experiment 2 involved masked displays. The addition of a mask allows us to examine whether participants use configural processing to detect human and/or object motion.

**Results:** Normal controls detected both the point-light defined human and tractor at above chance levels in the unmasked and masked displays. In addition, they were more accurate and faster to detect the human point light walker rather than the tractor. Observers with autism seem to stray from this pattern of performance, suggesting a decreased perceptual ability to detect the presence of human motion that is over and above deficits in the global analysis of object motion.

**Conclusions:** Performance by the participants with autism suggests that deficits in an underlying perceptual mechanism contribute significantly to the social impairments in this population.

**Sponsor:** Autism Speaks

**PS3.57 SLOWED VISUAL SEARCH IN THE ABSENCE OF TOP-DOWN INFORMATION IN AUTISM Brandon M. Keehn, Christine Connolly, Alex Fine, Robert M. Joseph, Boston University School of Medicine**

**Background:** Top-down selection during visual search engages both excitatory and inhibitory mechanisms to guide attention. Accelerated response times by individuals with autism have been found in studies permitting top-down guidance, although object-based inhibition and excitation have been shown to be intact in autism.

**Objective:** To evaluate visual search in autism in two multiple conjunctive tasks precluding the use of excitatory and inhibitory top-down information.

**Method:** Participants were 25 high-ability individuals with autism and 25 age- and NVIQ-matched typically developing (TD) individuals. Stimuli for the efficient search condition (RT x set size slope is small) were black and white disks and rings. Stimuli for the inefficient condition (RT x set size slope is large) were red and green rectangular bars in horizontal or vertical orientation. For each condition, the target was defined as the single element (one of four possible) sharing a single conjunctive feature with each set of distractors. Set size (6,12,18). target presence, and target type were pseudo-randomized within four 24-trial blocks for each condition.

**Results:** Groups did not differ in error rate. The autism group evidenced slower median RT than the TD group in both efficient and inefficient target present conditions. Search efficiency did not differ between groups for efficient or inefficient target present conditions. Eye-tracking results will be discussed.

**Conclusion:** Prior knowledge of target and distracters affords top-down guidance as well as inter-trial priming. In a search paradigm that precluded excitatory and inhibitory top-down modulation of attention, individuals with autism did not evidence accelerated RT compared to a TD control group. These findings suggest that enhanced visual search abilities in autism may rely on top-down processes, including target/distracter priming, which are of limited utility in multiple conjunctive search.

**Funding:** NIDCD(U19 DC03610)/CPEA.
**PS3.58**

**SEEING THE FOREST: THE EFFECT OF VISUAL CONTEXT AS AN ATTENTIONAL CUE IN AUTISM**

**Anastasia Kourkoulou, John M. Findlay, Susan R. Leekam, University of Durham**

**Background:** The Weak Central Coherence (WCC) hypothesis of autism (Frith, 1989, Frith & Happé, 1994) proposes that individuals with autism are impaired in their ability to integrate information in its context. Recent research provides mixed evidence for this claim.

**Objective:** The aim of the present studies was to investigate this proposal further by testing whether individuals with autism can learn a visual context and use it as a cue to guide their visual attention.

**Methods:** Research by Chun and Jiang (1998) showed that in a visual search task, participants detect targets more quickly from spatial configurations that they have previously seen. In other words, the context served as a cue that guided visual attention towards the target location. On the basis of this task, we tested 20 individuals with high-functioning autism or Asperger’s syndrome (diagnosis assessed with ADI and ADOS) and 20 IQ-matched controls on three types of visual context that varied in their degree of coherence: from abstract letters shapes (low coherence) to cabinets with realistic objects (intermediate coherence) and 3D real world rendered scenes (full coherence).

**Results:** Individuals with autism, like typical developing individuals, were able to learn each type of visual context, detecting targets more efficiently in previously seen than in new spatial configurations. However, the pattern of learning appears to differ between the groups.

**Conclusion:** So, although the end point might be similar (that searches are faster in previously seen configurations), the differing trajectories of the two groups, suggest that different perceptual processes are in work. Findings will be discussed in terms of theories in autism and of normal vision.

**Sponsor:** University of Durham, Department of Psychology

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**PS3.59**

**AUDIOVISUAL SPEECH INTEGRATION IN AUTISM SPECTRUM DISORDER: EVIDENCE FROM EVENT-RELATED POTENTIALS**

**Maurice Magnee, Beatrixede Gelder, Herman van Engeland, Chantal Kemner, University Medical Center Utrecht, the Netherlands**

**Background:** Integration of information from multiple sensory sources is an important prerequisite for successful social behavior, especially during face-to-face conversation. It has been suggested that communicative impairments among patients with Autism Spectrum Disorder (ASD) might be caused by an inability to integrate synchronously presented visual and auditory cues.

**Objectives:** Investigate cerebral activity underlying audiovisual speech integration among patients with ASD and matched controls.

**Methods:** We investigated audiovisual integration of speech stimuli among thirteen high-functioning adult patients with ASD and age- and IQ matched controls using electroencephalography, focusing both on early phonological, as well as late phonological integration.

**Results:** We show dissociation in integration abilities in the patient group, with a deficit specifically related to the late integration of phonological information.

**Conclusions:** Patients with ASD are able to integrate visual and auditory cues at an early level of information processing. However, impairments in the higher order integration of phonological information may very well contribute to the communicative disabilities which are typical for the disorder.

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**PS3.60**

**INTERSENSORY PERCEPTION AND ATTENTION DISENGAGEMENT IN YOUNG CHILDREN WITH AUTISM**

**Lisa C. Newell, Lorraine E. Bahrick, Mariana Vaillant-Molina, Melissa Shuman, Irina Castellanos, University of Miami**

**Background:** Children with autism have difficulty disengaging attention from one stimulus and shifting to another, show impaired attention to social vs nonsocial events, and may have difficulty detecting amodal information uniting sights and sounds. These skills develop in the first year for typically developing infants.

**Objectives:** The current research characterizes the nature of disturbances of attention in autism using a new behavioral assessment to measure attention disengagement and shifting, and intersensory matching for social vs nonsocial events.

**Methods:** A central stimulus was presented for 3 s, followed by two peripheral events for an additional 10 s. Only one of the peripheral events was synchronous with a centrally projected soundtrack. The central stimulus remained on (disengage trials) or was turned off (shift trials) when the peripheral events were presented. Three blocks of 20 trials were presented, nonsocial (NS; objects impacting a surface), social neutral (SN; women speaking with neutral affect), and social positive (SP; women speaking with exaggerated prosody and positive affect).

**Results:** Eight children with autism (ASD; M = 3.57 yrs; range = 2.75 to 4.92) and 8 mental age-matched typically developing children (TD; M = 2.05 yrs; range = 1.83 to 2.33) were tested. Overall, ASD children were significantly less attentive during social than nonsocial trials. All children were slower to disengage than shift attention. However, ASD children were slower to disengage for SN events, whereas TD children were slower to disengage for NS events. Finally, children with autism showed intersensory matching for NS events only.

**Conclusions:** Children with autism show a selective impairment in disengaging attention and intersensory matching for social events, particularly neutral audiovisual speech, compared with typically developing children.

**Sponsor:** Marino Autism Research Institute and the FIU Foundation’s Faculty Research Enhancement Award
PS3.61 IMPAIRED PERCEPTION OF RAPIDLY-CHANGING SOUNDS IN CHILDREN WITH AUTISM AND ASPERGER’S SYNDROME: A POTENTIAL MECHANISM FOR DIFFICULTIES HEARING SPEECH IN NOISY ENVIRONMENTS
Emma J. Weisblatt, Thomas Cope, Wei Cope, Jose I. Alcantara, University of Cambridge

BACKGROUND: Abnormal sensory responses are commonly reported in children with autism spectrum disorders (ASD), and these are auditory in over 60%. These often include difficulty understanding speech in noisy environments. This has been confirmed experimentally at noise levels found in primary school classrooms, especially when temporal dips are present in the background noise (Alcántara et al., 2004). Rapid changes in amplitude occur in speech signals, and difficulty processing these could cause the observed difficulties hearing speech in noise. The ability to process these changes can be quantified by measuring the Temporal Modulation Transfer Function (TMTF).

OBJECTIVE: To assess temporal processing abilities in children with ASD using TMTF.

METHOD: 11 children aged 10-14 with ASD and 8 age- and IQ-matched control children were tested. All had IQ above 70. TMTFs were measured using a 3-interval forced choice paradigm: participants indicated by button press in which of 3 intervals a noise was amplitude modulated. An adaptive procedure was used to measure the smallest amplitude modulation that could be detected, for modulation frequencies between 2 and 640Hz.

RESULTS: Children with ASD had higher thresholds for detecting amplitude modulation (p<0.001). A threshold deficit of 2-2.5 dB was found across all frequencies, corresponding to a 20-25% reduction in sensitivity.

CONCLUSION: The reduced sensitivity of children with AS to rapid amplitude modulation could account for the previous finding that speech-in-noise difficulties are especially pronounced when temporal cues are present. This processing difficulty has implications for teaching of children with ASD, for information provided to families and professionals, and for daily life and specific interventions, and these will be discussed.

SPONSOR: The Health Foundation

PS3.62 VALIDITY OF THE MULLEN SCALES OF EARLY LEARNING FOR USE IN CHILDREN WITH AUTISM SPECTRUM DISORDER Mia J. Coffing, Somer L. Bishop, Whitney J. Guthrie, Jamie Spangler, Susan A. Risi, Catherine Lord, University of Michigan Autism and Communication Disorders Center

Background: Despite widespread use of the Mullen Scales of Early Learning (MSEL) in young children with autism spectrum disorder (ASD), there is no information regarding the convergent or predictive validity of the MSEL. Furthermore, the original validation sample included no children with physical or mental impairments, and the test was constructed based on a non-empirically derived theory of intelligence (Bradley-Johnson, 2001).

Objectives: To investigate the psychometric properties of the MSEL, including convergent validity with the Differential Ability Scales (DAS). We will also examine whether verbal ratio IQs (VRIQ) and nonverbal ratio IQs (NVRIQ) derived from age equivalents on the MSEL are predictive of later ratio IQ scores derived from age equivalents on the DAS.

Methods: Participants consisted of children with ASD who were seen as part of a longitudinal research project or for clinic initial and re-evaluations. Children who received the MSEL and the DAS at the same appointment constituted the convergent validity sample. Children who received the MSEL at an earlier appointment and then received the DAS later were included in the predictive validity sample.

Results: Preliminary analyses using paired sample t-tests suggest that convergent validity between the MSEL and DAS is high for both VRIQ, t(42)=0.92, p=0.36 and NVRIQ, t(21)=0.07, p=0.95. Because these results indicate that the tests yield similar scores when administered simultaneously, the next step will be to investigate how well MSEL scores predict later DAS scores.

Conclusion: It is important to investigate convergent validity to determine whether scores derived from different IQ tests actually represent similar constructs. Moreover, in addition to being clinically relevant, examining the stability of IQ in children with ASD has very important implications for research, as IQ is often included as a primary variable.

Sponsors: NIMH (R01-MH066496); NICHD (U19-HD 35482)

PS3.63 SIGNAL DETECTION ANALYSIS OF THE DIAGNOSTIC ACCURACY OF THE PDD BEHAVIOR INVENTORY Ira L. Cohen, NYS Institute for Basic Research in DD

Background: The PDD Behavior Inventory (PDDBI) is an informant-based assessment tool for children, ages 18 months to 12 years, 6 months, having a Pervasive Developmental Disorder. It is age-standardized on a large sample of well-diagnosed cases and has good psychometric properties. The PDDBI yields T-scores for adaptive and maladaptive domains and composite scores, and generates discrepancy scores measuring social competence. Some measures are autism specific while others tap more generic issues. To date, there has been no information on the diagnostic accuracy of the PDDBI.

Objective: Assess the diagnostic accuracy of the PDDBI using ROC curves.

Methods: Two diagnostic comparisons were analyzed: 1) 300 cases clinically diagnosed with autism (N=184) relative to those who did not have autism but may have another PDD (N=116); and 2) 306 cases with any form of PDD (N=259) relative to those with no PDD diagnoses (N=47). For each measure, ROC curves were computed, the area under the curve (AUC) was computed and sensitivity, specificity and cut-off scores generated.

Results: When PDDNOS cases were part of the non-autism group, the AUC for three of the six autism
domains, two of the three autism composites, and one of the two autism discrepancy scores scored between 0.80 and 0.89. None of the nonspecific domains scored greater than 0.80. When all PDD cases were compared with non-PDD cases, accuracy improved for more of the measures. The AUC for four of the six autism domains, and all of the autism composite and discrepancy scores were above 0.80 (0.80 to 0.90). None of the nonspecific domains scored above 0.80. Sensitivity and specificity measures were good.

Conclusion: Autism specific PDDBI scores have very good accuracy and agree well with clinical diagnoses but this depends on the comparison group. Cut-off scores used for predictive purposes depend on expected base rates of autism in the samples of interest and results of cost-benefit analyses.

**PS3.64 ELECTRODERMAL RESPONSES TO SENSORY STIMULI IN CHILDREN WITH AUTISM**

**David Hessl, Cynthia Zierhut, Carolyn McCormick, Cherie Green, Sally Rogers, M.I.N.D. Institute, UC Davis**

**Background:** Children with autism are often described as having abnormal sensory reactions, yet there is mixed evidence on sensory dysfunction in children with autism (Rogers & Ozonoff, 2005). A reliable laboratory paradigm has been established for examining sympathetic nervous system reactions to sensory stimuli in other populations (Miller et al., 1999).

**Methods:** Young children are participating in a pilot study for the Autism Phenome Project conducted at the UC Davis M.I.N.D. Institute. Children’s diagnoses are confirmed with the ADI and ADOS-G and the SCQ is used to rule out autism in control children. Children are accompanied by a parent and are seated in a quiet room. To increase subject compliance with physiological data collection in these young children, electrodermal electrodes are applied to the dorsal surface of the child’s foot and an accelerometer is attached to the ankle to monitor movement for artifact screening. Five trials of visual, auditory, olfactory, and tactile probes are administered with 10-second inter-trial intervals, 20 seconds between modality. Electrodermal activity, which is mediated by the sympathetic nervous system is digitally recorded and scored blind to group status.

**Results:** Data has been collected on 20 children (13 autistic, 5 typical developing, and 2 developmentally delayed) with mean age=43.8 months, age range= 29 - 65 months. Preliminary analyses demonstrate good internal consistency across trials and validity shown by correlations with parent reports of sensory abnormalities.

There is a nonsignificant trend towards increased and more variable electrodermal responses in the autism group relative to the typically developing children. The groups show similar habituation pattern across trials.

**Conclusion:** Preliminary findings support the use of this methodology as an objective measurement of sensory reactivity in young children with autism.

Supported by the UC Davis M.I.N.D. Institute Autism Phenome Project

**PS3.65 COGNITIVE ASSESSMENT OF PRESCHOOL AGED CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD): COMPARING THE MULLEN SCALES OF EARLY LEARNING (MSEL) AND THE MERRILL-PALMER-REVISED (M-P-R)**

**Mandy Steiman, Mary Tsonis, Lee Tidmarsh, Eric Fombonne, Montreal Children’s Hospital**

**Background:** There is little research on the use of norm-referenced cognitive measures with preschool aged children with ASD. In particular, there is very limited information available on the use of the newly developed M-P-R with this population.

**Objectives:** Explore differences between results obtained on two cognitive tests, the MSEL and M-P-R, in a sample of preschool aged children diagnosed with Autism/Pervasive Developmental Disorder (PDD) and language delays.

**Methods:** 40 children aged two to four years old were recruited from the Autism Clinic at the Montreal Children’s Hospital. Diagnoses were confirmed using the ADI-R and ADOS. The MSEL and M-P-R were administered at the time of diagnosis. Adaptive skills were assessed using the Vineland-II Adaptive Behavior Scales (VABS-II).

**Results:** Preliminary analyses on 29 participants (mean age = 33 months; 93% male) indicated a significant moderate correlation between the MSEL Composite standard score and the M-P-R Developmental Index standard score (r = 0.58; p < .01). The mean standard score on the MSEL (M = 57.6; SD = 11.9) was significantly higher than the mean standard score on the M-P-R (M = 39.1; SD = 21.1). Significant moderate correlations were found between scores on related subscales on both tests. Overall standard scores on the MSEL and M-P-R were moderately correlated with the Adaptive Behavior Composite score on the VABS-II (0.58 and 0.59, respectively).

**Conclusion:** In this sample of verbally delayed children with ASD, cognitive test scores on the MSEL and M-P-R were correlated. Issues relevant to test selection and interpretation will be discussed, including implications for use of the M-P-R with ASD populations.

**Sponsor:** CIHR

**PS3.67 RECTIFYING DIFFERENCES IN DIAGNOSTIC CONCLUSION BETWEEN THE ADI-R AND ADOS**

**Rachel N. Avchen, Nancy C. Hobson, Lisa D. Wiggins, Centers for Disease Control and Prevention**

**Background:** Three instruments are widely used to assess autism spectrum disorders (ASD). The Social Communication Questionnaire (SCQ) is a screener to detect children who need further evaluation to determine ASD status. We define ASD consistent with DSM-IV/ICD-10 definitions for autism, Asperger’s, and PDD-NOS. The other two measures are considered diagnostic instruments: the Autism Diagnostic Observation Schedule (ADOS) and Autism Diagnostic Interview-revised (ADI-r). Until recently, resolution of discrepant results between
the ADOS/ADI-r was not standardized. In 2003, the Collaborative Programs of Excellence in Autism (CPEA) group outlined a three-level approach for resolving discordant scores. Level 2 delineates diagnostic criteria for determining ASD status (consistent with the DSM-IV/ICD-10) when standardized scoring on the ADOS/ADI-r yielded divergent conclusions.

Objective: To assess sensitivity of the SCQ given resolution of discordant ADI-r/ADOS scores using level 2 CPEA rules.

Methods: Parents of children receiving special education services and/or clinical services for a broad range of ICD10 codes were identified from a developmental disabilities surveillance system. If recruited, parental response to the SCQ/ADI-r was recorded. A research reliable clinician administered the ADOS. Children who met ASD criteria on either the ADOS/ADI-r (but not both) were classified as discordant cases and level 2 criteria was applied (n=23). The majority of children were male (70%) and 9 years at time of evaluation.

Results: Applying the standard cut-off of 15, SCQ results were compared against ASD status. The SCQ sensitivity was .58 (95% CI .30, .86), specificity .91 (95% CI .74, 1.08), positive predictive value .88, and negative predictive value .67.

Conclusions: The SCQ may not be a reliable screen for detecting potential cases of ASD in children whose ADOS/ADI-r scores are ultimately contradictory. However, the SCQ appears robust in determining true negatives.

**PS3.68**

**DOES THE USE OF SCREENING INSTRUMENTS IMPROVE THE ACCURACY OF REFERRALS TO SPECIALIST CHILD HEALTH SERVICES?** Abigail C. Davison Jenkins, Gillian Baird, Emily Simonoff, Andrew Pickles, Tony O’Sullivan, Ajay Sharma, Susie Chandler, Vicky Bird, Elizabeth Ireland, Fiona May, Tony Charman, UCL Institute of Child Health

Objectives: To evaluate whether the use of screening instruments would improve the accuracy of referral to specialist paediatric services for autism spectrum disorders (ASD) for pre-school children (18-48 months) with developmental problems referred to community child health services. To compare the accuracy of the M-CHAT and SCQ.

Method: In the first phase, the SCQ and M-CHAT were administered, either over the telephone or by post, to parents of 540 children referred to 2nd tier child health services. In the second phase (in progress) a stratified random sample of the screened children, based on M-CHAT and SCQ scores, are being assessed using the Autism Diagnostic Observation Schedule (ADOS), the Autism Diagnostic Interview (ADI), the Mullen Scales of Early Learning and the Preschool Language Scale (PLS-3).

Results from preliminary analysis (77 children): M-CHAT and SCQ scores are highly correlated with each other. Both screens are correlated with social and communication scores on both the ADOS and the ADI. Mullen composite scores are not related to scores on the screens, but do correlate significantly with ADI and ADOS measures.

Conclusion: Analysis of the final dataset will identify characteristics of cases that are discrepant across the screening measures and diagnostic instruments.

**PS3.69**

**USE OF THE STAT AS AN AUTISM SCREEN FOR 3-YEAR OLD CHILDREN** Jennifer Foss-Feig, Wendy L. Stone, Vanderbilt University

Background: The Screening Tool for Autism in Two-Year-Olds (STAT) is an interactive, play-based measure for identifying children at risk for autism based on social and communicative behavior (Stone, Coonrod, & Ousley, 2000; Stone, Coonrod, Turner, & Pozdol, 2004). A cutoff score for children 24-36 months old has demonstrated strong psychometric properties. An extended scoring system for use with 3-year-olds would increase the utility of the STAT for a wider range of clinical, research, and educational settings.

Objective: To formulate a developmentally sensitive STAT scoring system for children between 36 and 48 months.

Methods: Participants were 50 children with autism and 29 children with developmental delay (DD) (mean CA=39.9 and 39.5 months, respectively). The STAT and diagnostic measures were administered and scored independently. Signal detection was used to identify a cutoff score for a randomly selected subsample; the cutoff was then validated on the remaining subsample and on a subset of children matched for MA.

Results: Relative to the original scoring system for two-year-olds, a lower cutoff score was optimal for use in this older age group. The lower score yielded a sensitivity of .92 and specificity of .86 with the development sample, and a sensitivity of .88 and specificity of .73 with the validation sample. Positive predictive value (PPV) and negative predictive value (NPV) for the validation sample were .84 and .79, respectively. This cutoff was also effective for the MA-matched sample (sensitivity=.90, specificity=.90, PPV=.90, NPV=.90).

Conclusion: The STAT can be used effectively to screen for autism in children between 36 and 48 months old. The original items and administrative protocol are appropriate for this age range, and a lower cutoff was identified to maximize screening properties.

Sponsors: NICHD, DOE/OSERS, Marino Autism Research Institute

**PS3.70**

**THE CBCL AND THE IDENTIFICATION OF PRESCHOOLERS WITH AUTISM.** Roberta Igliozzi, Filippo Muratori, Antonio Narzisi, Barbara Parrini, Raffaella Tancredi, Division of Child Neuropsychiatry, Scientific Institute Stella Maris, University of Pisa, Pisa, Italy.

Background: Examination of the validity of the CBCL in children with autism was studied by Duarte et al. (2003). In that study the researchers found out that Internalizing...
Problems did not distinguish autistic children from children with other psychiatric disorders.

Objective: To study the CBCL 1½-5 as screening tool in preschool children with autism.

Method: The study includes an experimental group of 50 preschooler diagnosed with Pervasive Developmental Disorder (PDD) using ADOS-G: 45 with Other Psychiatric Disorders (OPD) and 41 with a Typical Development (TD). ANOVA and T test were used to identify the CBCL scales that might differentiate among three groups. Sensitivity of the CBCL and the correlation between CBCL and ADOS-G was evaluated.

Results: We found significant differences on almost all CBCL scales in our three groups, except on Somatic Complaints, Sleep Problems and Affective Problems. From the comparison between PDD and OPD we obtained significant differences on Internalizing Problems, Withdrawn, Attention Problems and Pervasive Developmental Problems. Comparison among PDD and TD groups showed significant differences on almost all CBCL scales. Concerning the sensitivity of CBCL, we obtained a value of 90 %. Significant correlations between CBCL and ADOS-G were obtained.

Conclusion: Our data point out the presence of internalizing problems in autistic children and contradict the results of Duarte et al. (2003). Data we obtained indicate an excellent predictive validity of the CBCL how sensitivity value suggests and a good compliance with ADOS-G. The current study demonstrates that CBCL can be used as a first level tool to identify children with autism.

PS3.71
THE M-CHAT IN AN EARLY INTERVENTION SETTING
Judith Miller, Judith Pinborough-Zimmerman, Susan Ord, Rachelle Blair-Thatcher, William M. McMahon, Department of Psychiatry, University of Utah

Background: The Modified Checklist for Autism in Toddlers (M-CHAT; Robins et al., 2001) shows promise as a screening instrument. However, previous studies have reported findings in mixed samples that combine toddlers from the general community with toddlers currently receiving early intervention services for one or more developmental concerns.

Objective: To determine how many children in an early intervention sample obtain positive screening scores (indicating possible autism) on the M-CHAT.

Methods: The M-CHAT was administered to all children between the ages of 16-33 months in a local early intervention agency. Family service coordinators administered the questionnaires during routine visits.

Results: 247 M-CHATs were completed; 18 were returned incomplete. 57 were completed by parents without assistance, 183 were completed during an in-person interview with the service provider, 3 were conducted over the phone, and the method for the remaining 4 was unknown. 51 were completed by Spanish speaking parents. 87 children (35%) obtained scores above the screening cutoff indicating possible autism. Of these, 50 were English speaking males, 21 were English speaking females, 10 were Spanish speaking males, and 6 were Spanish speaking females.

Conclusion: This study yielded a high rate of positive screening results when using the M-CHAT as a stand-alone questionnaire in an early intervention setting. Further research is needed to determine the validity of screening results.

Sponsor: DHHS; Utah Department of Health.

PS3.72
THE MODIFIED CHECKLIST FOR AUTISM IN TODDLERS (MCHAT) IN A REFERRAL POPULATION
Harriet Valentin, Jareen Meinzen-Derr, Susan Wiley, Cynthia Molloy, Cincinnati Children's Hospital Medical Center

Background: Valid screening tools would be useful in differentiating developmental delay (DD) from ASD Objective: Evaluate the sensitivity and specificity of the MCHAT and critical items in atypically developing children

Methods: The sample comprised 50 patients (24-36 mos) referred to a multidisciplinary diagnostic team for suspected DD. Standardized evaluation included developmental and language assessments and review of DSM-IV criteria. Caregivers completed the MCHAT prior to the evaluation, but investigators were blinded to results. Sensitivities and specificities for the MCHAT and critical items in the referral cohort.

Results: In this sample of 50 patients referred for suspected DD (mean age 28.8 months, SD 3.8; 39 boys), 15(30%) were diagnosed with ASD. The MCHAT had 80% sensitivity and 71% specificity for identifying ASD. The sensitivity of the critical items alone was significantly lower than the overall MCHAT (40%, p=0.03). Of the critical items alone, only 2 remained critical in our cohort. A new set of 4 critical items related to pointing and pretending increased sensitivity from 40% to 73% (p=0.07). Failing any 1 of these 4 items had a sensitivity of 80% (95% CI 60, 100) and specificity of 71% (95% CI 56, 86) for identifying ASD in our referral cohort.

Conclusions: In children referred for evaluation of DD, the MCHAT does not have the same sensitivity and specificity as noted in the general population. Aspects of pointing appear to be more helpful in distinguishing young children with ASD from children with other developmental disabilities.

PS3.73
MULTI-LEVEL SCREENING EFFORTS WITH THE MODIFIED CHECKLIST FOR AUTISM IN TODDLERS AND THE SCREENING TEST FOR AUTISM IN TWO-YEAR-OLDS
Lisa D. Wiggins, Diana L. Robins, Lama K. Farran, Annemarie Newman, Georgia State University

Background: Early identification of autism spectrum disorders (ASD) leads to improved developmental outcomes. To date, no study has combined the Modified

Objective: To evaluate the utility of using both the M-CHAT and STAT to improve ASD screening in toddlers.

Method: The M-CHAT was administered to families in primary care settings. Those at risk for ASD were referred for an evaluation that included the ESCS, STAT, Mullen, Vineland-II, ADOS, and ADI-R. Diagnosis (Autism, PDD-NOS, or non-ASD) was made by a clinical psychologist.

Results: The sample included 12 children who failed the M-CHAT and 3 controls. Mean age at time of screen was 20 months for the M-CHAT and 22 months for the STAT. Two children were diagnosed with Autism, 5 with PDD-NOS, and 8 with non-ASD. Total M-CHAT score was significantly correlated with total STAT score, r = .61, p = .02. The M-CHAT correctly classified 10 children (3 with non-ASD and 7 with Autism or PDD-NOS) and over-identified 5 children. The STAT correctly classified 10 children (5 with non-ASD, 3 with PDD-NOS, and 2 with Autism); but over-identified 3 children without an ASD and missed 2 children with PDD-NOS. When a cut-off score of 2.75 was employed for children less than 24 months (Stone, under review), the STAT improved to correctly classify 7 children as non-ASD, but still missed 2 children with PDD-NOS.

Conclusion: Level 2 STAT screening reduces the false positive rate of screening with the M-CHAT, improving specificity and positive predictive power; but reduces sensitivity in detecting all cases of ASD (but not Autism). If detection of all ASD cases is priority, every child who fails the M-CHAT should receive an evaluation. If improved specificity is critical, multi-level screening is recommended.
Oral Session #7
Functional neuroimaging

Chair: Nancy Minshew

Speakers:
Elizabeth G Redcay, Eric Courchesne, Department of Psychology, University of California, San Diego
Stephany Cox, Ashley Scott, Susan Bookheimer, Marco Iacoboni, Mirella Dapretto, Ahmanson-Lovelace Brain Mapping Center, UCLA
Diane L. Williams, Robert A. Mason, Rajesh K. Kana, Nancy J. Minshew, Marcel A. Just, Duquesne University
Ashley A. Scott, Stephany Cox, Mirella Dapretto, Susan Bookheimer, UCLA
Karen L. Pierce, Elizabeth Redcay, University of California, San Diego / Department of Neurosciences

ABSTRACTS

DELAYED AND DEVIANT fMRI RESPONSE TO SPEECH IN 25-50 MONTH OLD CHILDREN WITH AUTISM SPECTRUM DISORDER

Elizabeth G. Redcay, Eric Courchesne, Department of Psychology, University of California, San Diego

A failure to develop normal language is one of the most common first signs that a toddler might be at risk for autism. Currently the neural bases underlying this failure to develop language are unknown. We utilized fMRI to identify brain regions involved in speech perception in 25-50 month old children (n=10, mean age = 35.8±8.9 mos; mental age = 17.8±8.6) with a preliminary diagnosis of autism spectrum disorder (ASD) (9 Autistic Disorder, 1 PDD) during natural sleep. We also recorded fMRI data from 2 groups of typically developing controls during sleep: a mental age-matched (MA) (n=11, mean age = 19.6±4.4 mos; mental age = 20.2±7.1) and a chronological age-matched (CA) (n=12; mean age = 36.7±6.9 months; mental age = 42.2±12.4) group. During fMRI data acquisition, we presented six 30 second blocks of forward speech consisting of 2 passages from children’s stories, 3 blocks of backward speech stimuli, and 9 intervening rest periods. Group analyses revealed a delayed and deviant pattern of brain response to speech in ASD subjects. Like their MA controls, ASD subjects showed greater frontal cortex activation as compared to CA controls, suggesting a delayed pattern. The pattern of brain activity was also deviant in that ASD subjects showed greater right hemisphere activation (e.g. inferior frontal gyrus, insula, and pSTG/S) and reduced bilateral STG activation as compared to CA controls. Further, in comparison to MA controls, ASD subjects showed reduced activation in a number of other brain regions. These findings provide a unique glimpse into the autistic brain at the emergence of the disorder.

Funding: NIH-RO1 MH-36840 & NS-19855

MIRROR NEURON SYSTEM DYSFUNCTION RELATES TO IMITATION AND EMPATHY IN CHILDREN WITH ASD

Stephany Cox, Ashley Scott, Susan Bookheimer, Marco Iacoboni, Mirella Dapretto, Ahmanson-Lovelace Brain Mapping Center, UCLA

Background: Recent research suggests that dysfunction in the mirror neuron system (MNS) early in development may be related to the range of impairments that are characteristic of autism, with several studies reporting abnormal MNS functioning in individuals with autism.

Objectives: Here we further investigated the implications of an impaired MNS in children with ASD focusing on the relationship between the ability to imitate and empathize with others and MNS activity during development.

Methods: To examine MNS activity, 12 high-functioning children with autism (mean age: 12.3 ± 2.7; mean IQ: 106) underwent fMRI while observing and imitating emotional expressions using a previously validated paradigm. Children’s imitative behavior was measured using scores from the communication subscale of the ADI-R. Children’s empathic behavior was assessed using a validated modified version of the Interpersonal Reactivity Index (IRI), which assesses 4 distinct
facets of empathy. Results: After controlling for IQ, reliable positive correlations were observed between children’s total scores on the IRI and MNS activity in the right inferior frontal gyrus, as well as activity in the insula and amygdala (two regions previously implicated in the network subserving emotion understanding and empathy). Additionally, significant negative correlations were found between symptom severity on the imitation items of the ADI-R and activity within this same network, with the strongest correlation observed in the frontal component of the MNS. Conclusion: These findings provide additional evidence that a dysfunctional MNS may underlie the impairments in understanding and empathizing with others’ emotions typically seen in autism. Importantly, these results further indicate that MNS abnormalities may also negatively affect imitative behavior leading to a cascade of negative consequences for the development of key aspects of social cognition and behavior. Sponsors: NICHD (P01 HD035470)

DISCOURSE PROCESSING IN AUTISM: DISRUPTION OF THE THEORY OF MIND NETWORK Diane L. Williams, Robert A. Mason, Rajesh K. Kana, Nancy J. Minshew, Marcel A. Just, Duquesne University Background: Individuals with autism have a deficit in Theory of Mind (ToM) abilities that is manifested both behaviorally and in brain activation. Objective: This fMRI study examined the intersection of ToM processing with narrative discourse comprehension in autism. Method: 18 high-functioning individuals with autism (mean age 26.5 yrs) and 18 matched controls (mean age 27.4 yrs) with Full Scale and Verbal IQs > 80 participated. Stimuli consisted of reading passages that required three different types of inferences for understanding based on the physical situation, the protagonist’s intentions, or the emotional state of the protagonist. Results: The ToM network was disrupted in autism. Whereas the control participants selectively activated a ToM network only when appropriate, the autism group processed all inferences similarly. The autism group activated the RH more than controls, consistent with a decrease in LH capacity and a spillover of processing to RH homologs. In particular, the autism group engaged the right temporo-parietal aspect of the ToM network indiscriminately. Evidence of the inefficiency of the autism ToM network came from (a) the autism group having lower functional connectivity within the ToM network and between the ToM network and a language network and (b) across the individuals with autism, the functional connectivity within the ToM network was correlated with the size of the anterior portion of the corpus callosum. Conclusion: Discourse processing, which requires the integration of world knowledge and making inferences about the actions and intentions of others, is challenging. The cortical system in autism attempts to meet this challenge by engaging RH areas indiscriminately. However, network connectivity (functional and structural) limits how effectively the recruited cortical networks can function. The ToM network, though activated in individuals with autism, is inefficient. Sponsors: NICHD, NIDCD, Cure Autism Now

REWARD PROCESSING IN CHILDREN WITH AUTISM Ashley A. Scott, Stephany Cox, Mirella Dapretto, Susan Bookheimer, UCLA Background: Identifying common brain factors that underlie the three core deficits of autism; social reciprocity, language deficits, and presence of stereotyped behaviors and restricted interests, is key to understanding the neurobiology of the disorder. We have hypothesized that a deficit in basal ganglia function (BG) could potentially underlie these deficits by affecting two primary BG functions, implicit learning and reward processing. Objective: To conduct a functional assay of basal ganglia and reward circuitry in both typically developing children and children with autism using fMRI. Methods: Typically developing (TD) and autism spectrum disorders (ASD) boys (age 8-16) with ADI and ADOS diagnostic confirmation served as subjects. Participants were matched by age and IQ. Children were scanned while performing a probabilistic classification task, demonstrated to rely on the BG. Participants were shown a geometric pattern and told to classify it as group 1 or group 2. Feedback was given after each guess to guide learning; half of the trials were monetarily rewarded for correct classifications, the remainder of the trials had informational feedback alone (i.e. Correct/Incorrect). The stimuli have either a 17%, 50% or 83% probability of belonging to a group. Results: Preliminary results on 10 children (4 ASD) indicate that all children are able to perform the task and learn the classification scheme. TD children demonstrate a greater fMRI activity in
the BG than ASD children for all trials, with greater ventral striatum activity for rewarded feedback than the ASD group. The ASD group showed greater activity in extrastriate cortices than the TD children.

Conclusion: Our data suggest that children with autism may fail to utilize the BG learning and reward system effectively. Dysfunction of the BG may account for difficulties in acquisition of language, social reciprocity behavior, and presence of repetitive behaviors, all symptoms of autism.

Support: NIH, NAAR

FUSIFORM ACTIVATION IN CHILDREN WITH AUTISM IS A MATTER OF ‘WHO’
Karen L. Pierce, Elizabeth Redcay, University of California, San Diego / Department of Neurosciences

Scant functional magnetic resonance imaging (fMRI) research has been performed with children with autism. Early processing defects in regions critical to social perception, such as the fusiform gyrus (FG) or medial frontal lobe, could affect a child’s ability to fully appreciate social nuances contained in the face. Recent fMRI research with adults with and without autism has claimed that factors such as familiarity, motivation and attention play key roles in fusiform functionality.

Forty-three children between the ages of 6-11 participated in a practice fMRI session. Motion analyses determined that twenty two (11 with an ASD and 11 typically developing) showed less than 1mm or 1 degree of motion and were included for study. Stimuli consisted of 4 face types: familiar adult (i.e., mom), familiar child (i.e., friends), stranger adult and stranger child. During the fMRI session, children pressed a button in response to an identical face shown on two consecutive trials. Based on our prior research, two anatomical regions of interest (ROI), the FG and medial frontal lobe, were identified. Medial frontal lobes were further divided into anterior cingulate and the remaining medial frontal region (MF). Masks of each ROI were created and manually edited for anatomic precision for each subject.

Following deconvolution analyses, the number of voxels significantly active (p<.01) and % signal change values that fell within each ROI mask were calculated for each subject. Analyses revealed normal fusiform activity (both in number of voxels and percent signal) in children with autism when viewing a face of their mother or other child. In contrast, looking at the face of a stranger adult initiated profound deficits for children with autism in that the mean number of significantly active voxels in FG was only 1/3 that shown in typically developing children. Additionally, abnormal responses in MF were found throughout several conditions.

Research funded by NIMH K01 MH01814
Oral Session #8
Autism epidemiology

Chair: Rita Cantor

Speakers:
Li-Ching Lee, Hong Wang, Yanqing Guo, Rebecca A. Harrington, Rebecca Landa, Craig J. Newschaffer, Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology Bloomberg School of Public Health Johns Hopkins University

Cecilia Montiel-Nava, Joaquín A. Peña, La Universidad Del Zulia
Karla C. Van Meter, Lasse E. Christiansen, Lora D. Delwiche, Abdulrahman S. Azari, Tim E. Carpenter, Irv Hertz-Picciotto, UC Davis
Catherine Rice, Jon Baio, Kim Van Naarden Braun, Nancy Doernberg, for the ADDM Network, Centers for Disease Control and Prevention
Gayle C. Windham, Meredith Anderson, Jack Collins, Lisa A. Croen, Judith K. Grether, CA Department of Health Services

ABSTRACTS

AUTISM IN CHINA: LESSONS LEARNED FROM A POPULATION-BASED STUDY Li-Ching Lee, Hong Wang, Yanqing Guo, Rebecca A. Harrington, Rebecca Landa, Craig J. Newschaffer, Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology Bloomberg School of Public Health Johns Hopkins University

Background: ASD prevalence estimates using population-based approaches in developing countries are greatly needed.

Objectives: To report on challenges and lessons learned from a population-based epidemiologic pilot study in China and to describe ASD screening in a Chinese population.

Methods: The Social Communication Questionnaire (SCQ) and the ADI-R were translated into Chinese and culturally modified according to the region from which the study population was drawn. The translation effort was conducted by an expert panel from China and the US. Children aged 3-5 years who resided in Wei-Chang, Shandong Province were eligible for SCQ screening. Parents of children with SCQ>=15 were invited for an ADI-R.

Results: Some items from the SCQ and ADI-R were difficult to translate into Chinese or make culturally appropriate. For example, there is no difference between "he" and "she" in Chinese and some gestures (e.g. pointing) are considered culturally inappropriate and are suppressed. A lack of gestures, "being quiet and alone", and preoccupation are considered socially desirable behaviors for young children. The One-Child policy also makes it more challenging for parents to compare behaviors of their child with same age typically developing children. A total of 1716 children were screened and 27 completed the ADI-R. The mean SCQ score was 8.35 with 5.7% (n=98) >=15; only 1 out of 27 (3.7%) was an ADI-R determined autism case. In a subgroup analysis we found that higher SCQ scores were mainly due to higher positives in restricted and repetitive behavior items.

Conclusion: Although most parents in this study are primary care providers, they do not have the best knowledge about their child because, before age 3, the majority of children were raised by grandparents. Future autism studies intending to adopt Western-developed tools in China need to culturally modify the tools a great deal and modify them according to geographic region.

Supported by NIH FIC.

EPIDEMIOLOGICAL FINDINGS OF PERVASIVE DEVELOPMENTAL DISORDERS IN A VENEZUELAN STUDY Cecilia Montiel-Nava, Joaquín A. Peña, La Universidad Del Zulia

Objectives: to determine the prevalence of PDD in a geographically defined population in Venezuela, for children receiving diagnostic and treatment services.

Methods: Age, gender, and diagnoses were collected for all children with PDD between 3 and 9
years of age living in Maracaibo County. For each institution we questioned about ascertainment area, referral process, and inclusion criteria for every one of the patients. We targeted public and private clinics, pediatric hospitals, health centers, and treatment facilities.

Results: A total of 430 children were identified as having a PDD diagnosis (mean age 5.33 years, SD 2.2 years). There were 329 boys (76.51%), and 101 girls (23.49%), with a male to female ratio of 3:1. The overall rate for all PDD combined was 16.89 per 10,000 children aged 3 through 9 years (95% CI: 13.2-19.8). The prevalence for autistic disorder was 11.25 per 10,000 children (95% CI 9.8-13.9); while the prevalence rate for all PDD combined was 5.61 per 10,000 children (95% CI 4.4-6.8). 23 of the children with autism (8.01%) also had another medical condition, which included Fragile-X, epilepsy, tuberous sclerosis, and Down syndrome.

Conclusions: The prevalence of PDD in Maracaibo County is similar to most other epidemiological studies, although it is in the lower end of such band. Differences in case-finding methods, diagnostic criteria, and lack of awareness in the general population may have influenced the number of identified cases in this study. Contrary to what was expected, the prevalence for PDD-NOS and Asperger syndrome was 2.01 times lower than that of autistic disorder. This rate might be an underestimation, and a function of the ascertainment process used in this study. This study provides a foundation for epidemiological studies with larger samples, and will allow for monitoring of PDD trends, identification of risks and etiological factors of autism.

GEOGRAPHICAL DISTRIBUTION OF AUTISM Karla C. Van Meter, Lasse E. Christiansen, Lora D. Delwiche, Abdolrahman S. Azari, Tim E. Carpenter, Irva Hertz-Picciotto. UC Davis: Department of Public Health Sciences and Center for Animal Disease Modeling & Surveillance

Background: If autism incidence clusters geographically by birth, these clusters may be associated with pre-birth environmental exposures.

Objectives: Statistically describe geographic clustering of autism based on residence of the mother at delivery. Explore the extent to which parental age, race and education might explain this clustering thereby focusing future research on environmental factors in geographic regions of high autism incidence that remains unexplained.

Methods: Autism cases identified using records of the California Department of Developmental Services (DDS) through 2005 were matched to the state birth records from 1996 through 2000 yielding 2,453,717 mapped births including 9,900 autism cases. Analyses were conducted within 21 separate DDS Regional Center (RC) catchment areas due to varying RC interpretations of eligibility criteria. Tests of clustering using circles, ellipses or groups of adjacent areas were applied. A tool was developed to divide each region into rectangles with similar population sizes. We used two different sets of areal units in each RC area to limit biases created by arbitrary boundaries of areal units. For each cluster identified, its demographic characteristics were compared with those for the remainder of the RC area to assess the extent to which the cluster could be attributed to increased high risk demographic profiles within it.

Results: The incidence of autism ranges from 25 to 88/10,000 births with the highest incidence in one group of four counties. Background incidence, divisions and boundaries of the study area affect the significance of clusters in the areal tests. Three of four RCs examined so far contain significant clusters of autism incidence.

Conclusion: Preliminary findings suggest some areas of higher autism incidence, which are not fully explained by a concentration of known parental demographic risk factors.

Funding: NIEHS, EPA STAR grant, UC Davis M.I.N.D. Institute

PREVALENCE OF THE AUTISM SPECTRUM DISORDERS (ASDs) IN MULTIPLE AREAS OF THE UNITED STATES Catherine Rice, Jon Baio, Kim Van Naarden Braun, Nancy Doernberg, for the ADDM Network, Centers for Disease Control and Prevention

Background. Despite clear increases in the numbers of children with an Autism Spectrum Disorder (ASD) identified for services, there is little information on the population-based prevalence of the ASDs in the US.

Objective. Determine the population-based prevalence and describe the characteristics of children with ASDs in 14 sites in the US.

Methods. Children with an ASD were identified through screening and abstraction of evaluation records, representing a combined population of 407,578 8-year-old children in 2002. ASD case status was determined through clinician review abstracted data based on criteria consistent with the Diagnostic and Statistical Manual, Fourth Edition, text revision (DSM-IV-TR) for autistic disorder, PDD-NOS, or Asperger’s disorder.
Results. The overall prevalence ranged from 3.3 to 10.6 per 1,000 children with an overall mean ASD prevalence of 6.6 per 1,000 children. ASD prevalence varied by identification source, with higher average prevalence in sites with access to additional education records (mean prevalence = 7.2 per 1,000) compared with those sites with health records only (mean prevalence = 5.1 per 1,000). Of the 14 sites, 5 identified a higher prevalence for White, non-Hispanic children with an ASD than for Black, non-Hispanic children. The ratio of males to females ranged from 3.4:1 to 6.5:1. Females with an ASD were more likely to have cognitive impairment than males in most sites. For the 6 sites with prevalence data from the years 2000 and 2002, ASD prevalence was stable in 4 sites and increased in 2 sites.

Conclusion. Results from a large US multisite collaboration indicate consistency of ASD prevalence across most sites studied in 2002; however, some variation did exist. Prevalence was stable in the majority of sites with 2 years of data, but increases in one site and a trend towards increase in another indicate the need for ongoing monitoring of prevalence in multiple sites and over time.

BIRTH PREVALENCE OF AUTISM SPECTRUM DISORDERS (ASD) BY DEMOGRAPHIC CHARACTERISTICS IN THE SAN FRANCISCO BAY AREA OF CALIFORNIA. Gayle C. Windham, Meredith Anderson, Jack Collins, Lisa A. Croen, Judith K. Grether, CA Department of Health Services

Background: Concern about an increase in the number of children diagnosed with ASD has highlighted the lack of population-based data on rates and trends.

Objective: Establish a multi-source, active surveillance system to determine rates and demographic characteristics of ASD in a geographically-defined birth population in California.

Methods: The base population was all births in a 6-county region during 1994 and 1996. Children with a diagnosis of ASD by age 8 at any available health-related source, including the Department of Developmental Services (DDS), were identified through record review and chart abstraction. Records were linked to birth certificates to identify resident births and obtain demographic information. Clinician review of abstracted data determined final case status consistent with DSM-IV criteria for autistic disorder, PDD-NOS, or Asperger’s disorder.

Results: For 1994 births, 1115 source records were reviewed, of which 650 (58%) were abstracted, yielding 384 children ascertained as definite cases and 33 as suspect. In the population of nearly 82,000 births, prevalence of definite ASD was 4.7/1,000 livebirths (5.1/1,000 with suspect cases). Rates among white, non-Hispanics were about double those of Blacks (p=0.002) and Hispanics (p<0.001), but similar to Asians and others. The male:female ratio was 5.7:1, with some variation by race. Rates increased with maternal and paternal age, as well as higher parental education. In multi-variate models, the differences by education and race were somewhat attenuated. The rate appears similar for 1996 births, with 379 definite cases identified.

Conclusions: The ASD birth prevalence in California was within the range of rates recently determined by other sites in the CDC autism surveillance network, but may be somewhat of an undercount due to lack of access to Department of Education records. This work forms a basis for further assessment of trends and etiologic research.

Sponsors: CDC, CDHS
Oral Session #9
Autism phenotypes

Chair: Annette Estes

Speakers:
Hilary C. Boorstein, Molly Helt, Leandra Wilson, Juhi Pandey, Emma Esser, Alyssa Verbalis, Saasha Sutera, Michael Rosenthal, Eva Troyb, Ashley Maltempo, Sarah Hodgson, Marianne Barton, Thyde Dumont-Mathieu, Deborah Fein, University of Connecticut
Katherine Anne Loveland, David M. Lane, Deborah A. Pearson, University of Texas Medical School, Houston
Suzanne Macari, Kasia Chawarska, Paula Ogston, Sarah Hannigen, Yale Child Study Center
Sally Jane Wheelwright, Simon Baron-Cohen, Autism Research Centre
Leslie J. Carver, Lauren Cornew, Karen R. Dobkins, Joseph P. McCleery, University of California, San Diego

ABSTRACTS

DIFFERENT PROFILES IN REGRESSIVE VS. NON-REGRESSIVE AUTISM Hilary C. Boorstein, Molly Helt, Leandra Wilson, Juhi Pandey, Emma Esser, Alyssa Verbalis, Saasha Sutera, Michael Rosenthal, Eva Troyb, Ashley Maltempo, Sarah Hodgson, Marianne Barton, Thyde Dumont-Mathieu, Deborah Fein, University of Connecticut
Background: Developmental regression has been reported to occur in 20-49% of children with autism or PDD-NOS. Research is equivocal as to whether children who regressed differ in their profile.
Objectives: To investigate possible differences in cognitive and adaptive skills, DSM-IV symptoms, health problems, and autism severity between regressed and non-regressed young children.
Method: The 102 participants were part of a study aimed at the early detection of ASD. All participants were diagnosed with autism or PDD-NOS after a developmental evaluation (mean age=2.2 years). 40 of these children were seen for re-evaluation at a mean age of 4.2 years. Both evaluations included diagnostic tools (ADI, ADOS, and DSM-IV symptom checklist), as well as measures of cognitive development (Mullen, Bayley, or DAS), adaptive skills (VABS), and autism symptom severity (CARS).
Results: 47% of the children had a reported regression, with a mean age at regression of 16 months. The children with regression had higher CARS scores at both evaluations. At their first evaluation, children who regressed had a significantly higher mean number of DSM-IV symptoms as well as an increased incidence of 4 specific symptoms (1b, 2d, 3c, & 3d). In addition, their VABS Communication scores were significantly lower. There was also a trend for children with regression to have lower cognitive scores and VABS Motor scores. While DSM-IV symptom total did not vary significantly at the second evaluation, there was a trend for a greater frequency of 3 specific symptoms in the regressed group (1b, 2b, & 3c). The presence of GI problems was significantly higher in those who regressed but there were no significant differences in other health variables.
Conclusions: Young children with autism/PDD-NOS who experienced a regression appear to differ from those who did not in autism severity, as well as the presence of specific DSM-IV symptoms of autism and GI problems.
Sponsors: NICHD & MCH Bureau

CPEA/STAART GIRLS WITH AUTISM PHENOTYPE STUDY Katherine Anne Loveland, David M. Lane, Deborah A. Pearson, University of Texas Medical School, Houston
Background: Little is known about possible phenotypic differences between males and females with autism.
Objectives: Determine if males and females with autism in this sample differ in the relationship of IQ and Age to measures of adaptive skills and autistic symptoms.

Methods: The CPEA/STAART research network common database provides the opportunity to study a large, well-characterized sample of girls (n=298) and boys (n=942) aged < 18 years with autism. Measures examined were Verbal and Nonverbal IQ; Chronological Age; Vineland Adaptive Behavior Scales; Autism Diagnostic Interview - Revised.

Results: Boys on average had higher IQs and were older than girls in this sample. The relationship between Age and IQ did not differ by Sex. VABS Composite scores were higher in those with higher IQ, but this relationship was stronger for girls. There was no relationship of VABS Composite to Age, and no difference by Sex, thus, older, brighter individuals with autism did not show an advantage in adaptive skills over younger, less able individuals, as would be expected. On average, VABS Socialization scores in both sexes were lower with greater age, suggesting older persons with autism may have reached a developmental plateau. ADI-R Social subscale scores were lower (i.e., better) in both boys and girls of higher IQ; Communication scores were lower in boys but not girls with higher IQ; Repetitive behavior scores were higher (worse) in girls, but not boys, with higher IQs.

Conclusion: In this sample, adaptive behavior was more positively related to IQ in girls than in boys and higher IQ was associated with lower autism symptom scores on the ADI-R for boys but not for girls. These findings suggest possible phenotypic differences by Sex in autism. Because the sample was derived from many studies with differing samples, however, these results may not be representative of the underlying population, and further studies are needed.

Sponsor: NICHD, NIDCD

EXPLORATORY ANALYSIS OF THE LATENT VARIABLES DIFFERENTIATING TODDLERS WITH AUTISM, PDD-NOS, LANGUAGE DELAY, AND GLOBAL DEVELOPMENTAL DELAY

Suzanne Macari, Kasia Chawarska, Paula Ogston, Sarah Hannigen, Yale Child Study Center

Objective: To explore dimensions along which the four diagnostic groups can be differentiated.

Methods: Ninety-seven toddlers (M=26mo) were studied: Autism (N=38), PDDNOS (N=17), Global Developmental Delay (GDD) (N=25), and Language Delay (LD) (N=17). Measures of responsivity to dyadic (RDB) and triadic bids (RTB) for attention were administered along with the ADOS-G, Mullen, and Vineland Adaptive Behavior Scales. RDB reflected the number of verbal and nonverbal bids necessary to attract the child's attention during an experimental task (Corkum & Moore, 1998); RTB reflected the number of spontaneous responses to gaze and head directional cues.

Results. Exploratory principal component analysis identified three components. The first component loaded on Mullen nonverbal and Vineland Communication and Socialization scores, reflecting Nonverbal Cognitive and Adaptive Functioning (NCAF). The second component (Autistic Disability, AD) was highly correlated with RDB as well as ADOS social, communication, and stereotyped behavior scores. The third component (Language Functioning) was associated with Mullen Receptive and Expressive Language scores as well as RTB. The following patterns of between-group differences were found: NCAF factor: GDD=AUT>PDDNOS>GDD>LD; and LF factor: GDD=AUT

Conclusions. The autism group presented with significant impairments in cognitive, language, adaptive, and social skills, as well as marked difficulties engaging in dyadic and triadic social interactions. Toddlers with PDDNOS were also socially impaired, but their overall cognitive and language functioning was higher and social-communicative deficits were milder. They were more likely to respond to dyadic bids for attention than those with autism. Both ASD groups showed similarities with the two non-autistic groups of toddlers, highlighting the need for a multi-measure profile analysis approach to diagnosis.

Sponsor: NAAR, NICHD

DEFINING THE BROADER, MEDIUM, AND NARROW AUTISM PHENOTYPE IN PARENTS OF CHILDREN WITH AUTISM, USING THE AQ

Sally Jane Wheelwright, Simon Baron-Cohen, Autism Research Centre

Background: The Autism Spectrum Quotient (AQ) is a self-report questionnaire that quantifies autistic traits in adults of normal intelligence. Total scores range from 0 to 50 and are normally distributed in the population, males scoring higher than females. AQ scores show high heritability in twin studies and results are consistent cross-culturally. 80% of people with a diagnosed autism spectrum condition (ASC) score 32+ on the AQ (Baron-Cohen et al, 2001).
Objectives: 1. To test if parents of children with an ASC score higher than controls on the AQ 2.
To test what proportion of these parents have the Broader, Medium, or Narrow Autism Phenotype (BAP, MAP and NAP), as defined by the AQ.
Method: 400 mothers and 135 fathers of children with ASC completed the AQ online, along with 723 male and 1038 female controls. Parents of children with an ASC were recruited via the ARC’s online database, controls via a mirror website which does not mention autism.
Results: Mothers (M=17.5, SD=10.0) scored higher than female controls (M=15.5, SD=5.6). Fathers (M=22.8, SD=10.6) scored higher than male controls (M=17.4, SD=6.2). Phenotypes were defined using the control mean (16.3) and SD (5.9). 16% of fathers, and 9% of mothers scored 35+ (NAP), compared to only 0.8% of male and 0.4% of female controls. 27% of fathers and 15% of mothers scored 29+ (MAP), compared to 5% of male and 2% of female controls. 47% of fathers and 28% of mothers scored 23+ (BAP), compared to 21% of male and 10% of female controls (all ps < 0.0001).
Conclusions: Parents of children with ASC have significantly more autistic traits than controls, as measured on the AQ. They also show higher rates of the NAP, MAP and BAP.
Sponsor: MRC, NLM Family Foundation, TAG

SOCIAL REFERENCING IN CHILDREN AT RISK FOR AUTISM: BEHAVIOR AND BRAIN ACTIVITY
Leslie J. Carver, Lauren Cornew, Karen R. Dobkins, Joseph P. McCleery, University of California, San Diego

Background: Social cognition and social referencing are impaired in children with autism. Siblings of children with autism are at increased risk for the disorder, and family members often show subclinical characteristics of autism.
Objectives: Compared infant siblings of children with autism (High-Risk infants - HR) with infant siblings from families without history of autism (Low-Risk controls - LR) on measures of social referencing and its neural correlates.
Methods: HR and LR infants were shown novel objects that in pilot testing elicited social referencing from typically developing infants. The infants’ parents and an experimenter displayed positive, negative, or neutral emotion regarding these objects. Social referencing and emotion regulation were scored from videotape, and, infants’ brain activity was measured via event-related potentials (ERP) in response to pictures of objects associated with adult emotion.
Results: HR infants differed from LR infants in each element of social referencing. HR infants sought social information from adults less frequently than LR infants (t test, p<.05). HR infants also failed to show ERP differences in response to pictures of emotionally tagged stimuli, whereas LR infants showed faster responses to stimuli tagged with positive emotion than to those tagged with negative emotion (p=.06). LR infants regulated emotions by displaying more positive emotion following the presentation of a positive than a negative emotional message (p=.017), but HR infants did not show this pattern of behavior in response to adult emotion (p=.90). HR infants also differed from LR infants in how these elements of social referencing related to one another. For LR infants, ERP data and behavior regulation were correlated, whereas no such relation was observed for HR infants.
Conclusion: Preliminary results suggest that infants at risk for autism differ from controls on measures of social information seeking, emotion regulation, and brain activity.
**Poster Abstracts – 4**

1:00 – 6:30 pm

**Themes:** Brain Structure, Cognition, Emotions/Faces, Neuropathology, Structural Imaging

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**PS4.1**

**DOES THE SOCIAL BRAIN EXIST?** Sarah Carrington, Matthew Rushworth, Anthony Bailey, University of Oxford

In 1990, Brothers proposed that three regions of the primate brain constituted a ‘social brain’: the orbitofrontal cortex, amygdala, and superior temporal sulcus. Subsequently, several imaging studies have attempted to identify the neural substrates of Theory of Mind (ToM), a complex cognitive function that underlies many social interactions in humans. Although there is some overlap between the brain regions potentially subsuming ToM skills and the social brain, the findings from these imaging studies were mixed. The diversity in findings has complicated investigation of the neural substrates of ToM in individuals with autism spectrum disorder (ASD), in whom impaired ToM is a core deficit. Objectives: To a) identify the neural substrates of ToM; b) establish whether there is an interconnected ‘network’ of regions underlying ToM function through investigation of functional and structural connectivity. Methods: ToM will be assessed using a variant of the comic strip task (Sarfati et al., 1997). An additional false belief condition will be included for more comprehensive investigation of ToM both behaviourally and during fMRI. Diffusion tensor and structural images will also be acquired. Analysis of fMRI data will be used to identify brain regions associated with ToM. Fractional anisotropy and probabilistic tractography data from the diffusion images will be analysed to probe the integrity of white matter pathways running between them. Results: Data from typically developing (TD) adult males will be presented. Conclusions: It is anticipated that these results will provide a more coherent picture of the neural substrates of ToM in TD individuals for subsequent comparison with individuals with ASD.

MRC: McDonnell Centre for Cognitive Neuroscience, University of Oxford

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**PS4.2**

**TOTAL HEMISPHERIC VOLUME COMPARISONS OF CHILDREN WITH AUTISM AND TYPICALLY DEVELOPING CHILDREN**

Danielle E. Delosh, Andrew M. Silver, Tracey A. Knaus, Kristen A. Lindgren, Kelli C. Dominick, Melanie D. Schuring, Robert M. Joseph, Christine Connolly, Helen B. Tager-Flusberg, Boston University School of Medicine

Background: A ’normalization period’ (Aylward, 2002) seemingly occurs during early adolescence whereby, brain volume decreases in children with autism and parallels that of typically developing children matched on age. Objectives: The purpose of this study was to examine right hemisphere volume, left hemisphere volume, and total brain volume on volumetric MRI in autistic children and adolescents compared to typically developing children and adolescents.

Methods: The MEASURE program was utilized to measure left and right cerebral volume, including gray and white matter volume. These regions were measured in 10 children and adolescents with autism and 7 typically developing children and adolescents, ages 7-19 years. The ADOS and ADI were administered for all individuals with an autism diagnosis and an IQ test was administered to all subjects.

Results: Preliminary results indicated no significant group differences in hemisphere size or in total brain volume. In addition, there was not a significant asymmetry found in either group, or between the groups. Correlations between IQ measures and brain volumes were not significant. Within the autism group, correlations between social ability, communication, or repetitive behavior measures from the ADOS and ADI with brain measures were not significant. Data processing is ongoing, whereby there will be 20 in the autism group and 20 normal controls which will allow further investigation of the effects of age on brain volume.

Conclusion: Preliminary findings of this study support the theory that significant brain overgrowth in children with autism occurs primarily in early development and a normalization period occurs as part of the maturational process.

Sponsor: NIDCD(U19 DC03610)

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**PS4.3**

**ABNORMALITIES OF THE GYRAL WINDOW IN AUTISM: A MACROSCOPIC CORRELATE TO A PUTATIVE MINICOLUMNOPATHY**

Ayman S. El-Baz, Aly Farag, Meghan Mott, Hossam Hassan, Rachid Fahmi, Andrew Switala, Manuel F. Casanova, University of Louisville

Background: Autism is a neurodevelopmental disorder characterized by impairments in social interaction, language, and range of interests. Recent studies suggest that the brains of autistic patients have an increased number of minicolumns. This finding helps explain the presence of macroencephaly or increased brain size in a significant proportion of autistic patients. Changes in brain size and gyriﬁcation are usually concurrent.

Objectives: In this study we have implemented an algorithm that measured the gyriﬁcation window in the brains of 23 postmortem autistic and 16 postmortem control brains.

Method: Postmortem brains were obtained from the Autism Tissue Program (ATP). Diagnosis for each patient was established by the Autism Diagnostic Interview-Revised (ADI). The distance map at any point inside the...
segmented MRIs of the postmortem brains were calculated using the minimum Euclidian distance from the gray-white matter interface.

Results: At the 85% confidence level the algorithm correctly classified 22/23 autistics, a 0.96 accuracy rate, and 15/16 controls, a 0.94 accuracy rate

Conclusions: Previous structural neuroimaging studies in autism have emphasized volumetric measures. These methodologies are very sensitive to segmentation artifacts, being compromised by image noise, lack of strong edges, and sharing of color/texture among different structures. The present study offers a new approach to the classification of autism based on structural MRI. The finding bears relevance to the clinical presentation of autism as increased gyridization reduces the gyral window and constrains connectivity in favor of short corticocortical fibers.

PS4.4
AMYGDALA GROWTH AND SOCIAL DEVELOPMENT IN PRESCHOOLERS WITH AUTISM Matthew William Mosconi, Heather Cody-Hazlett, Gary Mesibov, Michele Poe, Joe Piven, University of North Carolina at Chapel Hill

A recent study of a patient with bilateral focal damage to the amygdala indicated that this structure is involved in the tendency to orient to faces and, specifically, the eye region of the face (e.g., Adolphs, 2005). This research has implications for autism, a disorder in which individuals show decreased eye contact and abnormal patterns of face processing. Structural MRI studies of individuals with autism have suggested that the amygdala is enlarged early in development (Mosconi et al., 2005; Schumann et al., 2004; Sparks et al., 2002), but may be reduced in volume in adulthood (Dalton et al., 2005; Nacewicz et al., 2006). Research has indicated that amygdala volumes are related to social and communication abilities in young children (Munson et al., 2005) and attention to the eye region in adolescents and adults (Nacewicz et al., 2006). The direction of the relationship between amygdala volume and social impairment, however, differed between these studies. This discrepancy likely is due to non-linear developmental changes in amygdala volume in autism, which can most clearly be elucidated through longitudinal study. We investigated the relationship between amygdala growth and change over time in rates of social-communication behaviors in a longitudinal sample of 53 children with autism. Children were studied between 18-35 months of age and also were followed up 24 months later. We previously reported amygdala overgrowth in this sample and hypothesized that this enlargement would be related to reduced rates of social-communication behavior, specifically in those behaviors involving attention to faces (i.e., orienting to faces, joint attention). Behavior was measured with a novel coding system aimed at quantifying rates of social and nonverbal communicative behaviors during ADOS sessions. Results and their implications for understanding the role of the amygdala in social deficits over the course of development in individuals with autism will be discussed.

PS4.5
CORTICAL FOLDING ABNORMALITIES IN CHILDREN WITH AUTISM Christine Wu Nordahl, Donna Dierker, Iman Mostafavii, Cynthia Mills Schumann, Susan Rivera, David G Amaral, David C Van Essen, University of California at Davis/M.I.N.D. Institute

BACKGROUND: Previous neuroimaging studies have identified structural abnormalities in the autistic brain, but relatively few have tested for cortical shape abnormalities. In addition, it has not been clear whether these structural abnormalities differ among major subtypes of autistic spectrum disorders.

OBJECTIVE: To test for cortical folding abnormalities in children and adolescents with a range of autism spectrum disorders.

METHODS: We used surface-based morphometry to generate sulcal depth maps from structural MRI data and compared three subgroups of autism spectrum disorders, Asperger’s Syndrome (ASP), high functioning autism (HFA), and low functioning autism (LFA), relative to typically developing controls. Because of evidence suggesting age-related differences in the patterns of neural alterations, children (7.5 - 12.5 years) and adolescents (12.75 - 18 years) were analyzed separately.

RESULTS: In children, we observed significant abnormalities in each autism spectrum disorder subgroup in a spatial pattern that differed across subgroups. In the ASP group, the intraparietal sulcus was deeper bilaterally. The HFA group had bilateral shape abnormalities in and near the pre- and postcentral gyri that were associated with sulcal depth differences in the parietal operculum, and the LFA group had a shape abnormality in and near the left inferior frontal gyrus that was associated with a sulcal depth difference in the anterior insula and frontal operculum. Significant cortical shape abnormalities were not discernible in any of the adolescent subgroups.

CONCLUSION: These findings are consistent with evidence that the autistic brain follows an altered trajectory of growth and identifies several regions not previously implicated in autism that may have abnormal patterns of connectivity early in development.

Supported by Human Brain Project grant R01 MH60974 (NIMH/NSF/NCI/NLM/NASA) and the UC Davis M.I.N.D. Institute

PS4.6
NORMAL CEREBRAL CORTICAL GRAY MATTER STRUCTURE IN OLDER CHILDREN WITH HIGH FUNCTIONING AUTISM (HFA) Marin E. Richardson, Sasha M. Wolosin, Stewart H. Mostofsky, Kennedy Krieger Institute (Department of Developmental Cognitive Neurology)

Background: MRI studies of cortical abnormalities in autism have been somewhat limited, focusing mainly on volumetric differences. Results of these studies have been strongly age dependant and often conflicting. Studies of young children with autism have consistently shown
increased gray matter, but results have varied for older subjects.

Objectives: To compare volume, surface area, mean thickness and folding of cerebral gray matter in children with HFA and typically developing controls in late childhood.

Methods: 1.5T MPRAGEs were acquired for 20 children with HFA (4 girls) and 38 controls (8 girls), ages 8-12. Cortical gray matter volume, surface area, mean thickness and folding were measured for left and right hemispheres and lobar regions (frontal, temporal, parietal and occipital) using FreeSurfer. In addition, statistical difference maps were used to compare mean cortical thickness between groups at all points along the cortical surface. Correlations of cortical measurements with age were also examined.

Results: No significant differences between diagnostic groups were found in cortical gray matter volume, surface area, mean thickness or folding. Further, after accounting for the number of comparisons made across the surface, there were no significant local differences in cortical thickness between groups. Across groups, mean cortical thickness decreased with age in both hemispheres and all lobes (all p<0.03) while right frontal lobe folding index increased with age (p=0.005). There was no effect of diagnosis on the correlations.

Conclusion: The results show no abnormalities in cortical gray matter structure in children with HFA during late childhood. This suggests that increased cortical gray matter volume observed in younger children with autism is not present later in childhood, but it does not preclude the possibility of additional differences developing in adolescence.

Sponsor: NAAR, NIH K02NS44850, R01NS048527, P30HD24061

PS4.7
COMPARISON OF THE MINICOLUMNAR MORPHOMETRY OF THREE DISTINGUISHED NEUROSCIENTISTS AND CONTROLS Andrew E. Switala, Juan Trippe, Michael Fitzgerald, Manuel F. Casanova, University of Louisville

Background: It has been suggested that the cell minicolumn is the smallest module capable of information processing within the brain.

Objectives: This study reports the neuroanatomical findings in the brains of three eminent neuroscientists and 6 normative controls. The focus of this research is the implementation of a new paradigm in the study of intellectual achievements: morphometric variations of the cell minicolumn, e.g., pyramidal cell arrays.

Method: In this case series, photomicrographs of six regions of interests (Brodmann areas 4, 9, 17, 21, 22, and 40) were analyzed by computerized image analysis for minicolumnar morphology in the brains of three distinguished neuroscientists (‘supernormals’) and six normative controls. Whole brains were celloidin embedded, cut into 35 ¼m serial sections, and Nissl-stained. Adjacent slides, stained with the Loyez technique (Loyez, 1910), were available to help identify brain parcellation.

Results: Overall, there were significant differences (p < 0.001) between the comparison groups in both minicolumnar width (cw) and mean cell spacing (mcs).

Conclusions: Although our supernormals did not exhibit deficits in communication or interpersonal skills the resultant minicolumnar phenotype bears similarity to that described for both autism and Asperger’s syndrome. Computer modeling has shown that smaller columns account for discrimination among signals during information processing. A minicolumnar phenotype that provides for discrimination and/or focused attention may help explain the savant abilities observed in some autistic people and the intellectually gifted.

Sponsor: NIH

PS4.8
MORPHOMETRIC VARIABILITY OF MINICOLUMNS IN THE STRIATE CORTEX OF HOMO SAPIENS, MACACA MULATTA, AND PAN TROGLODYTES Christopher Tillquist, Juan Trippe II, Andrew Switala, Manuel F. Casanova, University of Louisville

Background: Mammalian neocortex is characterized by the reiterative distribution of radially-oriented ensembles of neurons which are hypothesized to constitute an elemental neocortical circuit or minicolumn.

Objective: To examine for minicolumnar variability both within and across mammalian species.

Methods: The study sample included tissue from 19 macaques (Macaca mulatta); six common chimpanzees (Pan troglodytes); and 37 humans. Brains were celloidin-embedded, cut into 35 ¼m serial sections and Nissl-stained. Local neuron density was computed as the convolution of the centroids of large objects with an adaptively oriented smoothing kernel. Ridges in neuronal density indicate the cores of minicolumn fragments, and objects including those classified as interneurons are parcellated into clusters by associating each object to the nearest respective fragment core. The average distance between neighboring fragment cores is the minicolumnar width (CW). Standard deviation of the logarithm of inter-fragment distances is the scale-independent measure of variability in minicolumn width, VCW.

Results: Using a scale-independent measure of variability in minicolumnar width (VCW), we demonstrated a significant difference in VCW in layer III of striate cortex in Homo sapiens in comparison with Pan troglodytes, and Macaca mulatta. No significant differences in minicolumnar width variability were noted between macaques and chimpanzees. VCW does not appear associated with brain size.

Conclusions: Increased minicolumnar variability likely reflects a reorganization of striate cortical microcircuits during hominid evolution to accommodate visual perceptual processing requirements acquired during human evolution.
PS4.9
A TEMPORAL CONTINUITY TO THE VERTICAL ORGANIZATION OF THE HUMAN NEOCORTEX
Juan Tripple, Andrew E. Switala, Manuel F. Casanova, University of Louisville
Background: Radial translaminar arrays of pyramidal cells' minicolumns are a pervasive structural motif of placental mammalian neocortex, which are anticipated in the earliest stages of cortical development by the formation of ontogenetic cell columns comprising radial glial cells and associated radially-migrating neurons.
Objectives: In the present study we examine the temporal continuity of minicolumns throughout development and aging.
Method: Computerized image analysis of micrographs Nissl-stained postmortem tissue produced estimates of the median free path through neuropil in the radial direction (parallel to pyramidal cell arrays) and in the tangential direction (parallel to the cortical surface). These data were modeled as a biphasic power law with respect to in utero development and postnatal age, multiplied by a decay factor.
Results: No significant change in ratio of radial to tangential neuropil space was demonstrated in either the prenatal or postnatal sample population. Neuropil development follows a prenatal phase of cubic volumetric growth with a postnatal phase of linear volumetric growth.
Conclusions: These results lend strong support to the hypothesis that there is a fundamental temporal continuity in the vertical organization of the cortex, preeminent to formation of laminas and other higher-order organization, e.g., synapse formation.
Sponsor: NIH

PS4.10
AUTISM SEVERITY AND ANATOMICAL ABNORMALITIES OF THE SUPERIOR TEMPORAL SULCUS
Arnaud Cachia, Isabelle Meresse, Nadia Chabane, Nathalie Boddaert, Laurence Robel, Anne Philippe, Laurence Laurier, Yves Samson, Francis Brunelle, Catherine Barthelemy, Marie-Christine Mouren, Jean François Mangin, Monica Zilbovicius, U 797 INSERM CEA
Background: Recent brain-imaging studies have showed that the superior temporal sulcus (STS), which is highly implicated in social cognition, is functionally and anatomically abnormal in autism spectrum disorder (ASD).
Objectives: We investigated a putative relationship between the STS area and clinical profile in children with autism (Autism Diagnostic Interview-Revised [ADI-R] scores).
Methods: 45 children with non-syndromic autistic disorder were studied (37 boys, mean age: 7.9 ± 2.2 years; mean IQ: 44 ± 22). Autism was diagnosed according to the DSM-IV criteria and confirmed by ADI scores. 3D high-resolution anatomical images were acquired with a 1.5T GE Signa System scanner. These high-resolution T1-weighted images were used for the reconstruction of the fine individual cortical folds required for sulcus segmentation. A novel method was applied to extract and measure the STS area from 3D MRI. STS identification was performed manually on each hemisphere. STS area was preliminary divided by the area of the outer cortex (i.e. the area of the smooth envelop of the cortex) to control for global differences in cortex anatomy between subjects. Correlation analyses (analyses of covariance - ANCOVA) were performed to study the relationship between STS (normalized) area and ADI-R global score, as an index of clinical severity. Age, gender were included as confounding covariates. Significant main effects were probed using bilateral F-tests. Shapiro tests were used to check that the residuals were normally distributed.
Results: Significant negative correlation was observed between STS (normalized) area and ADI-R score. Main effects of sex and age were not significant.
Conclusion: The more severe the autistic syndrome, the more abnormal the STS anatomy, confirming implication of the superior temporal sulcus in ADS.
Sponsor: France Telecom Foundation, France Foundation, ANR.

PS4.11
ATTENTION MODULATION AND THE USE OF CUES IN ASD
Catherine S. Ames, Chris Jarrold, Social, Genetic and Developmental Psychiatry Centre
Background: The ability to utilise cues to others' mental states depends, at least in part, on the ability to exert endogenous control in order to identify the co-occurrence of behavioural signals and environmental events.
Objective: To identify conditions under which children with ASD are able to identify the relationships between cues and targets.
Three groups of participants. (ASD, moderate learning difficulties, typically developing) participated in a series of 3 experiments in which their ability to utilise non-social cues was investigated under varying conditions. These conditions varied in terms of the transparency of association between cue and target, the necessity to integrate information over time and space and the ease of verbal encoding of each cue.
Each experiment was designed and analyzed independently and the pattern of results produced reveal significantly impaired cue interpretation abilities in the ASD group in conditions where the association between cue and target relies on the recognition of the temporal proximity of cues across wider spatial spread. Participants with an ASD were able to identify and form associations between cues and targets when they were spatially proximal. Whilst the ASD group was less able to utilize cues that could be verbally encoded, they also experienced difficulties with cues that did not facilitate the use of this strategy in any group.
The pattern of results is interpreted in terms of a specific difficulty in identifying and using temporal associations between cues and targets in conditions of wide spatial spread. These results provide a possible reconciliation between suggestions of an inefficient attentional window.
and the need for additional research with very young samples of children [e.g., Volkmar et al, 2004]. We reviewed the abstracts from a major yearly autism conference in the field (the IMFAR Conferences) from 2004 to 2006 to examine the extent to which research presented has reflected these and other trends in the field. Objectives: To obtain a snapshot of the trends in autism research being presented at a major conference, the International Meeting for Autism Research in comparison with a sampling of published literature in the field. Methods: The published IMFAR conference presentation abstracts were surveyed for the years 2004 through 2006. The type of study, presence and type of control group, participant characteristics and diagnostic terminology were examined. A sample of the journal literature during that same time period was similarly examined. Results: The use of the term ASD vs DSM categories as sample descriptors is increasing at IMFAR. A trend towards studies with younger, preschool participants was also noted, at the expense of school-aged children. The use of control groups has remained consistent, with some trends towards increasing use for studies involving high functioning individuals. Conclusions: Presentations at IMFAR have increasingly focused on younger children. However, the appropriateness of a control group is complicated by the increasing use of the term ASD and the decreased diagnostic specificity that follows from the use of such umbrella terms. This, in turn, impacts on potential generalizability of results. Funding: CIHR-NAAR Autism Spectrum Disorders Strategic Training Program (JJAH-PI)

PS4.14
COGNITIVE-BEHAVIORAL CORRELATES AND THEIR RELATIONS TO INTERVENTION OUTCOME IN YOUNG CHILDREN WITH AUTISM Ditza Zachor, Esther Ben Itzchak, Assaf Harofeh Medical Center, Tel Aviv University Background: Individuals with autism vary widely in their cognition, autism symptoms severity, and response to intervention. Objectives: This study focused on several questions regarding cognition in autism: Does change in cognitive level with intervention in children with autism exceed the change in children with cerebral palsy (CP)? Does cognitive level relate to autism severity in social, communication, and stereotyped behavior? Does cognitive level prior to intervention relate to the measured change in autism severity after one year of intervention? Does change in cognitive level relate to the change in autism severity with intervention? Methods: Eighty-one children (mean age 25.9 months) with autism (n=44) and cerebral palsy (n=37) were enrolled in different center-based early intervention programs. At pre- and post one intervention year, cognitive abilities (autism and CP group) and autism severity (only in autism group) were assessed by standardized tests. Results: IQ scores increased significantly more in the autism group (15 points) than in the CP group (9 points).
Three pre-intervention cognitive level groups: IQ > 90, 70 < IQ < 89 and 50 < IQ < 69 were examined. The impaired group had more severe autism symptoms in social, play, and stereotyped behaviors domains than the borderline and the normal cognitive groups. However, the groups did not differ in the change in core autism symptoms after one year of intervention. IQ improvements correlated significantly with the reduction in stereotyped behaviors but not with progress in social and communication abilities.

Conclusions: Children with autism have a good potential for progress in their cognitive level with intervention. Cognitive ability in autism is associated with autism severity. However, baseline cognitive level can not predict the progress rate in autism symptoms with intervention. Stereotyped behaviors are affected by the change in cognitive abilities with intervention.

**PS4.15**

**TASK SUPPORT AND ITEM-CONTEXT RELATIONS IN THE RECALL OF ADULTS WITH ASPERGER’S SYNDROME AND TYPICAL DEVELOPMENT.** Dermot Bowler, Sebastian B. Gaigg, John M. Gardiner, City University, London

**Background:** Typical individuals show better recall of semantically related items. Memory is also better when items are studied along with semantically related context items. As the first of these effects is diminished ASD, it is reasonable to predict that the latter would be as well. Yet in a previous experiment, we found similarly positive effects of relatedness in the recognition of target and context items in adults with Asperger’s syndrome (AS) and typical development (TD). We argued that the undiminished performance of the AS group may have resulted from our having used a supported test procedure (recognition), on which people with ASD rarely show difficulty. We predicted that using free recall at test would diminish sensitivity to context relatedness in ASD.

**Objectives:** To compare free recall of incidentally encoded, semantically related and unrelated context by adults with AS and TD.

**Methods:** 16 adults with AS and 16 individuals with TD, matched on VIQ and CA studied 20 words presented inside a red box on a computer screen. On all trials another related or unrelated word was presented outside the box. Participants were told to study only the words inside the box. At test, they were asked to recall as many words as they could from either inside or outside the box.

**Results:** Significantly more target than context items were recalled, and more items were recalled when presented with a related than with an unrelated item. But whereas TD participants recalled more items (target or context) when these were studied with a related item, recall for AS participants was not significantly affected by the presence of a related item at study.

**Conclusion:** The findings show diminished use of item-relatedness in the aid of free recall in people with AS, and confirm that memory differences in this group are a function of the degree of support present in the test procedure.

**Sponsor:** The Wellcome Trust (UK)

**PS4.16**

**PARENT-REPORTED RATES OF MENTAL RETARDATION AMONG THEIR CHILDREN WITH AUTISM SPECTRUM DISORDERS** Robin P. Goin-Kochel, Sarika U. Peters, Diane Treadwell-Deering, Baylor College of Medicine

**Background:** Traditionally, it has been asserted that approximately 75% of children with autism also meet criteria for mental retardation (MR); however, some research has noted parent-professional discrepancies regarding affected children’s cognitive capabilities.

**Objective:** To determine the parent-reported rate of concomitant MR among a large sample of children with autism spectrum disorders (ASD).

**Methods:** Parents of children with ASD (N = 498; 88.8% mothers; M age = 38 years [SD = 7.2]) completed an online survey containing a variety of questions about their children’s development, including a section on their children’s additional diagnoses. Announcements regarding the study were distributed in the emails, newsletters, and websites of cooperative autism-support organizations in the U.S. and 7 other English-speaking countries (e.g., Autism Society of America, Cure Autism Now). The questionnaire was posted on a website from August 2002 until February 2004.

**Results:** Only 46 families (9.2%) indicated that their child had MR in conjunction with ASD. Relative to children for whom MR was not reported, children with MR were significantly older at the time of the survey (M[SD] = 13.4 [8.5] versus 8.1 [4.3]; t[496] = -7.161, p < .001) and had received their ASD diagnoses at later ages (M[SD] = 6.4 [6.0] versus 4.4 [2.9]; t[486] = -3.847, p < .001); however, there was no significant difference between groups concerning parent education level, t(477) = 1.872, p = .062.

**Conclusions:** A small percentage of families indicated that their child had MR in conjunction with ASD. Relative to children for whom MR was not reported, children with MR were significantly older at the time of the survey (M[SD] = 13.4 [8.5] versus 8.1 [4.3]; t[496] = -7.161, p < .001) and had received their ASD diagnoses at later ages (M[SD] = 6.4 [6.0] versus 4.4 [2.9]; t[486] = -3.847, p < .001); however, there was no significant difference between groups concerning parent education level, t(477) = 1.872, p = .062.

**P4S.17**

**EXPLORING VISUAL SPATIAL ATTENTION AND THE CEREBELLUM IN AUTISM** Rebecca Jeanne Groen, James Phillips, Kristen Merkle, Geraldine Dawson, Sara Webb, University of Washington

**Background:** While the specific cause of autism (ASD) is still unknown, there has been a substantial amount of research documenting cerebellar dysfunction in individuals with autism.

**Objectives:** The goal of this study is to examine visual spatial attention in children with autism spectrum disorders.

**Methods:** Nine to twelve year old subjects were recruited from the Early Development Study at the University of Washington. Subjects were given a spatial attention task which has been found previously to be related to...
cerebellar volume. In this task a central fixation point was flanked by two boxes. One of the boxes was cued; after a delay, a target appeared in one of the boxes. On a validly cued trial, the attention cue signaled the target. On an invalid trial the attention cue was incorrect, i.e. target location differed from the cue. Participants pressed a button when they detected the target. Variables include accuracy and reaction time to valid and invalidly cued trials.

Results: Data have been collected on 14 children with ASD and 20 controls. Both groups were faster when the cue was valid and 800, versus 100, milliseconds before the target. Both groups were faster to respond to the validly cued targets than the invalidly cued targets. The ASD group, in general had a slower reaction time and was potentially delayed more at faster cue times.

Conclusion: This pattern suggests that children with ASD have more difficulty with shorter cue times. Data collection is still ongoing.

Sponsor: National Alliance for Autism Research, National Institutes of Health NICHD & NIDCD.

**PS4.18**
**EVERYDAY MEMORY IN AUTISTIC SPECTRUM DISORDERS** Catherine Jones, Anita Jayne Sarah Marsden, Jeni Tregay, Francesca Happé, Gillian Baird, Emily Simonoff, Andrew Pickles, Tony Charman, Institute of Child Health, University College London

**Background:** Everyday memory refers to memory processing that occurs in response to the demands of daily life. For example, remembering directions, a person’s name or what to do at a certain time. The profile of everyday memory performance is not characterized in Autism Spectrum Disorders (ASD), despite anecdotal evidence of difficulties in at least a subgroup of individuals with an ASD.

**Objectives:** Investigate the everyday memory profile of adolescents on the autistic spectrum.

**Methods:** Diagnosis of ASD was established using the ADI and ADOS. Adolescents (14-16 years old) with and without ASD, ranging in symptom severity (autism, PDD) and IQ (40-136), were tested. Four subtests from the Rivermead Behavioural Memory Test were administered: Route and Message, Appointment, First and Second Name, and Belonging. The tasks aim to measure aspects of memory that contribute to everyday functioning in an ecologically valid way (e.g. remembering what to do when an alarm rings; remembering a route). Measures of semantic memory (Children’s Auditory Verbal Learning Test-2) and working memory (Numbers Task: Children’s Memory Scale) were also administered.

**Results:** Data collection is still in progress. We will report findings on the data collected so far, comparing the performance of adolescents with and without ASD.

**Conclusions:** We anticipate that the results will inform understanding of the profile of strengths and difficulties in memory processing in ASD.

Sponsor: Medical Research Council, UK

**PS4.19**
**RULE USE VERSUS RULE LEARNING IN CHILDREN WITH ASD** Oriane Landry, Peter L. Mitchell, University of Nottingham

**Background:** Children and adults with ASD have difficulty on ‘set-shifting’ that is often referred to as perseverative. However, this is typically measured using complex tasks such as the WCST, where the source of error is ambiguous. Perseveration could reflect problems interpreting feedback, not shifting.

**Objectives:** Does this perseverative behaviour reflect difficulty changing rule sets, or a difficulty formulating rule sets? Children with ASD (N=13, mean CA=11, mean FSIQ=62) were randomly assigned to perform a card-sorting task under one of two conditions: rule-use or rule-learning. In the rule-use condition, children were given sorting instructions before each trial. In the rule-learning condition, children were given feedback after each trial. To allow for a range of abilities, the task had three levels of difficulty. We predicted that children in the rule-use condition would commit fewer errors and complete more sets than children in the rule-learning condition.

**Results:** Overall, the children in the rule-use condition made more perseverative errors, the children in the rule-learning condition made more failure to maintain set errors, but both groups completed the same total number of sets. However, half of the children failed the easiest level; those in the rule-use condition successfully completed the first set only to perseverate on the second set (failure to change rule sets), whereas those in the rule-learning condition failed to complete the first set (failure to establish a rule set). Among children who passed the easiest level, a larger number of random errors were observed for those in the rule-learning condition, with no other differences observed. Passing this level was uniquely discriminated by PIQ.

**Conclusion:** Children with ASD do not have a basic impairment in set-shifting but rather difficulty generating a novel rule set using feedback.

Sponsor: ESRC

**PS4.20**
**THE RELATIONSHIP BETWEEN LANGUAGE AND THEORY OF MIND: COMPLEMENT SYNTAX AND FALSE BELIEF UNDERSTANDING IN AUTISM SPECTRUM DISORDER** Sophie Lind, Dermot Bowler, City University, London

**Background:** The fact that some individuals with ASD pass false belief (FB) tasks is problematic for the theory of mind (ToM) hypothesis of autism. One suggestion, which preserves the hypothesis, is that individuals with ASD use compensatory verbal strategies to "hack out" solutions to the tasks (Happé, 1995; Bowler, 1992). Indeed, both receptive vocabulary and grammar are more highly correlated with FB task performance for individuals with ASD than for those without ASD (Fisher et al., 2005). De Villiers (1995) has argued that a specific aspect of grammar - complement syntax - is a prerequisite of FB understanding and Tager-Flusberg (2000) found a relationship between the two abilities in ASD. Firm
conclusions from this study are difficult to draw, however, as (a) the ASD sample were atypical in showing unimpaired ToM abilities, (b) ASD overall performance on the complement syntax task was not reported, and (c) the complement syntax tasks used were unnecessarily complicated, taxing working memory.

Objectives: To assess whether complement syntax is actually impaired in ASD and whether it relates to performance on FB tasks.

Methods: 33 children with ASD and 33 comparison children, matched on age and receptive vocabulary, completed two standard FB tasks and a test of memory for complements embedded under communication verbs. The test was characteristic of those used recently with typically developing children (de Villiers & Pyers, 2002) and taxed working memory substantially less than the tasks used by Tager-Flusberg (2000).

Results: Relative to controls, children with ASD showed impaired ToM despite unimpaired complement syntax performance. After controlling for vocabulary scores, there was no relationship between complement syntax and FB task performance in either group.

Conclusion: These data suggest that children with ASD do not utilize complement syntax as a strategy for hacking out solutions to FB tasks.

Sponsor: City University

PS4.21 TASK SWITCHING IN AUTISM Edita Poljac, Jan Buitelaar, Harold Bekkering, Radboud University Nijmegen

Background: Mainly based on data collected from neurological tests (e.g., WCST), some studies on autism proposed recently that autism spectrum disorders are associated with problems in executive functions, such as mental flexibility. A different type of paradigm often used for examining executive control processes in the field of cognitive psychology is the so-called task-switching paradigm. The central phenomenon is the switch cost, defined as a decrement in task performance due to task switching.

Objectives: Compare task-switching performance in persons with autism with normally developing persons and persons with dyslexia.

Methods: Patients were recruited from different clinical institutions specialized in autism. All patients were clinically diagnosed with ASD according to DSM IV. Response times (RTs) and error rates were measured for switching and non-switching conditions in a color- and shape-matching task. Switch costs were defined as a difference in task performance after a task switch and after a task repetition.

Results: Data are collected on 20 autistic participants, 38 healthy controls, and 30 controls with dyslexia, matched on their age and IQ. Importantly, the autistic patients showed no higher switch costs than the controls, although a significant interaction between group and switch costs was observed. This interaction indicated a significantly larger switch cost for the dyslectic participants compared to the healthy controls.

Conclusion: The present study does not provide support for impaired executive functions on the level of task switching in persons with autism.

Sponsor: NWO

PS4.22 TRAITS AND THEORY OF MIND: THE OTHER SIDE OF THE COIN Rajani Ramachandran, Peter Mitchell, Danielle Ropar, University of Nottingham

The theory of mind hypothesis of autism provides an incomplete view of social perception considering that focus of this line of research has been on propositional attitudes like beliefs and desires. Attribution research puts forth the equation, ‘Behaviour = Disposition + Situation’. Extensive research on belief attribution in autism suggests a deficit in using situational information in order to attribute mental states which leads to errors in making predictions about future behaviour. What research has not yet established is whether individuals with autism are also impaired in taking account of traits and dispositions (e.g. clever, clumsy) when predicting behaviour

Initial investigation carried out by us (IMFAR, 2006) suggests that people with autism infer traits online from textual descriptions of behaviour with minimal effort. To investigate whether they associate the trait with a person, a pair of face stimuli were presented with a sentence under each, to 16 participants with and without Asperger’s Syndrome. Subsequently, at testing, the same face stimuli were presented, either in the same orientation or the opposite orientation, along with a single cue word. Participants had to choose which of the faces best relate to the word based on the information they had been given. There were two types of sentences: trait implying (This is Ross who smiled and said hello to everyone at the party) and fact implying (This is Ben who has to bend down to enter most doors). The words presented were of three types: traits (friendly in the above example), facts (Tall in the above example) and names (Ross or Ben in the above examples). Surprisingly, participants with Asperger’s Syndrome were able to accurately associate the trait, fact and name to the appropriate person irrespective of the orientation. This suggests that understanding traits might be a spared social cognitive function in Asperger syndrome.

Funding: Commonwealth Scholarships Commission

PS4.23 METACOGNITIVE MONITORING IN CHILDREN AND ADULTS WITH AUTISM: EXAMINING SELF-AWARENESS OF KNOWLEDGE Keiran M. Rump, Holly Gastgeb, Nancy J. Minshew; Mark S. Strauss, University of Pittsburgh

Metacognitive monitoring is the ability to assess the state of one’s own knowledge and requires a degree of self-awareness. Few studies have examined self-awareness in individuals with autism from the perspective of metacognition. A number of basic daily activities present difficulties for individuals with autism (e.g., face recognition, emotion perception) and it is important to determine the extent of their awareness of such
This study examined metacognitive monitoring in individuals with autism using a task in which they are known to evidence impairments, i.e., emotion recognition. High functioning adults and children with autism (N = 34) and age and IQ matched controls (N = 34) were presented with an emotion recognition task. Participants were presented with videos of six basic emotional expressions that varied in subtlety and were required to identify the expression presented and to state whether they were "certain," "somewhat certain," or "guessing" about their answers.

Metacognition results for the children indicated that when both groups said they were "certain," they were highly accurate in identifying the facial expressions. However, in contrast to the control participants, the children with autism were unable to make a more subtle distinction between when they were "somewhat certain" and when they were "guessing." By adulthood, both groups were comparable in their metacognitive abilities. Both groups were most accurate on trials in which they said they were "certain," less accurate when they said "somewhat certain," and least accurate when they said they were "guessing."

Metacognitive monitoring appears to be somewhat delayed in children with autism. This delay may have implications for the ability of children with autism to learn new information. By adulthood, however, individuals with autism seem adept at evaluating their performance on some tasks that are challenging for them. Sponsor: NAAR, NICHD

**PS4.25**

**ATYPICAL HIERARCHY OF VISUAL CATEGORIZATION IN AUTISM, ASPERGER SYNDROME AND TYPICAL POPULATION** Isabelle Soulères, Michelle Dawson, Jessica B. Rivest, Anthony Hosein, Laurent Mottron, Boutheïna Jemel, Université de Montréal

Background: Object detection and categorization are simultaneous and perhaps intermingled, while sub-categorization requires additional processing in typically developing individuals (Grill-Spector & Kanwisher, 2005).

Objectives: To explore autistics' temporal hierarchy of object detection, categorization, and sub-categorization using the methodology of Grill-Spector and Kanwisher. Methods: 13 subjects with autism, 13 with Asperger Syndrome, and 13 IQ-, gender- and age-matched control subjects participated in three distinct backward masking tasks. Grey-scale images of an object or a texture were presented for either 11, 22, 33, 44 or 110 ms and immediately replaced by a mask. Task 1 required detection of the presence of an object (vs. a texture). Task 2 required categorization of the object presented as a dog, bird, car or boat. Task 3 required more precise categorization of the object presented as a German shepherd, pigeon, Beetle, sailboat or other member of the displayed categories. Two hundred trials were presented for each task. The order of the three tasks was counterbalanced across participants.

Results: A correction for guessing was applied prior to data analyses. Control participants exhibited the same pattern of responses as in Grill-Spector and Kanwisher (2005), i.e. similar delay for categorization and detection, while autistic participants showed highest performance for categorization, with no advantage for detection over identification. Asperger participants showed results in between control and autistic individuals.

Conclusion: Autistic and Asperger individuals perceive information in a more detailed fashion, and tend to show
IMITATION DEFICITS OF MEANINGLESS GESTURES IN AUTISM SPECTRUM DISORDERS
Heidi Stieglitz Ham, Martin Corley, Thusha Rajendran, Jean Carletta, Sara Swanson, University of Edinburgh
Background: Body part specific meaningless gestures have not been previously investigated in the autism population.
Objectives: To compare a group of individuals with autism spectrum disorder and a matched neurotypical comparison group using hand posture and finger position tasks previously used with adult patient populations.
Methods: Participants were recruited through the Autism Society of Southeastern Wisconsin and tested at the Medical College of Wisconsin. Participants were reevaluated for diagnosis using the ADOS and the Social Communication Questionnaire. A newly-designed Apraxia Battery was administered. This included tests in multiple modalities for meaningful gestures as well as evaluating direct imitation of meaningless gestures. All productions were videotaped, coded, and analyzed. Here we report analyses of the meaningless gesture tasks.
Results: 19 individuals with autism (mean age 12.0, age range 7.5 - 15) and 22 neurotypical individuals (mean age 12.5, age range 7.2 - 15.8) were tested. As a group, the autism participants performed poorly on the imitation of both hand postures and finger positions compared to the neurotypical group, with preliminary analysis yielding a significant between group difference, p = < .001. In addition, measures of mirror image, rotation, body part orientation, and form were included in the analyses. Compared to the comparison group, the autism group demonstrated significant differences in body part orientation and form errors.
Conclusion: Based on the results of the meaningless gesture tasks, an imitation deficit appears to be general to hand postures and finger positions, thus differentiating them from adult patient populations.
Sponsor: Self-Funded

THE ROLE OF VISUAL ATTENTION IN IMITATION IMPAIRMENT IN AUTISM Giacomo Vivanti, Sally J. Rogers, The MIND Institute, University of California Davis Medical Center
Background. Research over the last 30 years has consistently reported impaired imitative abilities in children with autism. To clarify the mechanisms that underlie this imitation impairment, we investigated the role visual attention, during the observation of the action to be imitated, plays in imitation performance.
Objectives. This study evaluates 3 hypotheses:
(1) Children with ASD will demonstrate less precise imitations than will comparison subjects.
(2) Children with ASD will demonstrate less visual attention to the model than do comparison subjects.
(3) Gaze patterns to the model may be related to the precision of imitation in children with autism.
Methods. 8- to 12-year old children with ASD and typically developing subjects matched for IQ and age observed a series of videos showing a person performing an action, and were asked to imitate the action. Their eye movements were recorded using a head-mounted eye-tracking system to allow for analysis of visual attention to relevant areas of the model.
Results. Preliminary data (N=7 controls, 5 ASD) demonstrate that typically developing controls spontaneously watch the face of the person performing the action, although it is not relevant to imitating the action, during 25% of the imitation observation period, and watch the region where the action is performed during 50% of this period. Children with ASD tend to focus on the region where the action is performed for the same amount of time (50%), but watch the person's face only 10% of the time.
Conclusions. Between-group differences in visual fixation patterns while observing a model to be imitated may represent one mechanism underlying imitative impairments in children with ASD.
Sponsor. University of Siena, Italy; MIND Institute, UC Davis

BIG HEADS, SMALL DETAILS AND AUTISM Sarah White, Elisabeth Hill, Uta Frith, Institute of Cognitive Neuroscience, University College London
Background: Although a strong genetic component is thought to be involved in autism spectrum disorder (ASD), neurobiological markers of the disorder have yet to be identified. One of the more consistent neurobiological findings in the autism literature is of macrocephaly (increased head/brain size/weight) but little is known about how this relates to autistic behaviour. One speculative explanation for macrocephaly in ASD is that it results from an excess of feedback (top-down) connections in the brain, which are therefore inefficient. One consequence of this would be a mismatch between bottom-up and top-down processing streams. This might lead to good detail (bottom-up) processing but poor attentional control (top-down). This is claimed for the cognitive processing style of 'weak central coherence' documented in ASD across a number of studies.
Objectives: To investigate the relationship between macrocephaly and weak central coherence.
Method: 49 high-functioning 7-12 year olds with ASD were compared to 25 control children in their performance on a modified Navon task, designed to tap into global and local processing and therefore relevant to the weak central coherence hypothesis. Head circumference was also measured.
Results: No differences were found between the ASD and control groups either in their head circumference or in attention to the model than do comparison subjects.
their performance on the Navon task. Within the ASD group however, children with macrocephaly showed a greater processing cost when switching into global processing, when compared to children without macrocephaly.

Conclusion: Macrocephaly in ASD may be a biological marker of weak central coherence.

Sponsor: Medical Research Council (MRC), UK

**PS4.30**

**METAMEMORY IN INDIVIDUALS WITH AUTISM: SELF-AWARENESS OF PERFORMANCE ON FACIAL RECOGNITION TASKS** Desiree A. Wilkinson, Catherine A. Best, Nancy J. Minshew, Mark S. Strauss, University of Pittsburgh

Background: Little research has examined metamemory, or one’s knowledge of one’s own thought processes in individuals with autism. Although several autism studies have looked at metamemory, a component of metacognition, no studies have looked specifically at cognitive monitoring or one’s awareness of one’s own memory capabilities within individuals with autism (Farrant et al., 1999).

Objective: The current study examines the development of metamemory skills in children and adults with autism when applied to explicit and implicit facial recognition tasks.

Method: Participants consisted of 21 high-functioning children with autism and 39 high-functioning adults with autism. Controls consisted of 24 typically developing children and 44 adults. Controls were matched on age, gender, and FSIQ. Participants in both the explicit and the implicit recognition conditions were shown a series of faces on a computer. In the explicit recognition condition, participants were told that their memory for the faces would later be tested. Whereas, in the implicit recognition condition, participants were asked to rate the attractiveness of the facial stimuli and were then surprised with a memory test. Participants were also asked to make certainty judgments for all stimuli in the recall session using a 3-point Likert scale, consisting of "certain", "somewhat certain" and "guessing" with respect to their memory performance.

Results: Overall, individuals with autism assessed their memory for facial stimuli less accurately than individuals in the control conditions. Developmental differences and task related differences will also be discussed.

Conclusion: Problems with cognitive monitoring may contribute to deficits in facial recognition within individuals with autism. Furthermore, differences in metamemory skills may be indicative of further cognitive deficits in memory with autism.

Sponsor: NICHD, NAAR

**PS4.29**

**METAMEMORY IN INDIVIDUALS WITH AUTISM: SELF-AWARENESS OF FUNCTIONING AUTISM** A. Wilkinson, C. Best, N. Minshew, M. Strauss, University of Pittsburgh

Background: Our previous research has shown that adults with autism suggest deficits are prevalent in older children and adults with autism, but not in preschool aged children. Some attribute this paradox to EF deficits being a consequence of living with autism; however other task factors, such as language and social demands, may play a role in the disruption of EF skills observed at older ages.

Objectives: Compare EF performance between children with autism and typically developing children on a measure of cognitive flexibility that allows for manipulation of non-EF task factors.

Method: Thirty-Nine children were recruited through the research database in the Research On Autism and Developmental Disorders (ROADD) Lab and the DU Developmental Volunteer Research Pool. High-functioning autism (HFA)/Asperger’s Syndrome (AS) diagnoses were confirmed with ADOS, ADI-R or ASQ, and cognitive testing. Across 2 testing sessions children received computerized and human administered versions of the Flexible Item Selection Task (FIST) as well as diagnostic and cognitive assessments. Half of each diagnostic group was given additional verbal instructions to promote flexibility.

Results: Data from 18 HFA and 1 AS (mean age= 6.67 years; age range 5.00 - 7.58 years) and 20 typically developing children (TD; mean age= 5.82; age range 5.50 - 6.33 years). 95% of HFA group are males and 75% of TD group are males. Analyses suggest the HFA group is significantly worse on the flexibility measure relative to the TD group independent of administration format and verbal instruction.

Conclusion: Results suggest social context and verbal demands are not the only factors driving EF deficits for school-aged children with autism on tasks of cognitive flexibility.

Source: NICHD

**PS4.31**

**FACE PROCESSING DEFICITS IN FIRST-DEGREE RELATIVES OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER. Simon Wallace, Catherine Sebastian, Kate Renshaw, Anthony Bailey, Department of Psychiatry, University of Oxford**

Background: Our previous research has shown that individuals with ASD have a characteristic pattern of face processing deficits: a reduced face expertise; impaired recognition of fear and reduced sensitivity to eye gaze directed straight ahead. The aim of this study was to explore the nature and extent of face processing deficits in relatives of individuals with ASD.

Methods: The performance of 22 adult first-degree relatives of individuals with autism spectrum disorder (ASD) was compared with age- and IQ-matched individuals with ASD and typical controls. Family History Interview data suggested that half the individuals from the relatives group have the broader autism phenotype (BAP). Experiment 1 - a test of face expertise: participants decided whether pairs of sequentially presented faces or houses were the same or different.
Experiment 2 - recognition of facial expressions.
Experiment 3 - judging eye gaze direction: participants judged whether pictures of the eyes had gaze directed straight or averted.

Results: All groups showed evidence of face expertise but the size of the expertise effect in the relatives group was smaller than controls but larger than individuals with ASD. The relatives group was significantly impaired at recognising fearful expressions compared to controls. Lastly, the relatives were atypically neither faster nor more accurate to judge direct compared to averted gaze.

Conclusions: The face processing deficits shown by first-degree relatives of individuals with ASD are similar to those shown by individuals with ASD, although the scale of the deficit is noticeably smaller in relatives. These findings highlight the potential for assessing face processing deficits in studies of the BAP.

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PS4.32
GAZE DIRECTION DOES NOT MODULATE FACIAL EXPRESSION PROCESSING IN CHILDREN WITH AUTISM
Hironori Akechi, Yukiko Kikuchi, Atsushi Senju, Toshikazu Hasegawa, Yoshikuni Tojo, Hiroo Osnar, Graduate School of Arts and Sciences, The University of Tokyo

Background: Gaze direction is known to modulate the recognition of facial expression, which involves neural processing in amygdala. Although the structural and functional abnormalities are reported in autism, the effect of gaze direction on the processing of facial expression in autism is still unknown.

Objectives: To investigate the effect of gaze direction on the recognition of facial expression in children with and without autism.

Methods: Data were collected from 14 children with autism (mean age 12.5; range 8-14) and 17 typically developing children (mean age 11.3; range 9-15) matched on IQ. ‘Anger’ or ‘fear’ faces were presented for the participants, and they were asked to discriminate the facial expressions. The gaze direction of the stimuli were either directed toward the participant or laterally averted.

Results: Gaze direction of the stimuli modulated the speed of facial expression discrimination in typically developing children, which replicated previous study. However, the processing speed of children with autism was not affected by the gaze direction.

Conclusion: Results suggest that individuals with autism do not combine emotionally relevant information such as facial expression and gaze direction, which could be due to the atypical functioning of amygdala and could affect their social interaction and communication.

Sponsor: Japan Society for the Promotion of Science, and 21st Century COE Program J05, ‘Center for Evolutionary Cognitive Sciences at the University of Tokyo.’

PS4.33
EMOTION RECOGNITION AND ITS RELATION TO RSA AND EYE GAZE IN CHILDREN WITH AUTISM
Elgiz Bal, Amy Vaughan Van Hecke, Damon Lamb, John Denver, Olga Bazhenova, Emily Harden, Jocelyn Lebow, Alexis Kramer, Keri Heilman, Stephen W. Porges, University of Illinois at Chicago

Background: Studies evaluating emotion recognition in children with autism have yielded mixed results. The Polyvagal Theory proposes that respiratory sinus arrhythmia (RSA) and visual fixation on particular regions of the face may be related to accuracy of emotion recognition and latency to detect emotions.

Objective: To study emotion recognition and its relation to RSA and eye gaze in children with autism.

Methods: Accuracy of emotion recognition, latency to detect emotions, RSA, and eye gaze were measured while 8-13 year-old children with high-functioning autism (N=14) and neurotypical children (N=27) viewed movies of slowly changing facial expressions from neutral to one of six basic emotions. Participants were instructed to push a button when they identified the emotions. Physiological data were collected continuously.

Results: The autism group was consistently slower in identifying emotions, F (1, 37) = 5.63, p < .023, especially for disgust, t (39) = 3.21, p < .003. They also made more errors when recognizing anger, t (38) = 3.12, p < .003. Overall, children with higher amplitude RSA had shorter latencies in identifying emotions (r=.341, p < .034). Children who looked less at the upper face (r = -.456, p < .006) and more at the lower face (r = .412, p < .014) made more errors when recognizing surprise.

Conclusions: Children with autism were slower in identifying emotions and made more errors when recognizing anger. Increased vagal regulation of the heart (i.e., higher RSA) was related to shorter latencies to detect emotions. Gaze towards upper face region may provide unique information in identifying surprise.

Sponsor: NIMH, NLMF, and Autism Speaks

PS4.34
MEMORY FOR FACES: A COMPARISON OF INTENTIONAL VS. INCIDENTAL PARADIGMS
Catherine A. Best, Mark S. Strauss, Lisa C. Newell, Nancy J. Minshew, University of Pittsburgh

Background: In autism research, almost all recognition studies explicitly instruct participants to memorize faces. This method may allow individuals with autism to utilize strategies not readily used in real world instances of recognition.

Objective: Memory abilities of individuals with autism were compared with controls in 2 tasks that differed only in instructions either informing participants of an imminent memory test or not.

Method: Participants with autism were high-functioning. Controls were matched on age, gender, and FSIQ. Faces were presented one at a time on a computer. Half of the participants were given an intentional task and told to memorize faces for a subsequent memory test. The other
half were given an incidental learning task and asked to
rate the attractiveness of each face and then had a surprise
memory test. During identical memory tests, all
participants pressed computer keys labeled 'old' or 'new.'
Results: Data are collected on 39 adults with autism and
44 control adults (16 - 51 yrs). Accuracy analyses showed
that the autism group performed significantly better in the
intentional task than the autism group in the incidental
task. In contrast, controls were not statistically different in
either version. Additional analyses showed controls
remembered distinctive faces significantly better than
typical faces in both tasks, which was not true for autism
groups in either task.
Conclusion: Virtually all prior studies of face recognition
skills in individuals with autism have used explicit
memory tests. Reports from the existing experimental
literature may inflate estimates of recognition ability in
individuals with autism. More importantly, controls
appear to use similar strategies whether or not they are
told in advance to memorize faces or not, whereas the
autism groups appear to employ strategies for the
intentional task which were not used in the incidental and
more natural version of the task.
Sponsor: NICHD, NAAR

PS4.35
FACE PROCESSING STRATEGIES IN CHILDREN
WITH AUTISM: CONFIGURAL VS. FEATURAL
PROCESSING. Niki Daniel, Dermot Bowler, City
University, London
Background: It is hypothesised that deficits in processing
faces underlie the social difficulties observed in
individuals with autism. It has been suggested that these
deficits in face processing are due to a bias in processing
local rather than configural information in faces.
However, since there is empirical evidence that
contradicts this hypothesis, further explorations of face
processing difficulties in autism are needed.
Objectives: To compare performance on a face
identification task by children with autism, typical
development and moderate learning difficulties.
Methods: Children were recruited from special and
mainstream schools in London. Level of functioning was
assessed with British Picture Vocabulary Scale, Raven’s
Progressive Matrices and Clinical Evaluation of Language
Fundamentals. For the face identification task, a single
face was altered so as to create sets of faces designed to
manipulate featural, configural and contour processing.
Within each set, faces differed only in the shape of the
eyes and mouth (featural set), only in the spacing of the
eyes and mouth (configural set) or only in the shape of the
external contour (contour set). Faces were presented in
both upright and inverted conditions. Participants gave a
same/different response.
Results: Data are presented from 15 children in each of
the three groups (males, aged 7- to 12-years-old). The
groups are matched on chronological age and
performances on Raven’s Progressive Matrices.
Performance on the three sets of faces significantly
differed between groups (in both the upright and inverted
conditions). Typically developing children showed an
inversion effect in the configural set, which was not found
in the autism group. Performances in the other two sets
(featual and contour) did not differ between groups.
Conclusion: Findings support an impairment in
processing the configural information of faces in the
autistic group, whereas the processing of featural
information appears intact.

PS4.36
LOOKING AT EYES AS A PREDICTOR OF 18-
MONTH LANGUAGE AND SOCIAL BEHAVIOR
OF INFANTS AT RISK OF AUTISM Angeline
Dijamco, Marian D Sigman, UCLA
Background: Previous research has shown that children
and adults with autism pay less attention to the eye region
when looking at faces. Recent reports have found no
significant group differences between infants at risk of
autism and control groups in the amount of time spent
looking at the eyes. However, there is a considerable
amount of variability among individual infants.
Objectives: This study aims to investigate whether
individual differences in gaze patterns of infants at risk of
autism predict subsequent performance on measures of
language and social behavior. It was hypothesized that 6-
month-olds who spent more time looking at the eyes
would display higher levels of language and social
behavior at age 18 months.
Methods: 32 infant siblings of children with autism
participated in a habituation task in which they viewed
static images of happy faces presented one at a time on an
eye-tracking monitor. Gaze data were analyzed by
examining the percent viewing time that the infant looked
at the eye region. A region of interest was drawn around
the eyes, allowing a 1cm margin of error. Language was
assessed using the Mullen, and scores on the social
domain of the Vineland indexed social behavior.
Results: Preliminary analyses revealed that the percent
time spent looking at the eye region during the first three
looks at age 6 months was significantly predictive of both
receptive language \[r(14) = .611, p < .010\] and social
behavior \[r(11) = .554, p < .038\] at age 18 months.
Conclusion: These findings suggest that early attention
to the eyes predicts later language and social ability at 18
months of age.
Sponsor: STAART Grant MH068172

PS4.37
HOW DO INDIVIDUALS WITH ASD USE GAZE
CUES IN PHOTOS? Megan Freeth, Danielle Ropar,
Peter Chapman, Peter Mitchell, University of
Nottingham, UK
Background: Research has shown that individuals with
ASD are not as sensitive to the social information that can
be gained from people and their direction of eye-gaze as
typically developing individuals (e.g. Baron-Cohen, 1995;
Klin et al. 2002). How are attention and memory affected
by gaze cues in photos?
Objective: To test 3 hypotheses:
1. Typically developing individuals will spontaneously
follow gaze and visually cross-reference back and forth between the person in the photo and the direction in which they are looking more than individuals with ASD. 2. Typically developing individuals will have a better memory for objects that are looked at in a scene than for other objects. This will not be true for individuals with ASD. 3. Changes made to a scene in the direction of a person’s gaze will be noticed quicker by typically developing individuals than by those with ASD.

Design/Methods:
Phase 1 - Adolescents with and without ASD were presented with a series of photos of a person looking forwards or towards an object whilst their eye-gaze was tracked.
Phase 2 - Participants were presented with a series of objects and asked whether they had been present in the set of photos displayed in phase 1.
Phase 3 - A change blindness paradigm measured how long it took participants to notice changes made to scenes. Results: Preliminary findings indicate that typically developing individuals remembered and noticed changes made to objects in the direction of gaze better than objects that were not in the direction of gaze. Data from individuals with ASD are still being collected.

Conclusion: Eye-gaze is a strong cue for attention and memory in typical individuals. We anticipate that this effect will be attenuated in individuals with ASD. Funded by: University of Nottingham, School of Psychology

PS4.38
CONTINUOUS MEASUREMENT OF INFANT AND PARENT EMOTIONAL VALENCE IN THE FACE-TO-FACE STILL-FACE PARADIGM: INFANTS AT RISK FOR AUTISM
John D. Halfigan, Daniel S. Messinger, Sy-Miin Chow, James J. Jaccard, Tao Wang, University of Miami, Coral Gables, FL

The infant siblings of children with Autism Spectrum Disorders (ASDs) are at risk for developing the ‘Broad Autism Phenotype’ (BAP). The BAP is typically described as the expression of clinically softer yet similar phenotypic behaviors that are normally observed in diagnosed autism. For example, research using expert based coding has provided initial support for the claim that the infant siblings of children with an ASD diagnosis (SIBS-A) may show deficits in emotional communicative expression relative to the infant siblings of typically developing children (SIBS-TD).

To extend the finding that SIBS-A may show deficits in emotional expression relative to SIBS-TD, we used a novel continuous rating computer program to compare non-expert ratings of perceived emotional valence in SIBS-TD (n = 17) and SIBS-A (n = 13) at six months of age. All infants were observed in the face-to-face still-face paradigm (FFSF) which is an interactive protocol used to assess the positive and negative emotional expressivity of infants. The FFSF contains three ‘episodes’ in which the parent plays with the infant for three minutes (FF), stops interacting and holds a neutral, still-face for two minutes (SF), and then resumes playing for three minutes (RE).

Results indicated that non-expert raters perceived lower positive emotional valence in SIBS-A as compared to SIBS-TD (p < .04). Interestingly, they also revealed an interaction effect such that male SIBS-A were perceived as expressing lower positive emotional valence than male SIBS-TD (p < .00). This interaction effect was not seen for females and is congruent with noted gender ratios in the prevalence of Autism Spectrum Disorders. These results suggest that SIBS-A, particularly males, show perceptible emotional communication deficits as early as six months of age, supporting the concept of the BAP.

Sponsors: NICHD, NAAR/Autism Speaks, Marino Autism Research Institute

PS4.39
LOOKING AT FACES BY ADULTS WITH ASPERGER’S SYNDROME
Salma Khan, Sebastian B. Gaigg, Dermot M. Bowler, City University (London, UK)

Background: Existing studies of face scanning by people with ASD are contradictory. Pelphrey et al (2002) found marked atypicalities in the scan paths of adults with ASD yet van der Geest et al (2002) found none in ASD children. But the two studies differed in a number of respects. ASD participants in the Pelphrey et al study had big VIQ-PIQ differences, which was not the case in the van der Geest study. Both studies also differed in the instructions they gave participants and they presented face stimuli for different lengths of time (2s vs 10s). Finally the two studies used different definitions for a visual fixation (100ms vs 200ms).

Objectives: To clarify these conflicting findings on gaze patterns in ASD by manipulating methodological differences in existing studies.

Methods: 11 adults with Asperger’s syndrome and 14 typical individuals, matched on CA and IQ took part. They were shown pictures of emotional faces for either 2 or 10 seconds and asked to either look at the faces in any manner they wished or to name the emotion depicted in the face. Scan paths were measured with a head-mounted ‘fScan’ infra-red eye-tracker.

Results: There were no group differences in the number of fixations to different face regions. Average fixation durations showed that the ASD group looked for shorter periods of time at non-essential features of the face and that this tendency was greater under the 10 second as compared to the 2 second viewing condition. Fixation durations to central features of the face (i.e. eyes, nose, mouth) did not differ between groups.

Conclusion: The findings show relatively few atypicalities in the way high-functioning adults with ASD look at facial expressions of emotion. The conflicting reports of previous studies do not appear to be the result of methodological artefacts but the possibility remains that atypical gaze behaviour is present in individuals with ASD that are characterised by large VIQ-PIQ differences.
PS4.40
ATYPICAL ATTENTION TO FACES IN CHILDREN WITH AUTISM: A CHANGE-BLINDNESS STUDY
Yukiko Kikuchi, Atsushi Senju, Toshikazu Hasegawa, Yoshikuni Tojo, Hiroo Osanai, The University of Tokyo
Background: It has been clinically observed that individuals with autism exhibit an abnormal looking behavior toward other people. However, the results of behavioral observation studies to date are conflicting and it is not clear whether individuals with autism look less at other people’s faces or not.
Objectives: Using a change blindness paradigm, we investigated whether children with autism attend less to other people’s face compared to non-facial objects.
Methods: Participants were 16 children with autism (mean 12.0 years; range 7-15 years) and 22 typically developing children (mean 11.2 years; range 7-14 years) matched on non-verbal IQ. Pairs of stimulus displays containing multiple faces and objects were presented alternately, which were exactly the same except for a single change of either face or object, and children were required speeded detection of the difference between two stimulus displays.
Results: For detection of face changes, children with autism took longer time to respond compared to typically developing children. In contrast, for detection of object changes both groups did not differ in detection latencies. Moreover, typically developing children detected the face change faster than the object change, while children with autism did not.
Conclusion: These results suggest that children with autism lack an attentional bias, which prefers other people’s faces to objects.
Sponsor: Japan Society for the Promotion of Science, 21st Century COE Program J05, "Center for Evolutionary Cognitive Sciences at the University of Tokyo."

PS4.41
EMOTION RECOGNITION IMPROVEMENTS FOLLOWING COMPUTER BASED INSTRUCTION
Paul LaCava, Ofer Golan, Simon Baron-Cohen, Brenda Smith Myles, Department of Special Education, University of Kansas
Background: Emotion recognition (ER) is a challenge for people with autism spectrum disorders (ASD).
Systemizing is a common strength.
Objectives: Evaluate whether children and youth with ASD can learn emotion and mental state recognition through systematic training, using the Mind Reading interactive multimedia software. Investigate collateral social skill behavior in natural settings.
Methods: Two studies were conducted in the United States. The first study was a pilot study, replicating a previous UK study. The second was a follow-up study, using a multiple baseline across participants design to assess both ER and social skills. Pre and post intervention testing including generalization assessment were completed in both studies.
Results: In the pilot study, after 10 weeks of using Mind Reading in a home or school setting, participants improved on basic and complex ER from faces and voices, as well as the ability to generalize this skill to novel emotional stimuli. In the second study, mixed results were found in the multiple baseline design assessment of generalization of social skills in natural settings.
Conclusions: Findings suggest that time limited computer intervention can help children and youth with ASD to improve ER. Additional strategies may be needed to assist in generalization to natural settings.

PS4.42
INFORMATION ABOUT PERSONAL CHARACTERISTICS HELPS TYPICALLY DEVELOPING ADULTS BUT NOT HIGH-FUNCTIONING ADULTS WITH ASD TO RECOGNIZE FACES
Eva Loth, Brad Duchaine, Francesca Happe, University of Cambridge
Background: Whereas current evidence of overall face perception deficits in autism spectrum disorders (ASD) is mixed, several indicators suggest that people with ASD use atypical strategies to recognize faces. Studies with typically developing (TD) adults suggest that we remember novel faces easier when we know something about the person "behind" the face.
Objective: To examine the role of personal information in recognizing faces.
Method: We adapted the Cambridge Memory Test for Faces (Duchaine & Nakayama, 2006) to compare face recognition between two conditions: In the study phase, faces of 6 young men were either introduced along with personal information or were presented on their own. After 10 min delay, over 72 trials, participants were required to identify the target faces among two other distracter faces. Participants were 14 adults with ASD (mean age: 26.5, mean FIQ: 100.2) and 14 TD adults (mean age: 23.8, mean FIQ: 123).
Results: 1. The ASD group showed overall significant impairments in face recognition. 2. The control group but not the group with ASD recognized significantly more faces when they had memorized them together with personal information. (TD group: d=.53: ASD group: d=.06). These results remained unchanged after controlling for IQ differences.
Discussion: Above and beyond overall striking face perception deficits in high-functioning adults with ASD, our findings suggest distinct abnormalities in underlying processes. These findings are both consistent with the notion of diminished social interest in ASD, and suggest reduced top-down influences. We discuss implications for intervention and for potential abnormalities at the neuro-functional level.
Sponsor: ESRC
PS4.43
USING SELF REPORT TO ASSESS EMOTION PROCESSING IN ADOLESCENTS WITH AND WITHOUT AUTISM SPECTRUM DISORDERS
Anita Jayne Sarah Marsden, Catherine Jones, Jeni Tregay, Francesca Happé, Gillian Baird, Emily Simonoff, Andrew Pickles, Tony Charman, Institute of Child Health, University College London
Background: Difficulties in understanding and processing emotions is a well known feature of autism spectrum disorders (ASD). It has recently been found that adults with ASD are impaired when identifying and describing their own emotions and are more depressed than controls (Hill, Berthoz and Frith 2004).
Objectives: To use self report questionnaires to investigate emotional processing and mental health in a sample of adolescents with and without ASD.
Method: Questionnaires were administered to adolescents (14–16 years old) with and without ASD. A range of self report measures were administered, including: Toronto Alexithymia Scale-20 item (TAS-20); Adolescent Wellbeing (Birleson Depressions Self-rating Scale); State-Trait Anxiety Inventory for Children (STAIC).
Results: Data collection is still in progress. We will report findings on the data collected so far, comparing adolescents with and without ASD on all 3 measures of self report.
Conclusion: The results will extend previous findings and contribute to our understanding of emotion processing and mental health in adolescents with and without ASD.
Sponsor: Medical Research Council, UK

PS4.44
DISRUPTED FACIAL MIMICRY IN AUTISM: PRELIMINARY PHYSIOLOGICAL DATA DURING DYNAMIC EMOTION PERCEPTION
Matthew A. Mumaw, Tricia Z. King, Diana L. Robins, Georgia State University
Background: Individuals with autism spectrum disorders (ASD) often have difficulty perceiving nonverbal emotional cues (e.g. facial expression, tone of voice, body posture) which contributes to significant impairment in social relatedness. Previous research has shown that typically developing individuals exhibit automatic facial mimicry (as measured by facial EMG) when viewing static, emotional pictures (Dimberg, 1982), but these psychophysiological responses are absent in ASD (McIntosh et al., 2006).
Objectives: To replicate previous psychophysiological findings of impaired automatic facial mimicry in an ASD sample utilizing more realistic, dynamic audio-visual stimuli.
Methods: Individuals with ASD were recruited from parent support groups. Participants underwent a dynamic emotion perception task in which they judged the emotions expressed in short video clips containing facial expressions and affective prosody. For each trial, instructions to judge emotion (e.g. Angry: Yes or No?) appeared for 3 seconds, followed by the movie and 3 seconds response time. EMG sensors recorded facial movements on bilateral zygomatic and corrugator muscles during stimulus and response periods.
Results: Data were collected on a preliminary sample of 3 individuals with ASD and 9 typically developing individuals. Whereas typically developing individuals demonstrated the expected increase in corrugator response to angry stimuli and increased zygomatic response to happy stimuli, the ASD group failed to show significant increases in muscle activity in response to the stimuli. The two groups did not differ in their accuracy when making judgments about emotion.
Conclusion: Preliminary results of this study are consistent with previous research using static images and suggest a deficit in automatic emotional mimicry in individuals with ASD. The role of automatic facial mimicry in emotion perception will be discussed.
Sponsor: Georgia State University Brains & Behavior Program

PS4.45
DO YOU SEE A FACE? NEURAL CORRELATES OF FACE PERCEPTION IN ADOLESCENTS WITH AND WITHOUT AUTISM
Audrey Lauren Quinn, Sara Jane Webb, University of Washington
Background: Mooney stimuli are black and white abstract representations of faces that are commonly perceived as faces when shown upright. For typical adults, the amplitude and latency of the N170 ERP component in response to Mooney stimuli is related to both the stimulus orientation and the conscious perception of a face. Children and adults with autism (ASD) demonstrate disrupted processing of faces and a lack of an inversion effect for intact pictures of faces.
Objectives: This study assessed the role of conscious face perception on the amplitude and latency of ERP components that represent attention and face perception.
Methods: ERPs were collected from 27 typical adolescents and 28 adolescents with ASD while subjects were presented with upright and inverted Mooney face stimuli. Subjects responded to each stimulus by pressing one of two buttons, signifying either the perception of a face or no face.
Results: There were no significant differences between the two subject groups in the percent of stimuli recognized as faces. When upright Mooney stimuli were recognized as faces, both the P100 and N170 components were more positive and of slower latency in adolescents with ASD in comparison to controls. The teens with ASD also demonstrated a slower P100 latency for inverted Mooney stimuli recognized as faces.
Conclusion: Individuals with ASD not only differ in responses to normal faces, but also when top-down resources are dedicated to making a decision about the face-like characteristics of more ambiguous stimuli.
Sponsor: Cure Autism Now

PS4.46
FINDING THE STARE AMONG THE FACES: THE MECHANISM OF EYE CONTACT PROCESSING IN CHILDREN WITH AUTISM
Atsushi Senju, Yura
Background: Atypical mutual gaze behaviour is one of the main characteristics of autism spectrum disorder. However, empirical evidences are conflicting and it is difficult to describe the mechanism underlying the atypical eye contact behaviour in autism.

Objectives: To test whether the facial processing would affect eye contact detection in children with and without autism.

Methods: Participants consisted of 14 children with autism (8.3-14.8 years) and 27 typically developing children (9.5-15.2 years) in Experiment 1, and 22 children with autism (7.7-15.1) and 30 typically developing children (7.3-14.8 years) in Experiment 2. Both experiments adopted the same visual search paradigm, except for that only eyes were presented in Experiment 1 but whole faces were presented in Experiment 2. Children detected a target with either direct or averted gaze, which were presented among the distracters. Stimuli were presented right side up in half of the trials and upside-down in the other half.

Results: In both Experiments, the targets with direct gaze were detected faster and more effectively (i.e. shallower search slope) in both groups of children. Although the eye orientation made no effect in Experiment 1, in Experiment 2 the face orientation affected performance only in children with autism. It was because the search asymmetry preferring the targets with direct gaze was more prominent in upside down faces than in upright faces that in autism. Typically developing children seemed to show the opposite pattern but it did not reach significance.

Conclusion: Children with autism, as well as typically developing children, were faster to detect direct gaze compared to averted gaze. However, unlike typically developing children, their sensitivity to the direct gaze seems to rely on the local feature of the eyes rather than the facial context.

Sponsors: Japan Science and Technology Agency, Japan Society for the Promotion of Science

**PS4.47 EARLY DIAGNOSIS COULD REDUCE PARENTING STRESS**

_Caitlin Allen, Alan Lincoln, Bryna Siegel, St. Jude Children’s Research Hospital_

Background. Parents of children with autism report chronically high levels of stress. Objectives. The purpose of this study was to identify factors related to parental stress and the diagnosis of autism.

Methods. Eighteen mother-father dyads with a child with autism were interviewed regarding the length of time from their first suspicion of a developmental concern to the time of their child’s diagnosis with autism. The Parenting Stress Index was administered to provide information regarding their current experience of stress, and the Family Crisis Personal Evaluation Scales were administered to provide information about parental coping styles.

Results. The length of time between first suspecting something was wrong with their child and receiving a formal diagnosis of autism was strongly positively correlated with the amount of stress reported by mothers, but not fathers, even several years after the formal diagnosis. Parents reported first suspecting something was wrong with their child’s development at a mean age of 23 months but did not receive a formal diagnosis until their children were a mean age of 37 months old. The longer mothers reported suspecting something was wrong with their child’s development without receiving a formal diagnosis of autism, the higher their reported stress level (r = 0.47, P < .05). Parents used passive appraisal, a coping strategy that minimizes reactions to problems, as their primary coping strategy. Parents who used reframing as a coping strategy were less likely to report marital problems (r = 0.5668, P < .01). Mothers who used reframing reported feeling more competent as parents (r = 0.5527, P < .01).

Conclusion. Early diagnosis of autism is dependent on listening to parents’ concerns about their child’s development. Not only does early diagnosis improve the child’s prognosis by making earlier intervention possible, but the findings from this study also suggest that early diagnosis can reduce parental stress.

**PS4.48 SOCIAL-EMOTIONAL TECHNOLOGIES FOR ASD**

_Rana el Kaliouby, Rosalind W. Picard, Alea Teeters, Matthew Goodwin, MIT Media Laboratory_

This presentation will describe a collaborative project between the Massachusetts Institute of Technology Media Laboratory and the Groden Center to develop and evaluate wearable social-emotional technology that helps individuals with high-functioning autism and/or Asperger syndrome acquire an affinity for the social domain and improve their overall social abilities. The project is developing the first wearable camera system capable of perceiving and visualizing social-emotional information in real-time human interaction. Using a small wearable camera and video-pattern analysis algorithms, the system analyzes video of the wearer or interaction partner and tags it at multiple granularities (facial actions, communicative facial/head gestures, and emotions). The wearable system aims to: (1) facilitate learning and systemizing of social-emotional cues; (2) promote self-reflection and perspective-taking; (3) allow wearers to study subtle nonverbal cues and share experiences with peers, family members, and caregivers; and (4) contribute new computational models and theories of social-emotional intelligence in machines. An ongoing clinical study will be described that compares the efficacy of the wearable system to current gold standard interventions for autism spectrum disorders (ASD).
PS4.49
EXPLORING CULTURAL FACTORS IN AUTISM SPECTRUM DISORDERS Themba M. Carr, Rosalind Oti, Somer L. Bishop, Deborah Anderson, Catherine Lord, University of Michigan Autism & Communication Disorders Center

Background: There is little known regarding the experiences of African American families caring for a child with Autism Spectrum Disorder (ASD).

Objectives: To identify protective and risk factors that contribute to the experiences of African American families caring for a child with ASD.

Methods: Data were collected as part of the Early Diagnosis Study, a longitudinal study of children with ASD. Participants were consecutive referrals to four different regional state-funded sites (TEACCH centers) in North Carolina and an autism center in Chicago and were assessed at ages 2, 3, 4, 5, 9 and 14 using standardized instruments including the ADI-R and ADOS. Parents of participants were interviewed and asked to complete a number of questionnaires including the Child and Adolescent Impact Assessment interview and the Aberrant Behavior Checklist.

Results: Data are collected on 185 children with ASD (mean age=15.1 years) and their families. 58 of the families are African American and 127 are Caucasian. Preliminary analyses indicate differences in cultural influences between African American and Caucasian families, impacting factors such as social support, mother’s well-being, level of treatment received, and social outcome.

Conclusion: Preliminary findings of this study suggest differences in the experiences of African American families caring for a child with ASD from Caucasian families and highlight the importance of developing diagnostic and treatment programs that are culturally sensitive.

Sponsor: NICHD through the CPEA network, NIMH

PS4.50
PARENTAL ATTRACTIONS AND SOCIAL-EMOTIONAL DEVELOPMENT IN HIGHER FUNCTIONING CHILDREN WITH AUTISM Drew Carson Coman, Nicole E. Zahka, Annie P. Inge, Courtney P. Burnette, Peter C. Mundy, University of Miami

Background: There is currently a paucity of research on the effects of family factors on the social-emotional development of higher functioning children with autism (HFA).

Objectives: To clarify the role of negative, positive, and neutral attributions and their relation to the HFA child’s social-emotional development as well as investigate possible group differences between HFA and typically developing children (TD). Further, the study investigated possible relations between parental attributions and the parent’s own report of their child’s emotional symptoms.

Methods: A sample of 37 HFA children and 37 TD children, along with their parents, were recruited from the University of Miami Center for Autism and Related Disabilities, the Psychological Services Center and Miami Dade Public Schools. Participating parents completed two diagnostic screening questionnaires, the ASSQ and the SCQ, to confirm diagnosis of an autism spectrum disorder. Parents also completed a behavioral assessment questionnaire called the BASC-PRS and an interview known as the FMSS.

Results: A 2 x 3 repeated measures analysis of variance indicated a significant quadratic interaction between diagnostic group and attribution scores, F(1,72) = 6.33, p < 0.05. Post-hoc tests indicated that parents of HFA children made a significantly higher number of neutral attributions than the parents of TD children, t(50.696) = 3.120, p < 0.01, Cohen’s d = 0.77. A significant correlation was also found between the number of negative attributions made by the parents of HFA children and their report of externalizing symptoms, r(35) = 0.47, p < .01.

Conclusion: The parents of HFA children made significantly more neutral attributions than the parents of the TD children and the number of negative attributions was correlated with three subsets of the externalizing symptoms. This may have salient treatment implications for children with autism.

Sponsor: NIMH

PS4.51
STRESS AND BURDEN OF CARE IN PARENTS OF PRESCHOOLERS WITH AUTISM SPECTRUM DISORDER (ASD). Melanie Couture, Emmanuelle Jasmin, Erika Gisel, Eric Fombonne, Montreal Children’s Hospital McGill University

Parents who receive their child’s new diagnosis of autism spectrum disorder (ASD) are more stressed than parents of children with other disabilities. Which factors contribute to this increase in stress is poorly understood.

Objective: To determine which factors are significant contributors to parental stress in 35 families with a preschooler newly diagnosed with ASD.

Measures: Children 3 to 4 years old were diagnosed using the ADI-R and ADOS-G. Other tests administered were cognition: Merrill-Palmer-II, language: PLS-4, sensory processing: Sensory Profile, motor: PDMS-II, adaptive behavior: VABS-II, burden of care: WeeFIM, and the Parent Stress Index.

Results: Correlations revealed that poor performance of children in daily living skills is an important contributor to parental stress (r=-.528; p=.003) more so than the burden of care (r=-.427; p=.023). Poor motor skills are also related to parental distress (gross motor r=-.496; p=.004 and fine motor r=-.492; p=.005), whereas poor sensory behavior is related to the perception of the child as being difficult (r=-.639; p=.0001). Expressive language skills are related to parental distress (r=-.392; p=.032), but the cognitive level of the child is not. Regression analyses revealed that the best predictors of parental distress were gross motor, expressive, and cognitive skills (adjusted R²= .638; p = .011). The best predictor for parent-child interaction was the daily living skills score (adjR2=.412; p=.0001). The best predictors of a perceived difficult child were the total Sensory Profile score and PLS-4...
auditory score (adjR2=.524; p=.019).

Conclusion: Following the diagnosis of a child with ASD, parents seem to need support regarding the development of their child. Daily living skills, motor and sensory issues are areas suited for intervention to help parents cope with their stress.

**PS4.52**

AUTISM SEVERITY AS PREDICTOR OF PARENT SENSE OF COMPETENCE AND EMOTIONAL AVAILABILITY; MODERATED BY SOCIAL SUPPORT Julie M. Davies, Seattle Pacific University

Rationale: One of the greatest struggles children with autism face is in the area of emotional competence. Deficits in this area would be expected to impact not only the child but also the family system. As a child is guided toward development by an active parent, a parent is guided toward competence through the influence of the child. Poverty of child expression and response may predict low parent sense of competence as measured by self-efficacy and satisfaction (Johnston & Mash, 1989). This in turn may affect the level of emotional availability the parent is able to sustain toward the child (Biringen & Robinson, 1991). Prior research suggests additional time for concept formation is often necessary for children with autism to activate experiential learning. It would thus be imperative to prevent diminished effort from parents as a result of negative feedback or stress. Social support theory suggests effective intervention may be in the form of a more satisfactory social network. Instead of accessing social resources, families of children with developmental disabilities have been shown to rely on personal coping strategies that deplete family resources (Schilling, Gilchrist, & Schinke, 2001).

Concept analysis: A theoretical model incorporating autism severity, a developmental-structuralist model of emotional development (Greenspan & Porges, 1984), self-efficacy theory (Bandura, 1982), emotional availability (Biringen, 2000), and social support (Dunst, Trivette, & Cross, 1986) is proposed.

Implication: Strengthening social support networks among families impacted by autism is an intervention strategy that has the potential of benefiting family systems in multiple ways and is a promising direction for further exploration.

Sponsor: Autism Spectrum Treatment and Research (ASTAR) Center, Seattle, WA.

**PS4.53**

ASSOCIATIONS OF MOTHER-CHILD INTERACTION WITH 1-YEAR LANGUAGE AND SOCIAL-COMMUNICATION GAINS IN TODDLERS WITH AN AUTISM SPECTRUM DISORDER Shulamite A. Grossman, Alice S. Carter, Karen Wachtel, Boston University

Background: Maternal behaviors including synchrony, responsiveness, and directiveness predict language and social-emotional gains in typical and developmentally delayed children. There is also evidence that they predict similar gains in toddlers with autism spectrum disorders (ASD).

Conclusion: Findings emphasize the importance of parenting behaviors for optimal development in social-communication and atypical behaviors in toddlers with ASD, and thus have important implications for clinical practice.

Sponsor: NIMH

**PS4.54**

A CRITICAL REVIEW OF COPING IN MOTHERS OF CHILDREN WITH AUTISM Paula S. Hutchinson, Susan E. Bryson, IWK Health Centre

Background: For many years, maternal stress has been a major focus of research on autism. Findings indicate that mothers experience clinically high levels of stress, and that maternal stress is negatively associated with child outcomes, fathers’ well-being and sibling relationships (Hastings & Beck, 2004). However, recent research suggests that some mothers cope well and report positive benefits from raising a child with autism. Objectives: Our main goals are to review the literature on maternal coping, and to identify factors associated with positive health outcomes in mothers of children with autism. We also highlight conceptual and methodological considerations for future research.

Methods: Searched PsycINFO, Pubmed and Cinahl databases (1980-2006) using the terms coping and autism. The 15 papers selected for review included comparison groups and/or measures of maternal coping and health or well being. Extracted information is evaluated for the: (1) theoretical framework adopted, (2) sample characteristics,
(3) design and methods, including measures of coping, health or well-being, and (4) main findings and conclusions.

Results: Findings indicate that mothers’ use a range of cognitive, emotional, and behavioral coping strategies. Mothers who use problem solving and reappraisal strategies report fewer child behavior problems, more supports and better well-being. Mothers who report high stress and/or depression tend to employ emotion-focused coping and avoidance.

Conclusion: Evidence is provided for the importance of coping in predicting better maternal health outcomes, although the mechanisms by which effective coping is realized remain unclear. Prospective and intrapersonal research on maternal coping may provide data relevant to optimizing health outcomes.

PS4.55
MENTAL HEALTH PROBLEMS AMONG PARENTS OF CHILDREN WITH AUTISM: A PRELIMINARY INVESTIGATION Keiko Notomi, Department of Special Education, Fukuoka University of Education

Background: Previous studies have reported evidence of poor mental health among parents of children with autism.

Objectives: Compare maternal and paternal mental health among Autism and Control families.

Methods: The mental health of 20 married couples living in Fukuoka Prefecture, Japan, who were the biological parents of school-aged children with autism, was assessed using the General Health Questionnaire. Their scores were compared with those of 25 parents of typically-developing children.

Results: The mean GHQ total scores and scores for anxiety/insomnia were significantly higher in the index mothers than those of the controls. In contrast, there were no significant differences between the index and control fathers. The index mothers with poor mental health showed less satisfaction with emotional and substantial support from others and with their living environment.

Conclusion: Preliminary findings of this study support poor mental health among mothers of school-aged children with autism in Japan and suggest mother’s satisfaction with support may be associated with maternal mental health.

Sponsor: None

PS4.56
PREDICTING THE ADJUSTMENT OF SIBLINGS OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS: CONTRIBUTIONS OF WIDER AUTISM PHENOTYPE AND FAMILY VARIABLES Sarah E. O’Kelley, Laura G. Klinger, The University of Alabama

Background: Previous research is mixed regarding the potential impact of being a sibling of an individual with an Autism Spectrum Disorder (ASD).

Objectives: Explore the relation between sibling maladjustment, sibling broader autism phenotype (BAP), parental stress, and proband severity in families of individuals with ASD or Down syndrome (DS). It was predicted that the addition of BAP to a model of sibling adjustment would clarify existing perceptions of sibling outcome, specifically that siblings with maladjustment would rate higher on measures of BAP.

Methods: Families were recruited through parent support groups across the United States. 57 caregivers of individuals with ASD and 54 caregivers of individuals with DS completed measures of functioning in siblings (Social Communication Questionnaire, Children’s Social Behavior Questionnaire, Behavior Assessment System for Children), probands (SCQ, Scales of Independent Behavior), and caregivers (Parenting Stress Index). Results: Groups did not differ on measures of maladjustment or BAP for siblings, with siblings in both groups rated as relatively well-adjusted. However, a subgroup of siblings exhibited significant adjustment difficulties and broader phenotype symptoms. Clinically significant levels of parental stress were noted for both groups, with parents of individuals with ASD reporting higher levels of proband-related stress than parents of individuals with DS. Contrary to the hypothesis, BAP was not the best predictor of sibling maladjustment. Across groups, sibling adjustment was better when the sibling had lower BAP, fewer parent-child interaction problems, and decreased age difference between sibling and proband.

Conclusion: Results contribute to the evolving description of the sibling experience and suggest that interventions should focus on the proband, the parents, and siblings as individuals as well as include family-based approaches.

Sponsor: UA Graduate School

PS4.57
PARENTS’ HOPE, JUST WORLD BELIEF AND DECISION MAKING FOR CHILDREN WITH AUTISM SPECTRUM DISORDER Tana Todd Olson, Seattle Pacific University

Background: There are multiple avenues of treatment for autism that require decision making. Little research exists that specifically examines parents’ decision making influenced by beliefs and hope for children diagnosed with autism spectrum disorders. Taking into consideration the many facets of decision theories, most compelling is Image Theory which provides a descriptive psychological theory of decision making which takes into account intuitive and automatic decision making (Mitchell & Beach 1990).

A theoretical model of decision making influenced by hope and belief in a just world is proposed based on Image Theory. IT asserts the idea that a cognitive adaptation takes place through a process where decisions are shaped by three kinds of images which are defined as schematic knowledge structures. In the case of parents making decisions for their child with autism spectrum disorder, the value image is the aggregate of a person’s principles, beliefs and values. The trajectory image is composed of elements of previously conceived goals a
parent may have for their child and play a role in guiding future orientation and goal agendas. The third image is an intentional image where the components are the plans adopted to achieve the goals (trajectory image) the parent has in mind. A parent’s internal locus of control will moderate this decision making process.

Objectives: Understanding decision making utilizing Image Theory and the influence of hope and belief in a just world can aid a parent in the process of making choices that best serve their children.

Theoretical Implications: Parental decision making utilizing the theoretical model of Image Theory, hope and belief in a world and moderated by internal locus of control may be predictors for future satisfaction with parental decisions made for children with autism spectrum disorders.

Sponsor: ASTAR-Autism Spectrum Treatment and Research Center, Seattle, Washington

PS4.58

A CONCEPTUAL MODEL FOR TREATMENT UTILIZATION BEHAVIOR AMONG PARENTS OF CHILDREN WITH ASD

Rachel K. Petrak, University of Michigan

Parents of children with ASD are utilizing myriad treatments, many lacking a basis in research. Green et al (2006) found that families employ an average of 7 different treatments simultaneously for their child with ASD. These parents continuously face a complex and high-stress decision making process when choosing interventions across their child’s lifespan (Green et al, 2006; Trepagnier, 1999). Little has been documented about how parents navigate this web of treatment decisions.

The Theory of Planned Behavior (TPB) (Ajzen, 1991) describes the factors and process that lead to the adoption of a set of behaviors. In parents’ management of their child’s ASD, treatment utilization centers around the adoption of a set of interventionist behaviors by the parent. The TPB accounts for many of the most important variables and relationships affecting parents’ management of their child’s ASD. A conceptual model based on the TPB is proposed to explain treatment utilization behavior in parents of children with ASD.

This model is an attempt to address the lack of literature on the treatment utilization behavior of parents managing their child’s ASD. Intervention for ASD often involves parents adopting complicated intervention-specific behavior sets. The TPB addresses this and provides an excellent framework to base a description of parents’ treatment utilization behavior. The process described in this conceptual model is one that parents undergo repeatedly throughout their child’s life, underscoring the importance of investigating the strength of the relationships proposed in this model with empirical testing.

PS4.59

INFLUENCE OF ENVIRONMENTAL FACTORS ON PARTICIPATION OF CHILDREN WITH AUTISM IN HOME ACTIVITIES

Divya Sood, Patti LaVesser, Washington University in St. Louis, School of Medicine

Background: Participation in home, school and community activities require children to interact with their physical and social environment. Children with autism spectrum disorder (ASD) are at a risk of lower participation in these activities.

Objectives: To identify the key factors in the home environment that influences the participation of children with ASD in home activities by examining the relationship between participation of children, home environment and parenting stress.

Methods: Children with a diagnosis of ASD ages 3 to 6 years and who had participated in previous Washington University studies were recruited for the study. The Preschool Activity Card Sort (PACS) and the Home Observation for Measurement of the Environment (HOME) assessments were performed in the child’s home in the presence of the parents. The parents filled out a demographic questionnaire, Parenting Stress Index (PSI) and Social Responsiveness Scale (SRS). SRS was used to establish the severity of autism symptoms in the child.

Results: There were 22 boys and 4 girls ages 45 to 78 months in the study. Significant correlations were found between parenting stress, the characteristics of the home environment and participation patterns of children in home activities. Based on multiple regression analysis, the variance in participation in low demand leisure activities of children with autism was predicted by the availability of the learning materials in the home and the parenting stress after controlling for the severity of child diagnosis.

Conclusions: The results indicate that environment factors do contribute to a child’s ability to participate in home activities.

Sponsor: Department of Occupational Therapy, Washington University School of Medicine, St. Louis, MO.

PS4.60

PARENTAL ATTITUDES, FAMILY FACTORS, AND THE ROLE OF ATTRIBUTION IN THE EMOTIONAL AND SOCIAL DEVELOPMENT OF HIGHER FUNCTIONING CHILDREN WITH AUTISM

Nicole Elyse Zahka, Drew Carson Coman, Anne Prudella Inge, Nicole Marie Kojkowski, Camila Hileman, Caley B. Schwartz, Justin Dainer-Best, Amy Weisman de Mamani, Heather Henderson, Peter C. Mundy, University of Miami

Background: The study of comorbidity in children and adolescents with Higher Functioning Autism (HFA) or Asperger Disorder (AD) is an area of significant import, as higher rates of internalizing disorders and externalizing disorders exist in this population.

Objective: To investigate the relations between family factors and HFA children’s social-emotional development.
Methods: Participants were recruited from the University of Miami Center for Autism and Related Disorders database. Parents completed questionnaires on their child’s social and emotional development. The Five Minute Speech Sample (FMSS) was used to assess the parent’s attitude toward their HFA child. A method of coding attributional statements was developed based on Weisman (1998).

Results: Data were collected on 20 children (19 males) diagnosed with HFA, AD, or PDD-NOS - mean age=147.60 (33.91) months and mean WISC-IV Verbal Comprehension Index=95.55 (18.34). A rating of high expressed emotion was related to increased externalizing problems, as rated by the parent on the BASC (r=.54, p<.05). A positive correlation was found between FMSS Statements of Attitude and two scales from the Social Responsiveness Scale (SRS) indicating impaired social awareness (r=.58, p<.01) and communication difficulties (r=.47, p<.05). The number of FMSS positive attributions was associated with the SRS communication difficulties subscale (r=.47, p<.05). The number of FMSS neutral attributions was associated with child report of depressive symptoms on the BASC (r=.59, p<.05). The Family Environment Scale- Cohesion subscale was associated with child self-report on the BASC subscales of Social Stress (r=-.68, p<.05) and Anxiety (r=-.66, p<.05) such that higher cohesion was associated with lower reported social stress and anxiety.

Conclusion: These results provide preliminary support for the importance of the family environment in considering the development of comorbidity in children with HFA.

Sponsor: NIMH

PS4.61 VIDEO GAME PLAYING IN THE AUTISM SPECTRUM POPULATION
Gary Stobbe, Julie Davies, Kim Renner, Autism Spectrum Treatment and Research Center

Background: Studies show adolescents play video games on average 40-120 minutes per day. 90% of all video games contain violent content, and studies have supported a relationship between long-term exposure to violent video games and decreased empathy in children and adolescents. Studies have also demonstrated the potential clinical use of video game playing with improvements seen in reaction time in the general population as well as impulsivity in individuals with ADHD. Observations by parents and clinicians have suggested a large number of individuals with autism spectrum disorder (ASD) demonstrate a hyper-focused interest in playing video games, however, to our knowledge, no data exists on the video game playing patterns and preferences in the ASD population. Video game playing has the potential for both a positive and negative impact on the social, emotional, and cognitive development of children and adolescents with ASD.

Objective: Compare the amount of free time spent playing video games by ASD adolescents as compared to the normal population.

Method: A survey was conducted of 60 individuals with ASD (ages 12 to 18) selected randomly from our clinical database (seen previously as patients). Subjects were excluded for co-morbidity with other major neurological or genetic disorders prior to inclusion. Participation by the subject and parent/caregiver was voluntary. The same survey was conducted of age-matched normal adolescents selected from a local private school and used as a control group. The amount of free time spent playing video games was evaluated both on an absolute basis as well as a percentage of total free time available. Preliminary exploration into patterns of preferences to specific video game types as well as variability of game types played was conducted.

Results and Conclusion: Results from this survey will be presented. Strengths and weaknesses of the methodology and implications for future research will be discussed.

PS4.62 AN EMERGING GABA/GLUTAMATE HYPOTHESIS OF CEREBELLAR DYSFUNCTION IN AUTISM
Gene Blatt, Jane Yip, Jean-Jaques Soghomonian, Elizabeth Whitney, Sandy Thevarkunnel, Margaret Bauman, Thomas Kemper, Boston University School of Medicine

Background: There is a tight synaptic relationship between the cerebellar Purkinje cells (PCs) and olivocerebellar climbing fibers (OCFs) from the inferior olivary complex (IOC). Prior stereological and immunocytochemical studies of these components of the cerebellar complex have shown abnormalities in autistic brains.

Objective: We propose that these abnormalities lead to compensatory changes in two key neurotransmitter systems in the cerebellar cortex, GABA and glutamate, and that these neurochemical perturbations could provide a viable hypothesis to account for cerebellar dysfunction in autism.

Methods: The data from stereological studies from the IOC and PCs, immunocytochemical studies of OCFs, ligand binding studies on GABA and glutamate receptors and in situ hybridization experiments on GAD 65 & 67 (rate-limiting synthesizing enzymes for GABA) in cerebellar neurons are combined to demonstrate abnormalities in the cerebellar circuitry in autism.

Results: Abnormal glutamate innervation of PCs by OCFs likely results in increased GAD 67 mRNA in basket cells and a down regulation of AMPA, GABA-A and benzodiazepine binding sites in the cerebellar cortex. This in turn likely produces decreased GAD 67 mRNA in PCs which results in decreased inhibitory innervation of dentate neurons of the cerebellar nuclei (CN) where a subpopulation of CN cells contain altered levels of GAD65 mRNA. The CN provides the cerebellar projection to the forebrain and inhibitory feedback to the IOC.

Conclusion: An emerging hypothesis is that a disruption in the normal OCF input to PCs triggers off a cascade of neurochemical events could result in abnormal cerebellar output to higher cerebrocortical areas, affecting motor and cognitive behaviors in autism.
Support: Tissue from the Autism Tissue Program and The Autism Tissue Foundation. Grant support from NIH NICHD HD39459, Cure Autism Now Foundation, the Institute for Brain Potential and the Hussman Foundation (all GB, P.J).

PS4.63
NUCLEUS OF FACIAL NERVE AND NUCLEUS OLIVARIS INFERIOR IN AUTISTIC AND CONTROL BRAIN
Objective: To test the hypothesis that autism is associated with developmental abnormalities in brainstem nuclei.
Methods: Nucleus of facial nerve was examined in 10 brains of subjects who had autism (4-32 years of age) and 9 brains of control subjects (4-59 y). The n. olivaris was examined in the brains of 7 subjects who had autism (4-67 years of age) and 5 controls. 0.2-mm-thick serial sections and 3-D reconstruction were applied to evaluate the volume of examined structures. The number of neurons was estimated with unbiased dissector method.
Results: The volume and the total number of neurons of the facial nerve nucleus of the autistic brains did not differ significantly from those of the control brains (6.8 vs 6.3 cubic mm, and 31.5 vs 27.4 thousand, respectively). Also, the number and the number of neurons of the nucleus olivaris inferior principalis were similar in the autistic and control brains (69.8 vs 74.0 cubic mm, and 1.4 and 1.5 million, respectively).
Conclusion: The finding of a lack of difference in the volume and number of neurons in the facial nerve nucleus and n. olivaris inferior between autistic and control subjects fails to support the hypothesis that autism is associated with developmental abnormalities in these brainstem nuclei.
Sponsor: NAAR-Autism Speaks and the NYS Office of Mental Retardation and Developmental Disabilities.
Tissues were provided by Harvard Brain Tissue Resource Center (PHS grant number R24-MH 068855), and from the Brain and Tissue Bank for Developmental Disorders at the University of Maryland, Baltimore, Maryland.
Tissue acquisition and distribution was coordinated by the Autism Tissue Program

PS4.64
ALTERED GABA-A RECEPTOR BINDING IN THE ANTERIOR CINGULATE CORTEX IN AUTISM
Adrian Oblak, Sandy Thevarkunnel, Terrell Gibbs, Margaret Bauman, Thomas Kemper, Gene Blatt, Boston University School of Medicine
Background: The anterior cingulate cortex (ACC; BA 24) is characterized by intricate connectivity and a role in mediating executive function, affect, and socio-emotional behavior. Neuropathology and neuroimaging studies have found BA 24 to be abnormal in autism. Multiple lines of evidence, including alterations in GABA receptors and genetic studies in autistic patients, indicate that the GABA system, may be involved in the disorder.
Objective: To determine the density and distribution of GABA-A and benzodiazepine binding sites in the anterior cingulate cortex in adult autistic and control cases.
Methods: Multiple concentration radioligand binding experiments were completed in the ACC for GABA-A receptors (3H-Muscimol) and benzodiazepine (3H-Flunitrazepam) binding sites in adult autistic (n=7) and control (n=9) brains matched for age, PMI, and gender. Optical densities were measured in the superficial and deep layers using the Inquiry program. Student t-tests were used to compare the layers by group.
Results: There was a significant reduction in the number of GABA-A receptors (Bmax) in the superficial (p=0.01) and deep (p=0.02) layers of the ACC with no difference in binding affinity (Kd). Furthermore, a reduction in the density of benzodiazepine binding sites was observed in the superficial (p=0.01) and deep (p=0.01) layers, with no change in binding affinity.
Conclusion: The decrease in GABA-A and benzodiazepine receptors provides quantitative evidence for the involvement of the GABA system in the pathology of the ACC in autism and may in part underlie some of the social-affective behavioral alterations observed in this disorder.
Tissue was provided by the Harvard Brain Tissue Resource Center and the Autism Tissue Program. Supported by NIH STAART U54 MH66398.

PS4.65
AUTISM PREVALENCE AND RESPIRATORY DEPRESSION AT BIRTH
Eileen Nicole Simon, Conrad Simon Memorial Research Initiative
Background: Delay in initiating respiration at birth has been reported in children who later developed autism.
Objectives: Compare statistics on respiratory depression at birth with those for increased prevalence of autism.
Methods: Review of the literature on (1) the effects of oxygen insufficiency at birth, (2) traditional versus current obstetric practice, (3) transition from fetal to neonatal respiration, (4) statistics on delayed pulmonary respiration at birth, and (5) reports of perinatal complications associated with autism.
Results: (1) Experiments on asphyxia at birth in monkeys demonstrated that a brief lapse in respiration at birth damages nuclei in the brainstem, most prominently in the auditory pathway. (2) Traditional textbooks taught that the umbilical cord should not be cut until pulmonary respiration was established. The current protocol is to clamp the cord within 30 seconds after birth. (3) Transition from fetal to neonatal respiration requires filling of the capillaries surrounding the alveoli before carbon dioxide can be exchanged for oxygen. This may take several minutes. (4) Most infants breathe within 30 seconds of birth, but in 5.2 to 6.2 per 1000 births, delay in establishing respiration at birth has become a frightening dilemma. (5) Perinatal complications are among the many
medical problems associated with autism, and the statistics for respiratory depression at birth are similar to those reported in recent epidemiological studies of autism prevalence.

Conclusion: Investigations of increased prevalence of autism must include review of current childbirth practices and the effects of asphyxia at birth on the auditory system of the brain.

Sponsor: Conrad Simon Memorial Research Initiative

PS4.66
FEWER AND SMALLER NEURONS IN THE FUSIFORM GYRUS IN AUTISM
Imke van Kooten, Herman van Engeland, Patrick Hof, Harry Steinbusch, Christoph Schmitz, Dept. Neuroscience., Maastricht University, Maastricht, Netherlands

Background: Abnormalities in face perception may be a core feature of social disabilities in autism. Recent functional magnetic resonance imaging studies show that autistic patients can perform face perception tasks. However, the temporal fusiform gyrus as well as other cortical regions supporting face processing in controls are inactive in autistic patients. The neurobiological basis of this phenomenon is unknown.

Objective: To test the hypothesis that the fusiform gyrus shows specific alterations in neuron density, total neuron number and mean perikaryal size in autism.

Methods: We investigated the fusiform gyrus as well as the primary visual cortex and the entire cortical gray matter of 7 postmortem brains from autistic patients and 10 controls for volume, neuron density, total neuron number and mean perikaryal size with high-precision design-based stereology.

Results: Compared to controls, brains from autistic patients showed statistically significant reductions in neuron densities in layer III (-13.1%), total neuron numbers in layers III and V (-23.7% and -8.3%, respectively), and mean neuronal volumes of layer V (-25.9%) in the fusiform gyrus. None of these alterations were found in the primary visual cortex or in the cerebral cortex as a whole.

Conclusion: The results of the present study provide important insight about the cellular basis of abnormalities in face perception in autism.

Sponsor: Autism Speaks

PS4.67
GRAY MATTER ABNORMALITIES IN YOUTH WITH ASD (HIGH FUNCTIONING AUTISM AND ASPERGER SYNDROME) USING A NOVEL METHOD OF DIFFUSION BASED MORPHOMETRY
Manzar Ashtari, Joel Bregman, Shana Nichols, Carolyn McIlree, Andrew Adelsman, Linda Spritzer, Jinghau Wu, Melissa Naraine, Babak Ardekani, North Shore LIJ Health System

Background: Neuroimaging findings in ASD have been inconsistent, in part due to differences in image analysis. Whereas most previous morphometric studies involving MRI used high-resolution T1 images and segmentation techniques, apparent diffusion coefficient (ADC) based morphometry (ABM) is a powerful new technique not dependent on tissue segmentation, eliminating the risk for CNS tissue misclassification (Ardekani et al., 2005). In ABM, an increase in cortical gray matter (GM) corresponds to a decrease in sulcal CSF and a decrease in ADC. Thus, ADC images are a surrogate marker for regional GM volume change.

Objective: We used ABM to assess regional GM changes in a group of ASD and healthy control (HC) subjects.

Method: ASD subjects were recruited from the Fay J. Lindner Center for Autism. All met ADI-R & ADOS-G criteria for Autistic or Asperger’s disorder. 14 ASD and 12 age, gender and IQ matched HC subjects underwent diffusion MRI. Following inter-subject registration of the ADC maps, two-tailed voxelwise t-test was applied.

Results: ASD subjects had larger GM volumes (decreased ADC) in the medial frontal gyri, left precentral gyrus, right postcentral gyrus, right fusiform gyrus, bilateral temporal gyri and bilateral cerebellum (p<0.005 and a cluster size of 3100 contiguous voxels). The ASD group had smaller GM volume in the cerebellum and right amygdala. Analyses of social & neuropsychological correlates are underway. A separate t-test showed no difference in the total brain volume between groups.

Conclusion: ABM is a new, indirect method for highlighting brain regions with potential GM volume changes using diffusion-weighted MR. We found GM changes consistent with recent volumetric or voxel based morphometry reports. These areas have been linked to deficits in social-cognitive processes in autism. We believe ABM is extremely valuable for exploring brain abnormalities in ASD.

Sponsor: North Shore-LIJ Faculty Award; Feinstein Research Institute (GCRC)

PS4.68
VOLUMETRIC ANALYSIS OF THE AMYGDALA IN CHILDREN WITH AUTISM
Vanessa Carmean, Blythe A. Corbett, University of California, Davis, Dept. of Psychiatry and Behavioral Sciences

Background: The volume of the amygdala in autism has been studied with conflicting results, diverse methods and various groups and ages, all of which may be contributing factors to the variability in reports of amygdala volumes. There have been findings of differences in the size of the amygdala including, an increase (Schumann et al., 2004; Sparks et al., 2002), no differences observed (Nacewicz et al., 2006), as well as a reduction in size (Aylward et al., 1999).

Objective: To investigate amygdala volumes using a well characterized group of children with high functioning autism and typically developing children between the ages of 8 and 12.

Methods: Participants included twenty-five right-handed children with high functioning autism (n = 11) and a typically developing group (n = 14) between the ages of 8 and 12. The children participated in a functional and structural MRI session, and scans were performed in a 1.5T GE scanner. An established protocol for delineating the amygdala was used (Schumann et al., 2004). In
addition to reliability on the protocol (0.94), two raters established an inter-rater reliability correlation of greater than 0.90. The volume of the amygdala was investigated using several factors as covariates, including age, IQ, and diagnostic symptoms.

Results: This initial analysis suggests there were no significant differences between the groups (p>0.05) for both the right and left amygdala. Further analysis using covariates including age, IQ, and diagnostic symptoms will be discussed.

Conclusion: The current findings do not support differences in amygdalar volume between children with high functioning autism and typical children between 8 and 12 years of age. It is apparent that volumetric analysis of the amygdala in autism remains an open question.

Sponsor: NIH (PI Blythe A. Corbett, Ph.D)

PS4.69
AN MRI STUDY OF THE CAUDATE NUCLEUS AND REPETITIVE BEHAVIORS IN AUTISM
Kelli C. Dominick, Tracey A. Knaus, Kristen A. Lindgren, Helen Tager-Flusberg, Boston University School of Medicine

The caudate nucleus is involved in reinforcement based learning and habit formation. Differences or deficits in its actions may lead to the creation of maladaptive habits which could manifest as compulsive, ritualistic, or sameness behavior in individuals with autism spectrum disorders (ASDs). The caudate nucleus has been implicated in the presentation of repetitive behaviors as well as executive dysfunction in ASDs by recent neuroimaging studies. However, its relationship to specific types of repetitive behaviors has not yet been addressed.

Objective: To determine the relationship between repetitive behaviors and the volume of the caudate nucleus.

Methods: Participants were children with autism spectrum disorder (ASD) and typically developing children. The Repetitive Behavior Scale - Revised was used to characterize repetitive behaviors (Bodfish, Symons & Lewis, 1999). Volumetric MR images were acquired on a Philips 3 Tesla Intera scanner (T1 weighted images). Scan parameters were: TR=9.9ms, TE=4.6ms, slice thickness=1mm (contiguous), image matrix=256x256. The volume of the caudate nucleus was obtained using Freesurfer, an automated labeling application.

Results: On average the total volume of the caudate nucleus was larger in participants with ASD. This difference did not reach significance. Sameness behavior was significantly related to the volume of the caudate nucleus in participants with ASD. Neither compulsive behavior nor ritualistic behavior showed a strong relationship to caudate nucleus volume.

Conclusion: Preliminary results from this study support a role for the caudate nucleus in the presentation of repetitive behaviors in ASD. Additional data and analyses will offer further insight into the relationship between the caudate nucleus and repetitive behaviors in ASD.

This research was funded by grants from the NIDCD (U19 DC 03610, Helen Tager-Flusberg, PI), part of the NICHD/NIDCD CPEA, and by the NINDS (F30 NS048615).

PS4.70
INVESTIGATION OF THE RELATIONSHIP BETWEEN THE ASYMMETRY OF LANGUAGE CORTICES AND WHITE MATTER STRUCTURE IN AUTISM Kristen A. Lindgren, Tracey A. Knaus, Kelli C. Dominick, Robert M. Joseph, Helen Tager-Flusberg, Boston University School of Medicine

Background: Recent imaging studies have found structural abnormalities in language areas and differences in connectivity between these regions in individuals with autism.

Objective: To investigate the relationship between the structure of and connectivity between Broca's and Wernicke's areas (and the corresponding structures in the right hemisphere) in autistic and typically developing children using magnetic resonance imaging (MRI) and fractional anisotropy (FA) calculated from diffusion tensor imaging (DTI).

Methods: High-resolution DTI and T1-weighted volumetric MRI sequences were acquired in 11 children with autism and 13 age- and non-verbal IQ-matched controls aged 9-19 years. Scans were collected on a Philips 3.0T system (MRI: TR=9.9ms, TE=4.6ms, number of slices=160, slice thickness=1mm contiguous, image matrix 256x256; DTI: three sequences, number of slices=73, slice thickness=2mm contiguous, b-value=1000sec/mm2, 15 gradient directions, image matrix 128x128). Volumes of the pars opercularis, pars triangularis, and posterior superior temporal gyrus were obtained bilaterally using Freesurfer, an automated labeling application. These labels were then used as seeding points for probabilistic tractography between these regions in both hemispheres. DTI data were analyzed using FSL software. The average FAs of these tracts were obtained, and relationships to volumetric asymmetry quotients and corrected volumes of each structure were examined.

Results: In the control group, FA was related to volumes of both frontal and posterior regions, while in the autism group, FA was only related to volumes of frontal areas.

Conclusions: These preliminary findings suggest that the asymmetry of these regions may be related to the structural integrity of white matter connecting them and that there are regional differences in the organization of these pathways in children with autism.

This research was funded by the NIDCD (U19 DC 03610) and the NINDS (F30 NS 055511).

PS4.71
THE AMYGDALA-HIPPOCAMPAL COMPLEX IN ASPERGER'S SYNDROME Clodagh Murphy, Eileen M. Daly, Brian Hallahan, Fiona Tool, Christine Ecker, Dean Robertson, Quinton Deeley, Kieran Murphy, Declan Murphy, Institute Of Psychiatry

Background It has been proposed that people with autistic spectrum disorder have abnormal development of the
amygdala-hippocampal complex (AHC). Structural Magnetic Resonance Imaging (sMRI) can be used to measure brain morphometry, although AHC results are inconsistent.

Objectives: Compare volume and maturation of the AHC in Asperger's syndrome (AS) & typically developing controls, using sMRI.

Methods: sMRI was used to measure volume of AHC, using hand tracing to determine bulk volume, & voxel based morphometry to measure proportion of gray matter & effect of age in the AHC of 74 individuals with AS & 71 controls aged 9-68 years. 18 AS subjects were < = 16 y, & 56 were > = 18 y. 21 controls were < = 16 y, and 50 were > = 18.

Results: Neither bulk volume nor grey matter density of AHC differed significantly between the whole group of AS & controls. Overall, there was no group difference between age & volume. Using a categorical approach (< = 16, or > = 18 y) compared to age-relevant controls, we found significant differences. Adults with AS had a significant increase in volume, but children with AS showed no significant differences.

Conclusion: We suggest that people with AS (age 9-68y), do not have significant differences from controls in AHC volume or maturation measured via sMRI & dimensional age. Using categorical age, & smaller samples, we found significant differences. Inconsistent results of prior AHC studies may be due to small heterogeneous samples, cohort effects, & health/social differences.

FUNDING: UK AIMS

PS4.72 BUILDING CAPACITY FOR SERVICE DELIVERY THROUGH STATE AUTISM REGISTRIES AND THE INTERACTIVE AUTISM NETWORK (IAN)
Janet E. Farmer, James Laffey, Kiely Law, Paul Law, University of Missouri-Columbia

Background: As noted in the Autism Spectrum Disorders (ASD) Roadmap, families need comprehensive and coordinated services that are easily accessible. States often lack basic information to shape an effective service delivery system.

Objective: To develop a state-level model for the utilization of the national Interactive Autism Network (IAN) registry by state agencies, universities, researchers, support groups, and families.

Method: Developers of the IAN project at Kennedy Krieger Institute have worked with University of Missouri faculty, Missouri state officials and other stakeholders to establish a model for a state "dashboard" from the national registry data. This model will be piloted using IAN data provided by Missouri parents. Issues addressed in the process of creating the dashboard include ways to safeguard participants' privacy, technical issues of integrating state and national data and reusing datasets, tactics for increasing parents' awareness of IAN, and procedures for ease of use by researchers/analysts and for updating the dashboard over time.

Results: To date more than 200 children with ASD and their families are members of IAN, including many from Missouri. Now that the pilot phase of IAN is complete, national recruitment efforts are increasing. The state model derived from IAN data will be described, including standard reports that can be generated for states; methods for collecting additional state specific data; and our experience with linking IAN and existing state databases.

Conclusion: State autism registries derived from IAN offer a cost efficient method to obtain information that can guide public policy and contribute to improvements in the service delivery system.

Sponsors: Autism Speaks; Missouri Department of Mental Health/Division of Mental Retardation and Developmental Disabilities (CMS Real Choice Systems Change grant).
2:50 – 4:10 pm

Oral Session #10

Neuropathology, immunology and toxicology

Chair: Gene Blatt

Speakers:
Manuel F. Casanova, Imke van Kooten, Andrew E. Switala, Herman van Engelend, Helmut Heinsen, Harry W.M. Steinbusch, Patrick R. Hof, Christoph Schmitz, University of Louisville
Amber Hogart, Raman Nagarajan, Katherine Patzel, Dag Yasui, Janine LaSalle, University of California, Davis
Jane R. Yip, Jean-Jacques Soghomonian, Gene J. Blatt, Boston University
Andrew W. Zimmerman, Andrea A. Zachary, Mary S. Leffell, Karla J. Matteson, John D. Tyler, Li-Ching Lee, Kennedy Krieger Institute

ABSTRACTS

ABNORMALITIES OF CORTICAL MINICOLUMNAR ORGANIZATION IN THE PREFRONTAL LOBES OF AUTISTIC PATIENTS Manuel F Casanova, Imke van Kooten, Andrew E. Switala, Herman van Engelend, Helmut Heinsen, Harry W.M. Steinbusch, Patrick R. Hof, Christoph Schmitz, University of Louisville
Background: Recent imaging studies suggest deficits in connectivity between disparate regions in the brains of autistic individuals. One possible explanation to these findings is the presence of modular abnormalities in the neocortex of autistic patients.
Objectives: In this study we expand on previous findings by exploring the topography of minicolumnar abnormalities in autism.
Methods: Our postmortem study included six patients with autism (DSM-IV-TR and ADI-R diagnosed) and six age-matched controls. Entire brain hemispheres were celloidin embedded, serially sectioned, and stained with gallocyanin. Digital photomicrographs of n=9 cortical areas (including paralimbic, heteromodal association, unimodal association, and primary areas) were assembled into montages covering the entire cortical thickness. Computer image analysis clustered neurons into minicolumnar fragments. The full width of the image region nearest each fragment and the width of the cell-dense core of the fragment were estimated. The difference between these two quantities can be used as a measure of the peripheral neuropil space of minicolumns.
Results: We found an interaction of diagnosis and region for peripheral neuropil space (p=0.041). Post hoc analysis revealed significant differences (p<0.05) for the frontopolar region (area 10) and the anterior cingulate gyrus (area 24).
Conclusions: The frontopolar cortex is involved in executive functions by implementing control over internally generated thoughts and relational integration (combination of multiple cognitive rules). The anterior cingulate gyrus is involved in the analysis of socially salient information, including the processing of familiar faces. Pathological findings in these areas may provide a correlate to some of the more salient manifestations of autism.
Sponsor: NIH

Background: Diagnosis of autism is based on the presence of impaired social interaction, impaired

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communication, and restrictive and repetitive interests and activities.
Objective: Detect structural changes that could be responsible for the different domains of behavioral impairment seen in autism. The n. accumbens was selected as representing the human social brain and caudate/putamen as brain structures involved in rituals and repetitive behaviors.
Methods: The volume of and the number of neurons in these three striatal subdivisions were estimated in 11 autistic subjects from 4 to 67 years of age and 10 age-matched controls. The volume was estimated using 0.2-mm-thick serial sections and 3-D reconstruction, and the number of neurons was estimated by the dissector method.
Results: In the brains of autistic subjects, relative to controls, the mean volume of the n. accumbens was reduced by 19%, and the numerical density by 13%. Also, the numerical density of large neurons was down by 22% in the caudate and by 29% in the putamen; the total number of large neurons was reduced by 32% and 23% respectively. The ratio between large and small neurons was increased by 55% in the caudate nucleus and by 38% in the putamen.
Conclusion: The reduced volume of the n. accumbens as well as the smaller number of neurons in social brain circuits may be the substrate of deficits in social interactions. Similarly, the selective deficit in the number of large neurons in the caudate/putamen could be the component of pathology of striatal dopaminergic circuits linked to repetitive behavior.
Sponsor: NAAR-Autism Speaks and the NYS Office of Mental Retardation and Developmental Disabilities. Tissues were provided by Harvard Brain Tissue Resource Center (PHS grant number R24-MH 068855), and from the Brain and Tissue Bank for Developmental Disorders at the University of Maryland, Baltimore, MD. Tissue acquisition and distribution was coordinated by the Autism Tissue Program.

15q11-13 GABAA RECEPTOR GENES ARE NORMALLY BIALELICALLY EXPRESSED IN BRAIN YET ARE SUBJECT TO EPIGENETIC DYSREGULATION IN AUTISM Amber Hogart, Raman Nagarajan, Katherine Patzel, Dag Yasui, Janine LaSalle, University of California, Davis
Human chromosome 15q11-13 is a complex locus containing imprinted genes and a cluster of three GABAA receptor subunit (GABR) genes, GABRB3, GABRA5, and GABRG3 with undetermined imprinting status. Maternal duplication of 15q11-13, including the GABR genes, occurs in 1-2% of cases of idiopathic autism.
Objective: To conclusively determine if the 15q11-13 GABR genes are normally imprinted in human brain, and examine expression of these genes in autism and Rett syndrome brain samples with previously reported GABRB3 protein expression defects.
Methods: Single nucleotide polymorphisms within the coding regions of each gene were used to assess allelic expression of transcripts in post-mortem human cerebral cortex samples. Quantitative RT-PCR was used to investigate parental expression bias of maternal and paternal chromosomes.
Results: Equal biallelic expression of GABR genes was observed in 21 heterozygous control brain samples, demonstrating that these genes are not normally imprinted. Quantitative RT-PCR analysis of brain samples with paternal and maternal 15q11-13 deletions revealed a paternal expression bias of GABRB3, despite equal biallelic expression in control samples. Interestingly, 4 of 8 informative autism, and 1 of 5 Rett syndrome brain samples showed loss of biallelic expression of one or more GABR gene, suggesting that epigenetic dysregulation of these genes is common in autism-spectrum disorders.
Conclusions: The normal biallelic expression of 15q11-13 GABR genes in human cortex is commonly dysregulated in autism-spectrum disorders leading to reduced GABRB3 protein.
Funding: NIH 1R01HD048799

STUDIES OF GAD65 MRNA LEVELS IN THE DEEP CEREBELLAR DENTATE NUCLEI IN AUTISM Jane R. Yip, Jean-Jacques Soghomonian, Gene J. Blatt, Boston University
Background: The dentate cerebellar nuclei (CN) provide information linking the cerebellar cortex, previously been reported to be dysfunctional in autism, to higher cognitive centers. Neuropathology of the CN in autism has been observed in autism but it is not known whether GABAergic neurotransmission in the CN is affected.
Objective: In situ hybridization techniques are used to study the expression of the rate-limiting GABA-synthesizing enzyme, glutamic acid decarboxylase (GAD) in the dentate CN in the autistic compared to age and gender-matched control brains via the quantification of GAD65 mRNA levels. The levels and distribution of the GAD65 mRNA in major dentate CN cell groups were analyzed.
Methods: Fresh frozen blocks were taken through the lateral part of the posterior cerebellar hemispheres of 8 autistics, and 8 controls matched for age, PMI, gender and pH. Sections were processed with a 35S-GAD65 probe, and mRNA levels in dentate CN were measured by computerized analysis of silver grains on sections processed for emulsion radioautography. Results: A significant reduction in GAD65 mRNA levels was found in the dentate CN of the medium-large cell population in the autistic group compared to the control group (p=0.03; independent t-test). In the small cell population of the dentate CN, there were no significant differences between the two groups. Conclusion: The decrease in GAD65 mRNA levels in the medium-large cells of the dentate CN in the autistic brains suggests a dysregulation of the major CN output to the thalamus, precerebellar nuclei, and Purkinje cells. Normal levels of GAD65 mRNA in the small dentate neurons in the autistic group suggests heterologous effects within the dentate neuronal population and thus, only a select part of the circuitry may be adversely affected. Tissue was provided by the Harvard Brain Tissue Resource Center and The Autism Tissue Program. Supported by NICHD HD39459-04 and the CAN Foundation.

THE FREQUENCIES OF HLA-A AND B ANTIGENS IN FAMILIES WITH AUTISM

Andrew W. Zimmerman, Andrea A. Zachary, Mary S. Leffell, Karla J. Matteon, John D. Tyler, Li-Ching Lee, Kennedy Krieger Institute

Background: Immunogenetic factors such as Human Leuckocyte Antigens (HLA) may determine atypical immune responses in families with autism. We previously reported increased rates of HLA-DR4, an HLA type frequently associated with autoimmune disorders, in a cohort of families in East Tennessee, but not in a national sample.

Objective: To report on the frequencies of HLA-A and HLA-B antigens in families with children with autistic disorder.

Methods: Two groups were studied (Caucasians; 1 boy with autism and both parents from each family): 16 families selected from a geographically defined area have boys with autism; and 23 families across all regions in the US who have multiple boys with autism. The HLA-A and B antigen frequencies were compared to 265 unrelated Caucasians from the US National Marrow Donor Program.

Results: Boys in the geographically defined group had significantly higher frequencies of HLA-A1 and B8 than controls (OR=2.56, 95% CI=1.08-5.93; and OR=2.71, 95% CI=1.07-6.71, respectively). Fathers of these boys were 4.41 times more likely to have A68 (95%CI=1.17-15.20) than controls. No significant difference in the distribution of HLA-A or B antigen was found between the US-all region groups and controls or mothers of the geographically defined group and controls.

Conclusion: HLA-A1 and B8 may be important determinants of immune regulation in autism within a population in a geographically defined region. Increased frequencies of A1 and B8 most likely reflect the A1;B8 haplotype, which is commonly associated with HLA-DR4 and autoimmune disorders. HLA-A68 also may be a paternal marker for susceptibility to autism in children.

Supported by Dr. Barry and Mrs. Renee Gordon.
Oral Session #11
Innovative technologies for diagnosis and treatment

Chair: Gregory Abowd

Speakers:
Ian Cameron Cook, Gregory S. Young, Sally J. Rogers, UC Davis, M.I.N.D. Institute
Kate Gordon, Greg Pasco, Tony Charman, Patricia Howlin, St. George’s, University of London
Ofer Golan, Simon Baron-Cohen, Emma L. Chapman, Yael Granader, University of Cambridge, UK and Bar-Ilan University, Israel
David Moore, Salima Yawad, Marc Fabri, Bridget Cooper, Rennie Stephen, Leeds Metropolitan University

ABSTRACTS

IMMEDIATE IMITATION PREDICTS SPONTANEOUS AND PROMPTED REPRESENTATIONAL PLAY IN TODDLERS WITH AUTISM WHEREAS JOINT ATTENTION AND DYADIC ENGAGEMENT DO NOTIan Cameron Cook, Gregory S. Young, Sally J. Rogers, UC Davis, M.I.N.D. Institute

Background: Impaired play abilities in young children with autism may be linked to a metarepresentation deficit. Alternatively, the play deficit may be related to a more general impairment in social engagement.

Objectives: To test predictive relationships in a sample of children with autism between representational play and 1) Joint Attention, 2) Immediate Imitation, and 3) Dyadic Engagement.

Methods: The spontaneous and prompted play of 27- to 58-month-olds with autism was evaluated based on the representation of agency (i.e., animating dolls), the symbolic transformation of objects, and the integration of play-acts into sequences of actions. An overall representational play maturity score, an index of play complexity, and the frequency of symbolic play acts were entered as dependent variables into hierarchical regression models with joint attention (from the ESCS) dyadic engagement (derived from the ADOS), and immediate imitation, entered step-wise along with mental age as predictor variables.

Results: Data from 36 participants with autism revealed that although joint attention predicted spontaneous play maturity and dyadic engagement predicted prompted play maturity, immediate imitation proved to be the only variable that predicted a significant and unique portion of the variance in play maturity after controlling for variance shared by the three predictors. After parsing out shared variance and controlling for mental age, immediate imitation predicted prompted play maturity, spontaneous as well as prompted play complexity, and the frequency of symbolic play acts.

Conclusion: Although both joint attention and dyadic engagement are related to play abilities in autism when simple correlations are considered, only immediate imitation uniquely predicts the child’s capacity for representational play after controlling for mental age and parsing out shared variance amongst several indices of social engagement.

Sponsor: NICH

THE EFFECTIVENESS OF PICTURE EXCHANGE COMMUNICATION (PECS) TRAINING FOR TEACHERS OF CHILDREN WITH AUTISM: A PRAGMATIC, GROUP RANDOMISED CONTROLLED TRIAL Kate Gordon, Greg Pasco, Tony Charman, Patricia Howlin, St. George’s, University of London

Objective: To assess the effectiveness of expert training and consultancy for teachers of children with ASD in the use of the Picture Exchange Communication System (PECS).
Method: Design: Group randomised, controlled trial (3 groups: immediate treatment, delayed treatment, no treatment). A school-based study, treatment was delivered to the children in the classroom and all assessment took place in school. Participants: 84 elementary school children, mean age 6.8 years. Treatment: A 2-day PECS workshop for teachers plus 6 half-day, school based training sessions with expert consultants over 5 months. Outcome measures: Rates of communicative initiations, use of PECS, and speech in the classroom; Autism Diagnostic Observation Schedule-Generic (ADOS-G) domain scores for Communication and Reciprocal Social Interaction; scores on formal language tests

Results: Controlling for baseline age, DQ and language; rates of initiations and PECS usage increased significantly immediately post-treatment (Odds Ratio (OR) of being in a higher ordinal rate category 2.72, 95% confidence interval 1.22-6.09, p<0.05 and OR 3.90 (95%CI 1.75-8.68), p<0.001, respectively). There were no increases in rate of speech, or improvements in ADOS or language test scores.

Conclusions: This is the largest fully randomised controlled psychoeducational trial for children with ASD to date. The results indicate modest effectiveness of PECS teacher training/consultancy. Rates of pupils’ initiations and use of symbols in the classroom increased although there was no evidence of improvement in other areas of communication. Treatment effects were not maintained once active intervention ceased.

Sponsor: Three Guineas Trust

FACILITATING EMOTIONAL UNDERSTANDING AND FACE-PROCESSING IN YOUNG CHILDREN WITH AUTISM SPECTRUM CONDITIONS, USING ANIMATIONS OF VEHICLES WITH FACES

Ofer Golan, Simon Baron-Cohen, Emma L. Chapman, Yael Granader, University of Cambridge, UK and Bar-Ilan University, Israel

Background: Individuals with autism spectrum conditions (ASC) are characterized by difficulties in empathizing (Baron-Cohen et al., 2002). This includes difficulties in recognizing emotions from facial expressions and context, which hampers social functioning (Frith, 2003). Previous work has shown that children and adults with ASC can improve their emotion recognition skills with intervention (Golan & Baron-Cohen, 2006). Individuals with ASC show special interest in rule-based objects and systems, including mechanical ones. Aims: To evaluate the effectiveness of an animation series, designed to improve emotional understanding and facial emotion processing in children aged 4-7 years old with ASC. The series (The Transporters) involves characters who are mechanical vehicles with human faces that show emotional expressions in social context. The aim is to attract the children's attention with mechanical motion in order to encourage incidental social learning and increase attention to the face. Method: 40 children with ASC and 20 typically developing children took part in emotion recognition tasks at three levels of increasing generalization. This was carried out at Time 1 and then again 4 weeks later. During the 4 week period, 20 children from the ASC group were given a DVD of ‘The Transporters’ series (15 episodes of 5 minutes each, see www.transporters.tv) and asked to watch at least 3 episodes every day. Results: There was greater improvement in emotion recognition skills in the ASC intervention group, compared to the control groups. Conclusions: With as little as 4 weeks of daily viewing, this animated series may encourage children with autism to orient more to faces and to improve their recognition and understanding of emotions. Discussion: Early intervention using the child's own interests (in mechanical systems) may facilitate social and emotional understanding and skills. Future studies need to test generalizability to everyday behaviour.

COMPUTER TECHNOLOGY FOR PEOPLE WITH AUTISM

David Moore, Salima Yawad, Marc Fabri, Bridget Cooper, Rennie Stephen, Leeds Metropolitan University

The proposed presentation will start with a review of the current state of research in the area of computer systems for people with autism. It is hoped that this will be useful because it will update congress delegates on the current state of the art and software that might be useful to them. The presentation will then move on to look at collaborative virtual environments (CVE) as a potentially valuable technology for people with autism. It will be argued that CVE technology can potentially benefit people with autism in three ways - as an assistive technology, as an educational technology and as a means of helping address any Theory of Mind impairment. It will also be argued that this potential has been subject to very little empirical work. This provides the motivation for our studies of CVE for people with autism, and the presentation will move on to outline these studies. A completed PhD project and two on-going PhD projects will be outlined. These include work in the under-researched area of computer technology for people with severe autism.
Finally, the presentation will refer briefly to our work involving the development of a ‘story builder shell’ - a system designed to help parents and carers of children with autism to create individualised computer based learning material for their children. This and other software will be made available (free of charge) to interested parties.

INTERNET MEDIATED RESEARCH (IMR) IN AUTISM: INITIAL EXPERIENCES OF THE INTERACTIVE AUTISM NETWORK (IAN) RESEARCH PROJECT


Background:
Internet use by US adults has increased from 20% to nearly 80% in the past 10 years. Many people seek and provide health information online. This trend is changing the field of medicine. IMR is a novel use of web technology to collect scientific data. Autism Spectrum Disorders (ASDs) are well suited for online data collection. Parents already provide a large amount of research information via standardized paper instruments. However, parents are limited in their ability to participate in university-based research by geographic/logistical constraints. IAN Research, an online registry and research database, will remove these obstacles to participation.

Methods:
Parents and marketing professionals worked with a software development team to build IAN using both Clinical Data Interchange Standards Consortium and National Cancer Institute Common Data Element models and standards. The underlying technology platform, the Health Science Process Framework, is designed to support flexible evolution and interoperability to accelerate health research. IAN was designed so that researchers rather than software engineers can author forms, validation rules, and reports.

Results:
During the pilot phase, IAN recruited over 200 children with ASD, and over 500 subjects total (a figure which includes all participating family members) with minimal effort. Over 25,000 individual data points have been collected. Data quality verification efforts are ongoing. Initial results show a 4:1 male/female ratio of subjects, which concurs with other studies. The Social Communication Questionnaire average score in affected children was 22 compared to 4 in non-ASD siblings. Only 19% of children participating in IAN had previously participated in research.

Conclusion:
IMR is an efficient and well-received method for data collection with potential to increase participation and advance autism research. Further evaluation of this research method is merited.

Sponsor: Autism Speaks
Oral Session #12
Models of Autism

Chair: Mirella Dapretto

Speakers:
Isabel Dziobek, Ingo Wolf, Sandra Preissler, Jenifer Kirchner, Markus Bahnemann, Hauke R. Heekeren, Antonio Convit, Max-Planck-Institute for Human Development Berlin, Germany
Ruth Raymaekers, Jan Roelf Wiersema, Herbert Roeyers, Ghent University, Department of Experimental Clinical and Health Psychology, Research Group Developmental Disorders
Daniel P. Kennedy, Eric Courchesne, Department of Neurosciences, University of California San Diego
John Lawson, Oxford Brookes University
Gagan Joshi, Eric M. Morrow, Janet Wozniak, Robert L. Doyle, Erik Mick, Michael C. Monuteaux, Ronna Fried, Joseph Biederman, Massachusetts General Hospital

ABSTRACTS

NEUROPSYCHOLOGY AND CORTICAL THICKNESS IN ADULTS WITH ASPERGER SYNDROME Isabel Dziobek, Ingo Wolf, Sandra Preissler, Jenifer Kirchner, Markus Bahnemann, Hauke R. Heekeren, Antonio Convit, Max-Planck-Institute for Human Development Berlin, Germany
Background: Individuals with Asperger syndrome (AS) represent the cognitively higher functioning end of the autism spectrum with deficits possibly restricted to social perception and cognition. The neuronal underpinnings of AS are largely unknown.
Objectives: To compare neuropsychological profiles and cortical thickness measures of adults with AS with those of control subjects.
Methods: A group of 27 individuals with AS (7 women) and a group of 29 controls (7 women) matched for age and IQ were administered tests of social cognition, memory, attention, and executive functioning. In addition, participants underwent MRI scans to obtain structural images, from which cortical thickness was measured. We performed a vertex-based analysis across the entire cortical surface.
Results: Between-group analyses for the neuropsychological test battery revealed that differences were restricted to social perception and social cognition: individuals with AS scored lower only on tests of face processing and theory of mind. Imaging analyses revealed selective differences in cortical thickness between the groups in the left fusiforme gyrus and right temporo-parietal junction.
Conclusion: The fusiforme gyrus and temporo-parietal junction have been identified as crucial for face processing and social cognitive inferences in typically developing individuals. Our data thus represent convergent neuroanatomical and neuropsychological evidence for specific social perceptive and social cognitive impairments in AS. The results may be important in the understanding of unknown brain behavior relationships in autism spectrum conditions.
Sponsor: NAAR

EEG STUDY OF THE MIRROR NEURON SYSTEM IN CHILDREN WITH HFA
Ruth Raymaekers, Jan Roelf Wiersema, Herbert Roeyers, Ghent University, Department of Experimental Clinical and Health Psychology, Research Group Developmental Disorders
Background: The mirror neuron system is an observation/execution system, which may play an essential role in the ability to comprehend and imitate behaviors of others. Previous research has suggested that a dysfunction of this system may underlie the characteristics of autism, such as
deficits in imitation, theory of mind, empathy and pragmatic language. In addition, studies indicate that the analysis of electroencephalography (EEG) mu frequency band oscillations presents a valid index to assess the mirror neuron system functioning.

Objectives: To investigate the mirror neuron activity in children with high-functioning autism (HFA) by measuring mu responsiveness to actual and observed movements.

Methods: Normally intelligent children (9 to 13 years) with HFA were compared with normally developing peers. Subjects were asked 1) to watch videos or photographs and 2) to imitate the observed footage, during which mu wave suppression is measured. The videos show a) a moving hand, b) bouncing balls and c) white noise; the photographs depict 5 different facial expressions. This is in accordance with the methodologies introduced by Oberman et al. (2005) and Dapretto et al. (2006).

Results: All children complied with the task requirements. Preliminary results indicate that mu suppression is comparable between the HFA and the control group in action-imitation conditions, but is different in action-observation conditions. Further analyses are currently in progress.

Conclusions: Preliminary findings support the hypothesis of an impaired mirror neuron system in children with HFA.

Sponsor: Ghent University Research Fund

DISRUPTED AND INTACT INTRINSIC FUNCTIONAL ORGANIZATION OF LARGE-SCALE BRAIN NETWORKS IN AUTISM Daniel P. Kennedy, Eric Courchesne, Department of Neurosciences, University of California San Diego

Autism is characterized in large part by impairments in social and emotional processes (e.g., mentalizing, social perception, emotion recognition), but at the same time, there are remarkably preserved and even enhanced abilities in other domains of functioning (e.g., sustained attention, goal-directed cognitive processes). As these two distinct functional domains are served by two distinct large-scale brain networks, the current study aimed to examine these networks in individuals with high-functioning autism and Asperger’s syndrome, compared to control subjects.

Using functional connectivity MRI (fcMRI), we assessed the intrinsic functional organization of these networks in 9 autism and 9 control subjects while at rest (i.e., simple visual fixation), thus avoiding task-related confounds. We found a pattern of results consistent with the pattern of autistic functional deficits and strengths. Specifically, while the functional organization of the network supporting social and emotional processes was disrupted (i.e., the Task-Negative Network, or default mode network), we found entirely normal functional organization of the network supporting sustained attention and goal-directed cognitive processes (i.e., the Task-Positive Network, or dorsal attention network). Follow-up fcMRI analyses were carried out on the medial prefrontal cortex (MPFC), as this region of the Task-Negative Network was found to be particularly abnormal. Interestingly, we found reduced MPFC functional connectivity with the nucleus accumbens and the caudate nucleus, which may relate to reduced responsiveness to social reward and the stereotyped behaviors and restricted interests seen in autism, respectively. We suggest that these findings may serve to relate seemingly disparate features of the autistic phenotype into a tractable neurofunctional framework.

Supported by R01 MH36840.

THE DEPTH ACCESSIBILITY MODEL OF AUTISM: AN UPDATE John Lawson, Oxford Brookes University

Background: Conceptualising the autism spectrum on a cognitive level is crucial if we are to gain a full understanding of how the condition operates. In 2003 a new conceptualisation was developed that synthesised aspects of the Executive Dysfunction, Central Coherence and Theory of Mind models, and in doing so, moved towards a fuller explanation of the behavioural features found. This new theory (the Depth Accessibility model) was reported to IMFAR in 2006.

Objective: Evaluate the new model empirically by examining task performance among males with Asperger syndrome and non-autistic males and females.

Method: A total of 120 participants in three groups completed three tests that explored disparate aspects of cognition- 1) moral reasoning 2) pastime preference 3) rational / experiential reasoning. These were designed to examine underlying differences in preference and ability for open and closed systems (as predicted by the Depth Accessibilities theory).

Results: Significant differences were found in all but one of six group comparisons. In all comparisons that yielded significant outcomes the Asperger group demonstrated an inability to cope with / preference against open systems. The non-autistic female group consistently demonstrated the greatest ability with / preference for open systems and the non-autistic males
performed somewhere between the other two groups.

Conclusion: These results give support to the Depth Accessibility theory and also to the idea that autistic cognitive tendencies are stronger in non-autistic males than in non-autistic females.

EXAMINING CLINICAL CHARACTERISTICS INCLUDING PATTERNS OF PSYCHIATRIC COMORBIDITY AND PREVALENCE OF PERSASIVE DEVELOPMENTAL DISORDERS IN CLINICALLY REFERRED POPULATION OF CHILDREN AND ADOLESCENTS Gagan Joshi, Eric M. Morrow, Janet Wozniak, Robert L. Doyle, Erik Mick, Michael C. Monuteaux, Ronna Fried, Joseph Biederman, Massachusetts General Hospital

Background: Recent studies suggest high rate of pervasive developmental disorders (PDD) in the research population. Also, psychiatric comorbidity is common in youth with PDD.

Objective: To characterize clinical, cognitive, and social functioning including patterns of psychiatric comorbidity and prevalence of pervasive developmental disorders in clinically referred sample.

Methods: Consecutively referred children and adolescents (totaling 758) for diverse clinical concerns were assessed using structured diagnostic interviews and psychometric measures.

Results: Sixteen percent (120/758) of the referred population met full criteria for PDD with a mean age at onset of 2.8 years. Of patients with PDD, 84% (101/120) also met full criteria for ADHD, that was higher than the rate of ADHD in non-PDD referrals (71.0%) and total referrals (74.2%). Conversely, 18% (101/561) of patients with ADHD also met full criteria for PDD. Furthermore, mood and anxiety disorders were common in PDD, with 33.3%, 55.5%, and 42.0% of patients with PDD meeting criteria for mania, depression, and generalized anxiety disorder, respectively. Where data were available, cognitive assessments reflected that patients with PDD were of average intelligence (mean Full IQ 103.3±17.2, n=15), however functional impairments were serious (current GAF scores of 45.1±6.1).

Conclusion: Results suggest that PDD is common in pediatric outpatient clinics and that psychiatric comorbidity, ADHD in particular, is commonly identified when systematically assessed. While PDD patients have been routinely excluded from treatment studies targeting other psychiatric conditions, these data suggest the need to identify, diagnose, and treat comorbid disorders related to PDD.

Sponsor: Ethel Dupont Warren Fellowship Award
Invited Educational Symposium #5
New Approaches for Neuroimaging in Autism

Chairs: Declan Murphy & Thomas E. Conturo

Speakers:
Declan Murphy, Institute of Psychiatry
Thomas E. Conturo, Washington University School of Medicine
Marco Catani, Institute of Psychiatry

The purpose of this educational symposium is to describe new approaches for neuroimaging that can be used for non-invasive studies of biological abnormalities in autism. A brief description of structural and functional MRI will be given, followed by a detailed description of diffusion tensor MRI (DT-MRI) and diffusion tensor tracking (DTT). The theory and methods of DT-MRI and DTT will be presented, describing the process from "water molecule to pathway", and the assessment of "structural connectivity".

Early results from a research sample of young adults with high-functioning autism will be presented, demonstrating alterations in select cognitive pathways. Those results will be used to demonstrate one approach to the principles and practical methods of DT-MRI and DTT in studies of autism. Such findings can be considered the "end result" of developmental and/or behavioral abnormalities that persist into young adulthood. Early results from a clinical sample will also be shown, describing the normal development of specific cognitive systems (as measured using DT-MRI), and how this development is different in people with autism spectrum disorder. Results from these studies show the potential of DT-MRI and DTT for interrogating biological brain abnormalities in autism.

Grant Support: Nancy Lurie Marks Family Foundation; U.S. NIH R01 NS39538; Medical Research Council (U.K. A.I.M.S. Program), Cure Autism Now, Autism Speaks, and the U.K. Department of Health (Better Services for Better Health Program).

Declan Murphy
Dept of Psychological Medicine
Institute of Psychiatry, London
Introduction to the Symposium

Thomas E. Conturo
Mallinckrodt Institute of Radiology
Washington University School of Medicine
Diffusion Tensor Imaging from Water Molecule to Pathway in Autism

Marco Catani
Centre for Neuroimaging Sciences
Institute of Psychiatry, London
Diffusion Tensor Imaging of Normal Development of Cognitive Systems and Altered Development in Autism
Invited Educational Symposium #6
Adolescent and Adult Interventions and Outcomes

Chairs: Fred Frankel and Catherine Lord

Speakers:
Catherine Lord, University of Michigan Autism & Communications Disorders Center
Pat Howlin, Institute of Psychiatry, Kings College
Liz Laugeson, UCLA Semel Institute
Fred Frankel, UCLA Semel Institute

Despite increasing numbers of evidence-based programs for children with autism spectrum disorders, there is very little research being done on treatment for teens and adults with ASD. This symposium will grapple with some of important issues to consider in the development of effective treatment. Patricia Howlin will begin by discussing "The trajectory of development from child to adulthood." Cathy Lord will focus upon "Designing treatments for adults with ASD." Liz Laugeson will present some preliminary findings of "A randomized controlled study of an intervention to enhance friendships in teens with ASD." Finally, Fred Frankel will focus upon "How goals to promote friendships are related to other treatment goals for teens and adults with ASD."

Catherine Lord, Ph.D.
University of Michigan Autism & Communications Disorders Center
Ann Arbor MI
Designing Treatments for Adults with ASD

Pat Howlin, B.A., MSc, Ph.D., FBPS,
Professor of Clinical Child Psychology
Institute of Psychiatry, Kings College
London, United Kingdom
The Trajectory of Development from Child to Adulthood

Liz Laugeson, Ph.D.
UCLA Semel Institute, Los Angeles CA
A Randomized Controlled Study of an Intervention to Enhance Friendships in Teens with ASD

Fred Frankel, Ph.D., ABPP,
Director UCLA Children’s Friendship Program
UCLA Semel Institute, Los Angeles CA
How Goals to Promote Friendship are Related to Other Treatment Goals for Teens and Adults with ASD
Invited Educational Symposium #7
A World View of Autism Epidemiology

Chair: Marshalyn Yeargin-Allsopp
Sponsor: Autism Speaks

Speakers:
Narendra Aurora, INCLEN, New Delhi
Maureen Durkin, UW-Madison
Poul Thorsen, Aarhus University
Richard Grinker, George Washington University
Young Shin Kim, Yale University

ABSTRACTS

Epidemiology can play a unique role in determining the prevalence and understanding the causes of autism, particularly across diverse genetic and cultural settings. This symposium will focus on different methods for conducting surveillance and research in order to further our understanding of ASD similarities and differences around the world.

Narendra Aurora, M.D.
INCLEN, New Delhi, India
Community-based screening for Neuro-developmental disabilities in children in a developing country: An INCLEN study

Maureen Durkin, Ph.D.
UW-Madison, Madison, WI
The study of ASD in developing countries using population-wide screening

Poul Thorsen M.D., Ph.D.
Department of Epidemiology and Social Medicine, Aarhus University
Danish national resources for autism research: High quality databases and biobanks

Glenys Dixon, Ph.D.
TVW Telethon Institute for Child Health Research, Western Australia
Registry-based systems with potential linkage to biobanks

Richard Grinker, Ph.D. and Young-Shin Kim, M.D., Ph.D., MPH.
George Washington University, Washington DC 20052
Lost and found in translation: Conducting a prevalence study of ASDs in a Korean school system

Young Shin Kim, M.D., Ph.D., MPH.
Yale University, New Haven, CT
Use of multiple sources of data, including schools

Moderator:
Eric London, M.D.
Autism Speaks

Discussants:
Marshalyn Yeargin-Allsopp, M.D.
Diana Schendel, Ph.D.
Centers for Disease Control and Prevention
PS5.1
EPIDEMIOLOGICAL AUTISM FOLLOW-UP STUDY USING THE UTAH POPULATION DATABASE Heidi M. Block, Hilary Coon, William R. Jenson, Carmen B. Pingree, Megan Farley, William M. McMahon, University of Utah Autism Research Program Background: There is limited research addressing the outcome of adults with autism, especially studies utilizing epidemiological samples.
Objectives: Follow up a population-based sample of affected and unaffected adults for several outcome measures through use of the Utah Population Database (UPDB).
Methods: Children and adolescents originally ascertained as having autism (n=222) or not having autism (n=94) in the UCLA-University of Utah epidemiological prevalence studies in the 1980’s were followed up as adults. Names of these individuals were submitted to the UPDB to link to driver’s license, identification card, marriage, divorce, and offspring records.
Results: Computer records were found for 185 of the affected and 84 of the unaffected subjects from the initial study. The autism group had a smaller proportion married (3.8%), with driver’s licenses (16.8%), and with children (2.2%); however, there were more people with identification cards (54.1%). One individual in each group was divorced. Chi-square analysis demonstrated no statistically significant differences between groups in number of linked records or number deceased. Significant differences existed between groups for driver’s license (c2=11.8, pe0.001), identification card (c2=12.3, pe0.001), marriage (c2=11.4, pe0.001), and offspring (c2=5.6, pe0.025).
Conclusion: Outcomes for adults with autism are varied but results suggest that there are significant differences between groups in this study. Subjects with apparently good outcome (having a driver’s license, married, and/or with children) will be of particular interest for future assessment to determine potential predictors of these outcomes. Factors related to outcome are discussed.
Sponsor: University of Utah Seed Grant

PS5.2
OUTCOMES OF A SOCIAL AND VOCATIONAL SKILLS SUPPORT GROUP FOR ADOLESCENTS AND YOUNG ADULTS ON THE AUTISM SPECTRUM Ashleigh Hillier, Tom Fish, Patricia Cloppert, University of Massachusetts Lowell
Adolescents and young adults with autism spectrum disorders (ASD) frequently experience social isolation and vocational failure. Although social skills groups are vital, relatively few model programs have been developed for this age group. Here we review the model and evaluation of our ‘Aspirations’ program, an 8-week social and vocational skills support group for adolescents and young adults with ASD. Self-report measures were completed pre- and post-Aspirations, including appraisal of peer relations and empathy. Data from structured observations were also examined for changes in frequency of contributions made by group members over the course of the program. In addition, notes taken during staff meetings, and feedback sessions with group members and separately with their parents were reviewed for further evidence of the program’s success. The results from these measures support the efficacy of the Aspirations program, and provide insight into implementing a successful model for this population.

PS5.3
EFFECTS OF WEIGHTED VEST ON THE ENGAGEMENT OF YOUNG CHILDREN WITH AUTISM Erin E. Barton, Brian R. Reichow, Mark Wolery, Vanderbilt University
Background: The use of weighted vests and pressure vests for children with autism spectrum disorders as part of sensory integration therapy programs is a common practice. A weighted vest is a removable vest with pockets to place weights in; typically 5-10% of a child’s weight. Although use of these vests is common, there is no sound empirical evidence of their efficacy.
Objectives: The purpose of the present investigation was to extend the research on the use of weighted vests for children with autism spectrum disorders. Specifically, the investigation examined if increases in engagement, or decreases in problematic or stereotypic behaviors occurred when a child with autism wore a weighted vest during a teacher led table activity.
Methods: The study was conducted as a double blind placebo trial using an alternating treatment design, which is a comparative single subject design. Alternating treatment designs allow the comparison of three different conditions: (1) a weighted vest, and (2) a vest with no weight, and (3) no vest. Since the data coders and the student were not aware of which condition was in effect, the study represents a double blind placebo trial. One PI coordinated the amount of weight in the vest with the teachers prior to each session.
Results: The children with autism were videotaped during tabletop activities, which were part of the typical classroom daily schedule. The videotapes were coded by the PI who was unaware of the amount of weight in the vest. Data was collected on the child’s engagement, problem behaviors, and stereotypic behaviors. Preliminary analysis of one child with autism indicate no
relation between the use of a weighted vest and engagement, problem behaviors, or stereotypic behaviors. Conclusions: Preliminary findings of this study do not support the use of weighted vests for children with autism during tabletop activities.

PS5.4
PERCEPTIONS OF APPLIED BEHAVIOR ANALYSIS FOR CHILDREN WITH AUTISM: TECHNICAL VS. CONVERSATIONAL LANGUAGE
Lisa Natalie Barzotto, Marcia Nadine Gragg, University of Windsor, Department of Psychology

Background: In spite of evidence for effectiveness of Applied Behavior Analysis (ABA) for treating children with autism, it still has low acceptance by the public and professionals. An important reason for this may be the language of behaviorism. Behavioral terms may be perceived as technical, cold, and depersonalizing and the use of such technical language may contribute to the difficulty in teaching lay people about behavioral interventions. Parents may find the concepts of ABA difficult to understand, making it less likely they will choose ABA for their children.

Objectives: Investigate the effects of technical language vs. ‘plain English’ on perceptions of ABA for preschool children with autism. More specifically, examine whether undergraduate students at the University of Windsor perceive conversational descriptions of ABA more favorably than technical descriptions.

Methods: Undergraduate students (N= 115) recruited from the University of Windsor, read four ABA treatment scenarios, each written in both technical style and conversational style. Participants rated their perceptions of the treatment scenarios and completed questionnaires assessing knowledge of behavioral principles and of autism.

Results: 91% of participants rated treatment scenarios in conversational style to be more understandable, acceptable, caring, and compassionate. 4% of participants preferred scenarios in technical style, and 4% had no preference.

Conclusion: Technical language may reduce public understanding and acceptance of behavioral interventions. Plain English may result in greater public acceptance of ABA. Jargon-free language may make it easier to teach behavioral principles and ABA’s evidence base to lay people, especially to educators and parents of children with autism. Introducing ABA in conversational language at the college level may encourage more students to pursue a career in ABA, and enable future professionals to communicate more clearly with parents.

PS5.5
A PRELIMINARY QUANTITATIVE REVIEW OF ABA-BASED EARLY INTERVENTION PROGRAMS
Jonathan Mark Campbell, University of Georgia

Background: To date, reviews of early intensive behavioral intervention (EIBI) treatment outcomes have been narrative; therefore, authors conducted a preliminary meta-analysis of published studies.

Objectives: Quantify average outcomes of EIBI treatment programs in the areas of IQ, language, adaptive functioning, and autism symptomatology. Test for hypothesized moderators of treatment outcomes: pretreatment IQ, age at enrollment, intensity of treatment, and length of treatment.

Methods: The author identified a total of 18 published studies and calculated effect sizes (ES) for the following: IQ, language, adaptive skills, and autism symptomatology. For within-group designs, ESs were calculated using the standardized mean gain formula: MPretest - MPosttest / SDPooled. For between-group designs, standardized mean difference scores were calculated using the formula: MTreatment - MControl / SDPooled.

Results: For 392 children (M age = 43 mos; M IQ = 54), intensive ABA-based intervention resulted in an average unweighted ES of 0.65 (SD = 0.44) for IQ, 0.64 (SD = 0.57) for adaptive functioning, 0.52 (SD = 0.38) for language functioning, and -0.84 (SD = 1.17) for autism symptomatology. For IQ, ABA interventions resulted in an average unbiased ES (d’) of 0.62 (SD = 0.43) and an average weighted ES of 0.73 (SD = .40). The effect of intervention on IQ was significant ($z = 5.27, p < .05$). Correlations between unbiased IQ ES and moderator variables revealed no significant relationships. For single group designs, the mean d’ for IQ = 0.49, for designs using a post hoc comparison group, d’ = 0.83, for quasi-experiments, d’ = 0.74, and for randomized controlled trials, d’ = 0.26.

Conclusion: ABA interventions produced medium to large effects in the areas of IQ, adaptive functioning, and symptom reduction. IQ outcomes were uncorrelated with pretreatment IQ, age of treatment onset, treatment intensity, and treatment length.

Sponsor: None.

PS5.6
HOW MANY HOURS IS FORTY HOURS? RANGE OF TREATMENT INTENSITY IN LOVAAS (1987)
Michelle Dawson, Laurent Mottron, Pervasive Developmental Disorders Specialized Clinic, Rivière des Prairies Hospital, University of Montreal

Background: 40hrs/wk of one-to-one treatment--the reported intensity of ABA-based intervention received by the experimental group in Lovaas (1987) and McEachin, Smith and Lovaas (1993)--is a benchmark in autism research.

Objective: To compare accounts of hrs/wk received by the experimental group in Lovaas (1987) and McEachin, Smith and Lovaas (1993).

Method: We compared detailed 2004 sworn legal testimony from a behavior analyst (Leaf) directly involved in treatment of 10 of the 19 experimental group children reported in Lovaas (1987) and McEachin, Smith and Lovaas (1993), to descriptions in published articles authored by Lovaas, Smith and/or McEachin.

Results: 34 published descriptions of hrs/wk in the experimental group authored by Lovaas, Smith and/or
Fathers' Perspectives on Interventions to Help Their Children with Autism

Susan A. Donaldson, Meghan L. Bullard, Erica S. Hilliard, Jennifer E. Elder, University of Florida College of Nursing

Background: This qualitative study is a follow up to the In-Home Training for Fathers of Children with Autism, which aims to assist families develop language skills, increase socialization, and improve quality family interactions with their children through specific interventions taught to the fathers.

Objectives of this study: To describe in rich detail how fathers of children with autism perceive their roles and to discover whether the fathers’ perceptions of their roles change after participating in the family training intervention.

Methods: Semi-structured interviews with fathers participating in the In-Home Training for Fathers of Children with Autism are conducted using a set of questions developed for the study. The interviews are videotaped, transcribed and reviewed for common patterns and significant statements.

Results: Preliminary results indicate fathers are positively affected by the interventions citing the influence of the interventions on their relationships with their children with autism and the affect this has on the entire family unit.

Conclusion: Although preliminary, results indicate fathers relate their experience with the In-Home Training project as a positive influence on their roles as fathers and in some cases change the father’s perspective of his role in the family.

Sponsor: CIHR

Novel Approaches and Technology in Training for Fathers of Children with Autism

Jennifer H. Elder, Susan Donaldson, Gregory Valcante, H.K. Seung, Richard Ferdig, P. Jane Mutch, Tanya Murphy, Meghan Bullard, Erica Hilliard, Jeffery Walker, University of Florida

Background: Literature regarding fathers of children with autism remains sparse, and because mothers are the more common intervening parent, few training methods have been tested with fathers. This presentation summarizes the first two year findings of a NINR/NIH funded study aimed at the development and implementation of novel father-directed training methods.

Objectives include: (a) evaluating the effects of training fathers of autistic children with an expanded training module, (b) evaluating the effects of the expanded father training on skill acquisition by mothers, (c) evaluating the effects of the in-home training on parental stress and family cohesion, and (d) developing an Internet-based investigator-father feedback system and evaluating its feasibility during the training protocol and maintenance phases.

Methods: Fathers are taught four components of an in-home training intervention (following the child’s lead, imitation, commenting, and expectant waiting). Implementation of these strategies is evaluated via twice weekly, in-home videotaping of father-child and mother-child sessions. Parent and child behaviors have been operationalized and data are analyzed using the Observer Program. Training is enhanced by feedback that fathers receive in person and via a newly developed interactive website.

Results: Data analyzed during the first two years of this new R01 (N=12 families) support earlier findings where children responded with increased social initiations, responses, and vocalizations. In addition, fathers have responded favorably to the interactive website that can be used to reinforce training and provide ‘booster sessions’ for the families.

Conclusion: These preliminary Year 2 data are promising and suggest that novel approaches and the latest computerized technology can be effectively used to facilitate father-focused parent training. This, in turn, may improve not only child behavior and development but also family dynamics.

Case Studies of Optimal Outcome: Typical Functioning Following Early Intensive Behavioral Intervention

Doreen Granpeesheh, Mary Ann Cassell, Jonathan Tarbox, Rachel Tarbox, Center for Autism and Related Disorders

Background: Several studies employing group research designs have document robust therapeutic effects produced by early intensive behavioral intervention (EIBI), including the achievement of typical educational and intellectual functioning. However, researchers have identified the need for detailed case studies of the effects

Sponsor: National Institute of Nursing Research, National Institutes of Health
of EIBI at the level of the individual client. Objective: This presentation describes the course and outcome of EIBI for two young children who achieved optimal outcomes.

Method: Two toddlers, one with a diagnosis of autism and one determined to be at high risk for autism, received intensive intervention, based on the principles of applied behavior analysis, for approximately three years. Progress was tracked via regularly scheduled behavioral observation and recording, as well as yearly standardized assessments of intellectual and adaptive functioning.

Results: Both children achieved typical or nearypical scores on all assessments by the end of intervention and are functioning independently in regular educational settings.

Conclusion: EIBI can produce substantial improvement in individuals with autism, up to and including the achievement of typical educational and intellectual functioning for some children. Critical components of these children’s intervention programs, as well as the role of parent involvement in their progress are discussed.

PS5.10
TEACHER PERCEPTIONS OF SOCIAL COMPETENCE IN ELEMENTARY SCHOOL-AGED CHILDREN WITH AUTISM Amanda Gulsrud, Jill Locke, Erin Rotheram-Fuller, Connie Kasari, University of California, Los Angeles

This study provides preliminary findings from a larger randomized, controlled social skills intervention study conducted within the elementary school setting. More specifically, this study examines the change in teachers' perceptions of children with autism after intervention in the elementary school setting by evaluating children's social skills via teacher questionnaires.

Methods: Participants include 27 children with high functioning autism in 1st - 5th grades. Overall, there were 10 children in first grade, six children in second grade, six children in third grade, three children in fourth grade, and two children in fifth grade. The children were from diverse ethnic backgrounds (44% Caucasian, 8% African American, 22% Latino, 11% Asian, and 15% Other) and were predominantly male (89%). All were fully included in regular education classrooms and were an average of 7.8 years old (sd=1.4), with an average IQ of 87.9 (sd=12.6). Measures included a 26-item Teacher Perception form that evaluated children's social skills and classroom conduct.

Results: A paired samples t-test revealed a significant improvement in teacher perceptions of child social competence at the end of intervention, t(1, 26)=-2.52, p<.05, suggesting that teachers perceived an improvement in children's social skills at the end of intervention. The teacher rated domain of classroom conduct did not significantly change.

Conclusions: This study shows that teachers of children with autism are reporting social improvements in these children after completion of a social skills intervention. However, teachers did not perceive improvement in classroom conduct, which is expected considering that the intervention targeted peer interactions on the playground and did not focus on classroom conduct. This study provides preliminary evidence that the social competence of children with autism can be improved within a school setting using a systemic social skills intervention.

Sponsor: NIH

PS5.11
USE OF A COMPUTER-BASED AUDIO AND VIDEO CAPTURE SYSTEM FOR FUNCTIONAL BEHAVIORAL ASSESSMENT IN SCHOOLS Gillian R. Hayes, Gregory D. Abowd, Juane Hefflin, Carina DeFazio, Georgia Institute of Technology

CareLog is a computer audio/video capture system for functional behavioral assessment (FBA) that includes four video cameras and one microphone to record behavior in a classroom. The system records a buffer of information that is deleted automatically (like a tape loop) or can be saved by a teacher. Teachers press a remote button when or shortly after an incident to save a set amount of video leading up to and after that moment.

Four teachers at an in-center facility for autism and behavior disorder used traditional and technology enhanced methods for FBA as part of a study of use of CareLog. Each teacher assessed two students, one with each method, with conditions counter-balanced and randomly assigned. All teachers attended a one-day training with instruction on FBA and CareLog. Teachers spent 6 weeks on average in the study, with 14 days per student collecting data. In both conditions, they disregarded pieces of collected data for various reasons (e.g., erroneous saving of video or unintelligible handwriting on paper forms). They used 245 incidents (average of 31 incidents per student assessment, Â= 15.8).

Overall workload, using the NASA Task Load index, was reduced with CareLog. Use also resulted in a 32% reduction of errors in recording incidents (p = 0.0025) as determined from ground truth video recorded and coded by the researchers. An average of 17 hrs 26 mins or 21.5% of time in study was recorded for each student with at least 90% agreement from two coders on at least 20% of data per student.

Beyond improving reliability and efficiency of data collection in FBA, we observed other effects. Teachers reported noting behaviors of staff, including following of intervention plans, indicating CareLog could be used for ongoing monitoring. Teachers also reported analyzing their own teaching, indicating a potential training use. One teacher later used CareLog to record data on five students at once, using a separate remote button for each child over five months.

PS5.12
SOCIAL AND COMMUNICATION CHANGE IN A 6-MONTH TODDLER INTERVENTION PROGRAM Katherine Cullinan Holman, Rebecca Landa, Allison O'Neill, Kennedy Krieger Institute

Background: Toddlers with autism spectrum disorders (ASD) exhibit significant impairments in interpersonal synchrony, yet few intervention programs directly and
effectively target these critical social communication skills.

Objectives: To compare and measure outcomes within two 6-month intervention programs for toddlers with ASD, with different treatment targets.

Methods: A stratified randomized clinical trial was used to compare two interventions, where treatment target, not instructional method, was compared. Forty-nine toddlers (N=25 in the Non-Interpersonal Synchrony (NIS) condition, N=24 in the Interpersonal Synchrony (IS) condition) with ASD participated in an early intervention program that provided 10 hours per week of direct intervention in a classroom-based model over a six-month period. Children received both group and 1:1 intervention. Weekly parent trainings and monthly home visits were also part of the intervention program. Assessments were made prior to onset of treatment, at the conclusion of the 6-month intervention, and at 6-months follow up by clinicians who were blind to treatment grouping. The main outcome measures of nonverbal cognition, social, communication, affective, and symbolic abilities were assessed using the Mullen Scales of Early Learning (Mullen) and the Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP).

Results: The children in the IS group made significant gains in frequency of initiation of joint attention (p<.01) and shared positive affect (p<.05) at post and follow-up assessments as compared to the children in the NIS group. Both groups show robust improvement in language and NV cognitive domains (p’s<.001).

Conclusions: These data indicate that measurable and lasting improvement in core deficits of ASD (e.g., joint attention) as well as language and cognitive deficits occur in 2-year-olds with ASD after a 6-month intervention program.

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**PS5.13**

**EVIDENCE-BASED PRACTICES FOR SCHOOL AGE CHILDREN WITH AUTISM: SINGLE SUBJECT CONTRIBUTIONS**

*Michaela Jelen, Veronica Smith, University of Alberta*

Background: Single subject designs offer strengths as initial tests of innovative treatment and typically pay close attention to generalization, maintenance, and social validity issues related to treatment.

Objective: The current review is to extend the work of Odom et al. (2003) by examining the scientific evidence provided by single subject studies that support effective intervention for school age children with autism.

Method: Searches in MEDLINE, PsycINFO and ERIC from the years 1994 - 2006 were conducted for articles that were published in peer-reviewed journals, employed single-subject design, at least 50% of the participants were identified as having autism spectrum disorder, and at least 50% of the children had to be older than 6 years of age and younger than 18 years. The inclusion criteria were met for 187 studies that were subsequently coded and summarized. All studies were coded using two forms that provided details of participant characteristics and practices investigated and examined quality aspects of the study design.

Results: Across the studies, the majority of participants were male and 90% were less than 13 years of age.

Interventions took place in segregated school settings, inclusive school classrooms, clinic, home, and combined settings. Based on criteria established by the APA Task Force on Promotion and Dissemination of Interventions (1998) and further modified by Odom et al. (2003) categories of practice were organized into three groupings: well established practices (6 practices), emerging and effective practices (5 practices), and probably efficacious (2 practices).

Conclusion: This review provides a comprehensive examination of practices well established as effective interventions for school age children with autism and, additionally, represents insights into innovative practices that have yet to be widely adopted.

Sponsor: Alberta Centre for Child, Family, and Community Research

**PS5.14**

**ABARIS: COMPUTING TECHNOLOGY TO SUPPORT COLLABORATION AND DECISION-MAKING FOR DISCRETE TRIAL TRAINING**

*Julie A. Kientz, Gregory D. Abowd, Georgia Institute of Technology*

Decisions about the care of children with autism can often be a difficult process, as often data is subjective and collected independently by multiple caregivers. To aid this process, we have developed a computing technology system, called Abaris, which helps caregivers collect and analyze data for discrete trial training therapy (DTT). Abaris uses digital pen and paper and a camera to help therapists automatically record videos of therapy sessions and capture data points. It also provides an interface that creates graphs and provides access to additional session data, such as individual prompts for trials and relevant moments in the video stream.

We analyzed Abaris over a four month period in the home of one child with autism and his team of DTT therapists. Results show that therapists were able to quickly adopt the system. They used the graphing and video interface in six team meetings to enrich discussion and help make decisions about the child’s progress. We found that Abaris helped increase collaboration amongst caregivers and increased the use of more objective evidence (such as videos and data sheets) in making decisions.

We are continuing to study Abaris in a school setting with multiple children. We are studying its ability to encourage more frequent review of DTT data for teachers not in the habit of frequently reviewing data. By integrating data review (such as graphs of progress) into the data sheet creation process, we are ‘forcing’ data review by integrating it into something they must do before beginning their sessions. We are currently deploying this technology with a team of 9 teachers in a special needs classroom for a 1-2 month real-use study.

Sponsors: Cure Autism Now, National Science
PS5.15 PERSONAL GUIDANCE SYSTEM FOR SCHOOL AND VOCATIONAL FUNCTIONING Minna Levine, Gary B Mesibov, SymTrend, Inc.
Background: Persons with Asperger Syndrome (AS) have executive and social difficulties that impair personal management and social pragmatics, limiting success in the workplace.
Objectives: Improve the functioning of teens and adults with AS through a TEACCH-inspired program that features the use of a handheld computer-based personal guidance system (PGS) in school and vocational settings.
Methods: The PGS combines a PDA, a website with secure two-way Internet communication, and software that guides the user with reminders and instructions. The instructions are individualized for performing a task, for checking accuracy along the way, and for solving task problems. The PGS software also supports self-monitoring. The user sends feelings and social behavior ratings to a website for graphical comparison with staff ratings. The comparisons are used to detect obstacles to progress and provide feedback. The PGS was used first to support human teaching/coaching. It was then used to continue guidance and to maintain student performance levels as human guidance was weaned.
Results: PGS use enabled students to achieve, then to maintain and to generalize normal range classroom social pragmatics. It enabled students to quickly achieve normal range speed and accuracy goals in a desktop publishing task. It enabled students to accommodate more demanding work and more variable schedules. Finally, it helped to identify obstacles to progress, and to reinforce behavioral improvement.
Conclusion: PGS methodology, when employed with teachers/coaches, proved to be a very effective tool for teaching social and job skills and for boosting independence in AS persons.
Sponsor: Supported by a NIMH STTR grant to SymTrend and TEACCH.

PS5.16 MODIFIED FUNCTIONAL COMMUNICATION TRAINING IN THE NATURAL ENVIRONMENT WITH YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER Richmond Mancil, University of Florida
Background: There is concern about the generalizability and maintenance of traditional Functional Communication Training (FCT) procedures.
Objectives: Determine the effectiveness and efficiency of FCT with milieu procedures on decreasing aberrant behaviors, increasing communication mands, and increasing spontaneous communication with children with Autism Spectrum Disorders (ASD).
Methods: The subjects were referred by a local autism center that provides services for children with autism spectrum disorder and their parents. The subjects’ diagnosis of ASD was confirmed by a review of records and the completion of the ADI-R. A functional analysis (FA) was completed to identify the function of each subject’s aberrant behavior. The subjects were then taught picture communication using milieu therapy procedures in play routines in their homes. The researcher trained the parents who then provided training to their children. Sessions were videotaped, coded, and then graphed using a multiple baseline format.
Results: The subjects’ FAs indicated a tangible function. The subjects obtained efficient use of three picture communication cards within 30 five-minute session blocks. Aberrant behavior decreased to zero and latency to respond to an opportunity leveled at 2 seconds. Further, two of the three subjects’ verbal vocabulary increased on average from two words to 56 words. The complexity (i.e., number of words paired together) of their verbal speech also increased from one to four on average. In addition, these results maintained over time and generalized to the classroom for each subject.
Conclusions: Findings of this study show the utility of milieu procedures in FCT to simultaneously decrease aberrant behaviors, increase communication mands, increase the diversity and complexity of verbalizations, and increase levels of maintenance and generalization.
Sponsor: University of Florida

PS5.17 USING PLAY AS THE CONTEXT FOR INTERVENTION: CASE STUDY Rebecca B. McCathren, April Schremp, University of Missouri
The purpose of this study was to assess the effects of a play-based intervention a three year old child with autism. A single subject multiple baseline across behaviors was used. At the start of intervention Sam had been in an intensive home-based behavioral intervention for about a year. He was also receiving OT, speech, and attended preschool. Sam was verbal and responsive to adult initiations although he often used echolalia and rarely engaged in pretend play.
The Communication and Symbolic Behavior Scales (CSBS) (Wetherby & Prizant, 1993) was administered to evaluate his communication and play skills. The CSBS is normed on children from 8 - 30 months. Although Sam was older than the children in the norming sample he scored in the 3rd percentile on the communication composite and the 63rd percentile for play. During the assessment Sam rarely looked at the adult when he spoke, seldom initiated an interaction, and displayed low levels and rates of play. Although Sam's father sat next to him, Sam did not direct communication to him. Based on the assessment three behaviors were targeted; verbal initiation, pretend play, and directing speech toward the adult. Intervention strategies included; following the child’s lead, imitating play, modeling and prompting for language, modeling symbolic play schemes, and prompting for eye contact.
Intervention occurred in the child’s home using his toys. Sessions lasted 20 minutes, and occurred twice a day for four weeks. Results showed that Sam made increases in all targeted behaviors. Rate of initiation went from .3 to
2.4 per minute. His play changed from being primarily undifferentiated exploration and self-stimulation to including higher rates of pretend play. Communication directed toward the adult changed from a rate of .1 to .95 per minute. The increases in the targeted skills suggest that play-based interventions may be effective for teaching social communication and plays skills to some children with autism.

PS5.18
AN EXAMINATION OF DATA COLLECTION METHODS IN AN EARLY INTENSIVE BEHAVIORAL INTERVENTION PROGRAM FOR CHILDREN WITH AUTISM Adel Najdowski, Jonathan Tarbox, Center for Autism and Related Disorders, Inc.

Background: There is a growing debate about the amount of data needed to make informed decisions in an ABA-based intervention program for children with autism.

Objectives: Compared intermittent and continuous data collection procedures to determine if there is a difference as to when skills are considered mastered using each data collection method and whether using one method leads to better maintenance of skills learned.

Methods: Children were recruited from CARD. Four skills were taught to each child using discrete trial training. Ten teaching trials were conducted for each skill during each teaching session. Decisions as to when skills were considered mastered were made based on either an intermittent or continuous data collection method. During the intermittent condition, data were recorded only during the first trial of a teaching session, and mastery was considered when the child responded correct during that trial across three consecutive sessions. During the continuous condition, data were recorded during all 10 trials of a teaching session, and mastery was considered when the child responded 80-100% correct across three consecutive teaching sessions.

Results: Preliminary analyses of the differences between conditions on the number of sessions to mastery and the maintenance of skills that were considered mastered according to each data collection procedure demonstrated no difference in findings for 12 children. Specifically, both data collection methods led to the determination that 48 skills were mastered in approximately the same number of sessions, and all skills were maintained at high percentages correct across three follow-up visits occurring once per week for three weeks.

Conclusion: Preliminary findings suggest both intermittent and continuous data collection methods used in an ABA-based intervention program for children with autism appear to yield similar results and that either can be used in making decisions about a child’s mastery of a skill.

SEVERE AUTISM Jo-Ann Reitzel, Jane Summers, Julia Frei, Liezanne Vaccarella, Peter Szatmari, Lonnie Zwaigenbaum, Hamilton Health Sciences/McMaster University

Introduction: Little is known concerning the effectiveness of IBI in children with severe autism since existing literature relates to children with mild to moderate impairments. Research concerning predictors of outcome is relevant to determine if IBI is clinically effective for these children and to prevent unnecessary exposure to costly and ineffective treatment for some children.

Objectives: Can static measures (age at entry, Autism symptomatology (Childhood Autism Rating Scale), cognitive functioning (Mullen) and IBI intensity) and a dynamic Early Learning Measure (ELM) predict 6 month outcome on the Vineland Adaptive Behaviour Scales (VABS) following IBI in children with severe autism?

Methods: Children with a diagnosis of Autistic Disorder were recruited. Children were administered the ELM monthly starting at entry to IBI until 4 months of treatment. ELM performance was classified as 'mastered' or 'not mastered', where mastery was 80% success on the ELM by 4 months of IBI. The VABS was used to assess adaptive functioning. Univariate regression analyses were performed with each predictor variable and the VABS standard scores.

Results: The Mullen and ELM both appeared to be good predictors of 6 month VABS outcome. However, there are limitations to using the Mullen for predictive purposes:

1) It is difficult to obtain a valid measure in each domain due to limited attention, compliance and motivation and the presence of behavioural problems

2) The domain scores are continuous requiring an appropriate cutoff and the identification of a single domain or a combination of domains that will best predict outcome

The ELM, however, is a repeated measure allowing children who do not master at baseline to show a more representative indication of their potential.

Conclusion: The dynamic ELM may a useful predictor of children who will benefit from IBI and those for whom alternate interventions should be explored.

Sponsor: Lawson Foundation & OMHF

PS5.20
INDIVIDUAL DIFFERENCES IN THE ACQUISITION OF SELF-INITIATIONS DURING SELF-INITIATION TRAINING Marie Louise Rocha, Laura Schreibman, Marie Rocha, University of California, San Diego

Background: The literature and our preliminary studies have identified marked deficits in self-initiations in young children with autism. Researchers believe that interventions effectively targeting these early social communication behaviors in this population may minimize obstacles to subsequent language learning and social interaction skills. Thus far, there is very little research on specific behavioral training of self-initiations to young, preverbal children with autism or on the effect of this early training on response to treatment.
Conclusion: Both family characteristics and changes in child language have implications for parenting stress and for supports that might be required.

Sponsor: BC Ministry of Children and Family Development; Human Early Learning Partnership

PS5.21
FAMILY CHARACTERISTICS AND CHILD LANGUAGE PREDICTORS OF PARENTING STRESS IN MOTHERS OF CHILDREN WITH AUTISM OVER TWO YEARS

Veronica Smith, Pat Mirenda, University of Alberta

Objective: The purpose of the study was to examine the variability and predictors of parenting stress in mothers of children with autism who received early intervention over two years.

Method: Standardized test and parental report data were collected for 66 children with ASD prior to intervention (T1) and 6 (T2), 12 (T3), and 24 months (T4) later. Their mothers completed the Parenting Stress Inventory-Short Form and demographic questionnaires that addressed language, ethnicity, marital status, education, and family histories.

Results: A cluster analysis revealed three distinct patterns of parenting stress change over 2 years. 40 percent of the mothers exhibited stress beyond clinically significant levels at the beginning of the study and maintained this level over two years. These levels were associated with children who were more frequently nonverbal and demonstrated less language change. These families more frequently had English as a Second Language. 48 percent of the mothers demonstrated clinically significant stress at the beginning of the study that decreased over two years. Greater child language change was associated with this group. The remaining 12 percent of the mothers did not demonstrate clinical levels of stress and their stress levels remained relatively stable over the two year period. These mothers perceived their children as less autistic but no child language changes were associated with this group.

Conclusion: Both family characteristics and changes in child language have implications for parenting stress and for supports that might be required.

Funded by: NIMH; Autism Society of America

PS5.22
SCHOOL-BASED STRUCTURAL ANALYSIS TO IDENTIFY SETTING EVENTS THAT PROMOTE AND MAINTAIN ADAPTIVE BEHAVIOR FOR STUDENTS WITH AUTISM SPECTRUM DISORDER

Janine Peck Stichter, Thompson Center for Autism and Neurodevelopmental Disabilities, University of Missouri

Since the inception of behavior analysis, basic research in the field has always been concerned with the theoretical and empirical study of antecedent variables (Mostofsky, 1965; Skinner, 1938). However, the applied literature has tended historically to emphasize the role of consequences (Carr & Durand, 1985; Iwata, et al., 1982). Yet, research has long demonstrated clear effects of setting events such as teacher behavior, instructional practices, and environmental characteristics on prosocial and adaptive behaviors of students with disabilities (e.g., Kern, et al., 1994; Reynolds, 1992; Stichter, et al., 2005). However, systemically assessing contextual variables within school settings by natural change agents continues to be an elusive process.

This study investigated the use of practitioner-implemented structural analyses to determine setting events affecting the adaptive behavior of three elementary age students with autism within their typical classroom settings. Descriptive measures including direct observation, as well as analogue probes were employed and contrasted. An ABA reversal design was used to compare intervention packages. Optimal intervention packages were assessed utilizing a multiple baseline design across settings. Maintenance and social validity data were also obtained.

Findings indicate that structural analyses can be implemented by a practitioner and can lead to the development of successful interventions within educational settings. All three students demonstrated quantifiable gains in prosocial behaviors and concomitant decreases in maladaptive behaviors across settings. Interobserver agreement was obtained of 87% for 35% of sessions.

Funding Source: University of Missouri

PS5.23
FEASIBILITY OF SOCIAL COGNITION AND INTERACTION TRAINING FOR ADULTS WITH HIGH FUNCTIONING AUTISM (SCIT-A).

Lauren M. Turner-Brown, David Penn, Gabriel Dichter, James W. Bodfish, University of North Carolina

Background: Impairments in social cognition and social functioning are defining features of autism that challenge otherwise high-functioning individuals to maximize their potential. Social Cognition and Interaction Training (SCIT; Roberts et al., 2004) is a group intervention developed to improve social-cognitive functioning. It...
utilizes cognitive and behavioral techniques to target emotion perception, theory of mind (ToM), and attributions, as well as social functioning. SCIT has been shown to improve ToM and social skills in individuals with psychotic disorders (Combs et al., 2006; Penn et al., 2005), a group that shows comparable social-cognitive deficits to HFA. Objectives: To modify and conduct a preliminary test of SCIT with adults with high functioning autism (HFA) to assess feasibility and potential of this program in the autism population. Method: We developed and tested SCIT-A in a sample of adults with HFA (6 in treatment condition, 5 in no treatment control). Groups were matched on IQ. Participants ranged in age from 27-55 years, and IQs ranged from 84-114. All participants met criteria for an ASD on the ADOS, and completed a battery of social cognition and social attention tasks at baseline and after intervention. Results: Feasibility results were promising: group attendance levels were excellent, with 92% attendance overall. Ratings of satisfaction among participants were also high, with 4/5 participants who completed a satisfaction survey rating the group as ‘useful’ or ‘very useful.’ Large effects were noted for social cognition measures. Conclusions: SCIT-A shows promise as an intervention program for adults with HFA. Future directions, including development of a SCIT-A manual, and challenges are discussed.

PS5.24
THE EFFECTS OF PARENTS AS THERAPISTS ON SOCIAL-COMMUNICATIVE DEVELOPMENT OF TODDLERS WITH AUTISM Laurie A. Vismara, Sally J. Rogers, Costanza Colombi, UC Davis M.I.N.D. Institute
Background: Autism interferes with the process of child learning and prevents adults from providing typical teaching opportunities within ongoing social interactions. Deficits in areas of development may reduce opportunities for children with autism to participate and learn from natural interactive experiences that occur throughout the day. These developmental delays may be further compounded by the time these children reach the toddler period.
Objectives: The current study was designed to provide parent training and support for parents of newly diagnosed toddlers with autism and to fill in the gap between diagnosis and treatment initiation that often occurs for families.
Method: The Early Start Denver Model was delivered to four toddlers with autism, ages 24 months and their primary caregivers. The study consisted of one hour weekly sessions for 12 weeks, in which primary caregivers were taught naturalistic therapeutic techniques based on communication and socio-cognitive development as well as applied behavior analysis. During each session, primary caregivers were taught to use specific teaching strategies during play activities in order to build child language and imitation skills and to increase the reward value of social engagement with others.
Results: All children showed measurable gains in social-communicative behaviors and increased attentiveness and initiation. These gains continued to maintain and generalize for those children who have completed treatment, all of whom acquired useful communicative speech and imitative behaviors. In addition, parents demonstrated mastery of the teaching techniques by midpoint of treatment and maintained their mastery across successive sessions.
Conclusions: Findings are discussed in relation to providing parents with the necessary tools to engage, communicate with, and teach their young children with autism.

PS5.25
COMPARING INDIRECT, DESCRIPTIVE, AND EXPERIMENTAL FUNCTIONAL ASSESSMENTS IN CHILDREN WITH AUTISM Art Wilke, Jonathan Tarbox, Adel C. Najdowski, Rachel S.F. Tarbox, Ryan Bergstrom, Center for Autism and Related Disorders, Inc.
Background: Current standards of practice dictate the need for ascertaining the function of challenging behaviors before treating them and for behavioral interventions to be function-based. The process of identifying the function of challenging behavior has come to be known as Functional Behavioral Assessment. Three broad categories of functional assessments have been developed, including indirect, descriptive, and experimental procedures. Although experimental functional analyses are common in research on behavioral intervention, indirect and descriptive functional assessment procedures may be more commonly used in clinical/educational practice. Little research has systematically compared indirect, descriptive, and experimental functional assessments. Objective: To compare the results of indirect, descriptive, and experimental functional assessments in children with autism. Methods: Indirect functional assessments consisting of the Questions About Behavioral Function, descriptive functional assessments consisting of antecedent-behavior-consequence data, and experimental functional analyses were conducted with 9 children with autism. Results of the assessments were compared in terms of conclusiveness and the function(s) identified, if any. Results: The indirect assessments produced conclusive results in 4 of 9 children, the descriptive assessments produced conclusive results in 6 of 9 children, and the experimental assessments produced conclusive results in 9 of 9 children. Agreement in results across all three forms of assessment was obtained for 2 of 9 children. Conclusion: Experimental functional assessments appear to produce conclusive results in a greater proportion of cases than either indirect or descriptive assessments. Experimental functional assessments are therefore recommended, whenever the necessary resources are available. This research was funded privately by the Center for Autism and Related Disorders. The authors have no conflicts of interest.

PS5.26
TEMPERAMENT IN THE INFANT SIBLINGS OF CHILDREN WITH AN AUTISM SPECTRUM
DISORDER Cristina Angela Fernandez, Daniel S. Messinger, Lisa Ibanez, University of Miami

Background: Studies examining temperament in children with autism have found that they exhibit less positive mood and lower approach orientation than typically developing children. Prospective studies have found that the infant siblings of children with an Autism Spectrum Disorder (ASD-sibs), who later received an ASD classification, have lower activity level than siblings of typically developing children (TD-sibs).

Objectives: We examined temperament differences between ASD-sibs and TD-sibs using the Infant Behavior Questionnaire (IBQ) and the Toddler Behavior Assessment Questionnaire (TBAQ). The between and within scale correlations of these measures were also examined.

Methods: ASD-sibs (n = 23) and TD-sibs (n = 25) were compared as parents completed the IBQ (at 8, 10, 12, and 15 months of age) and the TBAQ (at 18 and 24 months of age).

Results: At 18 months of age, when controlling for gender, ASD-sibs (n = 12) tended to exhibit more social fear than TD-sibs (n = 17), p = .08. At 24 months of age, when controlling for gender, ASD-sibs (n = 9) were significantly higher on social fear than TD-sibs (n = 8), p < .05. IBQ scales were moderately correlated over time, except for the duration of orienting scale. All scales of the TBAQ were moderately correlated over time.

Conclusion: There were no significant group differences between 8 and 15 months of age. However, ASD-sibs were reported as exhibiting more social fear than TD-sibs at 18 and 24 months of age. This is comparable to other studies that have found that children with autism, with a mental age of 24 months, exhibit less approach orientation than TD children. Overall, temperamental differences between groups seemed to emerge at later ages.

Sponsors: NICHD, NAAR/Autism Speaks, Marino Autism Research Institute

PS5.27 INTESTINAL PERMEABILITY IN CHILDREN WITH AUTISM SPECTRUM DISORDERS Ann Marie Reynolds, Kristina Kaparich, Susan Hepburn, Kathy Culhane-Shelburne, Lisa Miller, Alison Herndon, Edward Hoffenberg, University of Colorado at Denver Health Sciences Center

Background: There is a concern that children with Autism Spectrum Disorders have a "leaky gut." D-Eufemia (1996) found that 9 of 21 subjects with ASD had increased intestinal permeability.

Objectives: Compare intestinal permeability of children with ASD to children with typical development.

Methods: Intestinal permeability was assessed on a 6-hour urine collection after administration of an oral solution of lactulose (L) and mannitol (M) (Marsilio, 1998). The L/M ratio was compared among children (ages 2-18) with ASD (confirmed by ADOS and SCQ) on a regular diet (RD), children with ASD on a Gluten Free/Casein Free diet (GFCF), and children with typical development (TD).

Results: The mean L/M ratio for children with ASD/RD=0.086, for children with ASD/GFCF=0.088, and for children with TD=0.070. The difference between ASD/RD and TD was significant p=0.02. The difference between ASD/GFCF was not significant despite similar mean values. The difference between all children with ASD and TD was also significant p=0.02. If children with any history of asthma or eczema were excluded, ASD (n=21) had a mean L/M ratio of 0.09 and TD (n=13) had a mean L/M of 0.06. Normal L/M ratios have not been well established. Some studies use <= 0.09 as normal intestinal permeability, others use <0.44. 43% of children with ASD and 19% of children with TD had an L/M ratio above 0.09. No children with ASD expressed celiac antibodies.

Sponsors: CTRC/NIH, CDC

PS5.28 COGNITIVE PROFILES IN AUTISM: A POTENTIAL FOR IDENTIFYING PHENOTYPES Michele E. Villalobos, Judith Miller, Hilary Coon, Megan Farley, Heidi Block, Margaret A. Ashcraft, Lindsey Warner, William M. McMahon, Department of Psychiatry, University of Utah

Autism Spectrum Disorders (ASD) may result from genetic risk alleles that are shared with family members who do not have autism. Identifying intermediate phenotypes in families may accelerate discovery of genes conferring risk for autism. Recent studies have suggested that particular cognitive strengths (e.g. average or above average verbal abilities) and distinct IQ profiles (e.g. significantly higher nonverbal abilities relative to verbal skills), may be related to specific ASD characteristics. The current study examines cognitive profiles in a large sample of multiplex families as an initial step in identifying potential intermediate phenotypes. Family member status (affected or unaffected) was identified with the ADOS, ADI-R, DSM-IV criteria, and clinical judgment. Then, discrepancies between verbal and nonverbal intelligence were calculated for all participants. The hypothesis that IQ discrepancies diminish with age was then tested using a regression analysis to predict VIQ-PIQ across all participants, controlling for overall IQ level and gender. We also tested the association between social abilities and IQ profile in order to determine if certain IQ profiles (e.g. VIQ less than NVIQ) were indicative of lower social abilities. Preliminary data suggests that IQ patterns may differ across the life span in...
our sample of Utah families. Additionally, the relationship between cognitive profiles and ASD-related social characteristics will be discussed. Future analyses will apply these results to a larger study identifying other specific neurocognitive profiles in unaffected and affected family members with autism and will attempt to link these phenotypes to genetic variants.

Support was provided by: NICHD Collaborative Programs of Excellence in Autism Grant (5 U19 HD035476) and R01 MH069359.

PS5.29 HIGHER RATES OF WIDER PHENOTYPIC TRAITS IN PARENTS OF CHILDREN WITH ASD COMPARED WITH CONTROL PARENTS: THE USE OF THE FHI-R Marethade Jonge, Chantal Kemner, Anthony Bailey, Andrew Pickles, Jeremyr Parr, Herman van Engeland, University Medical Centre Utrecht

Background: the Family History Interview (FHI), previously used to measure broader phenotypic traits in first degree relatives of children with ASD, is now revised and includes separate scales for interviewing subjects and informants.

Objectives: To examine broader phenotypic traits in parents of ASD families in comparison with control parents and to investigate whether cut-off scores could be established to distinguish between the parent groups.

Methods: Parents of 28 families with affected sibpairs were administered the subject and informant version of the revised version of the FHI (FHI-R) and compared with a matched group of parents of a child with Down Syndrome. ROC curves were constructed.

Results: Significantly higher rates of social and communicational problems were found on both versions of the interview in the parents of children with ASD compared with the control group and were more pronounced in the fathers than in the mothers of the ASD families. Fathers, but not mothers, of the ASD group reported significantly more repetitive and rigid behavior than the control fathers or mothers. These difficulties were already present in childhood and were not found to be correlated with social burden. ROC curve analyses revealed that thresholds should be high to result in a high specificity, although this resulted in a low sensitivity.

Conclusions: Using the FHI-R, high rates of broader phenotypic traits were found in parents of the ASD group, especially in fathers. A first attempt to set thresholds for the broader phenotype revealed that the traits measured by the FHI-R are dimensional traits also seen to a certain degree in parents of the control group.


Background: Little is known about adult outcome for people with a childhood diagnosis of autism and average intellectual ability.

Objectives: To obtain information about current cognitive, social, and adaptive functioning of adults who were diagnosed with autism and had average intellectual ability during childhood and to examine diagnostic variation using DSM-III and DSM-IV diagnostic criteria.

Methods: Subjects are being recruited from a state-wide sample of 243 children and adolescents diagnosed with DSM-III autism in the 1980’s. A subset of twenty subjects with autism and average intellectual ability in childhood are now being assessed for outcome in adulthood. Current evaluations include diagnostic testing; assessments of cognitive, language, and adaptive functioning; and history of chronic psychiatric and medical conditions. Data are being collected from affected individuals, significant others, and related service agencies. Analyses will examine adult functioning compared to childhood characteristics.

Results: Findings presented will concern diagnostic and cognitive stability, development of adaptive functioning relative to cognitive ability, current language functioning, and outcome adjustment categorization.

Conclusion: Results will augment current knowledge of adult outcome for children with high-functioning autism and may contribute to better understanding of prognostic factors.

Sponsor: Autism Adult Outcome Pilot Study, Funding Incentive Seed Grant Program, University of Utah

PS5.31 THE EFFECT OF IMPROVISATIONAL MUSIC THERAPY ON JOINT ATTENTION, SOCIAL INTERACTION AND AFFECT SHARING BEHAVIORS IN CHILDREN WITH AUTISM: A CONTROLLED STUDY Jinah Kim, Aalborg University, Aalborg, Denmark / Jinah Kim Music Therapy Clinic, Seoul, Korea

Background: Improvisational music therapy is reported to be effective at improving social communication skills in children with autism. Testing this premise formed the basis for the doctoral study of the author.

Objective: To compare the effects of improvisational music therapy and play sessions with toys on joint attention, social interaction and affect sharing behaviors in children with autism.

Methods: 10 Participants, aged between 3 and 6 with confirmed diagnoses of autism, were recruited from the Child and Adolescent Psychiatry of the Seoul National University Hospital. A repeated measures, within subject comparison design was used and children were randomly assigned to two groups; group 1 had music therapy first, and then a play session later. Group 2 vice versa. Sessions were equally divided into undirected and more directed parts. The children's responsiveness to both music therapy and play sessions was assessed with the Pervasive Developmental Disorder Behavior Inventory (PDDBI), the Early Social Communication Scales (ESCS), and DVD analyses of selected session data.
Results: The overall results from the PDDBI, the ESCS and session analysis were generally in favor of music therapy over play sessions, indicating improvisational music therapy was more effective at improving joint attention, social interaction and affect sharing behaviors in children than play sessions. The most clinically relevant findings were that children showed markedly more and longer events of ‘eye contact’, ‘joy’, ‘emotional synchronicity’ and ‘initiation of engagement’ spontaneously in improvisational music therapy than play sessions, and during the undirected part of the session more than the directed part.

Conclusion: The findings highlighted the motivational aspects of musical interaction between the child and the therapist, and supported the claims of improvisational music therapy, promoting social communication skills. Fund: PhD Scholarship from AAU

PS5.32
SYSTEMATIC REVIEW OF SOCIAL SKILLS INTERVENTION FOR SCHOOL-AGED CHILDREN WITH HIGH-FUNCTIONING AUTISM OR ASPERGER’S SYNDROME
Cynthia J. Koning, Joyce Magill-Evans, University of Alberta
Background: Social difficulties are a primary concern for children with high-functioning autism (HFA) or Asperger’s Syndrome (AS). While clinicians often provide social skills intervention, methodologically sound research examining outcomes is only just emerging.
Objective: This paper provides a systematic review of peer-reviewed published research examining the research quality and summarizing the social skills intervention outcomes for school-aged children with HFA or AS. Methods: Literature from 1996 to 2006 in the CINAHL, Medline and PsycINFO databases was searched to locate studies published in English that measured the outcome of social skills interventions for school aged children. Three journals specific to autism were hand searched. To be included, research needed to address the core social skills difficulties experienced by children with HFA or AS as defined by current diagnostic criteria, rather than only examining discrete component skills such as greeting skills.
Results: Ten studies met the inclusion criteria. Almost all research used a pre-post-test design with relatively small samples. Methodological challenges included limited descriptions of participants, interventions, and outcome measures, and multiple statistical analyses with a small sample. In most of the studies, intervention resulted in significant gains.
Conclusions: Providing intervention improves some social skills of children with HFA or AS but it is unclear whether one intervention works better than another. Many of the successful intervention strategies were based on cognitive behavioural techniques and included typically developing peers. Interventions also included social problem-solving games, role-playing and some form of feedback.

PS5.33
GIRLS GROWING UP ON THE AUTISM SPECTRUM & DEVELOPMENT AND EVALUATION OF A ‘GIRL TALK’ GROUP CURRICULUM
Shana Nichols, Gina-Maire Muscillo, Fay J. Lindner Center for Autism North Shore/Long Island Jewish Health System
Background: No studies to date on social skills, therapy, or adjustment to adolescence have addressed the unique needs of girls with autism spectrum disorders (ASDs). Objectives: Evaluate the effectiveness of a pilot ‘girl talk’ girls group for high-functioning teens designed to (a) increase self-esteem, acceptance, and awareness (b) promote friendships and a safe place to talk (c) reduce stress related to growing up, (d) provide knowledge about adolescent issues, and (e) facilitate goals and understanding for parents.
Methods: Two 6-week girls groups (N=6) with participation of peer mentors (N = 3) have been conducted. Mothers of girls (VIQ>80) ages 13-18 (M=14.9) participated in parent groups, simultaneous with girls programming (1st cycle). In the 2nd cycle, 6 girls group sessions comprised 3 CBT, and 3 social skills (alternating), while parents led their own group. Measures include parent and self-report (pre- and post-) and observations.
Results: Curriculum development is outlined. Qualitative data regarding satisfaction/effectiveness from both members and parents will be presented (ratings of 4-5/5), in addition to case studies of 3 families. Preliminary analyses demonstrate increased self-esteem, body image, emotional regulation, and friendships (scores from 2-3 to 7-10). Parents became more comfortable with adolescent issues, and reported goal accomplishment. Data will be presented on vulnerability, puberty, body image, and parenting competence. Common themes arose (e.g., isolation, menstruation, emotion regulation, understanding friendships, emerging sexual interest, self-injury, and perfectionism).
Conclusions: Preliminary findings demonstrate appropriateness of group-based skill building and CBT for addressing mental health, self-esteem, social skills, and issues related to growing up for young women with ASDs.
Sponsor: N/A

PS5.34
FRIENDSHIP IN HIGH FUNCTIONING AUTISM SPECTRUM DISORDERS: MIXED AND NONMIXED DYADS
Nirit Bauminger, Sally J. Rogers, Marjorie Solomon, Bar-Ilan University
Background: There has been little empirical work comparing ‘mixed’ (child with HFASD and a typical child) and non-mixed (child with HFASD and a child with a disability) friendship dyads.
Objectives: To examine differences in mixed, non-mixed, and typical friendships, and to explore developmental and social-emotional characteristics of HFASD children in each.
Method: Participants were seventy three preadolescents
and their friends, comprising three groups: (1) HFASD (n = 42, 2-girls n = 23, Israel, n = 19, USA), divided into 2 groups depending on whether friends had typical development (n=26) or a disability (n=16); (2) typically developing children (n=31, 2-girls; 21= Israel, n=10, USA). Groups were matched on SES, VIQ, CA, and gender. Assessments included observation of dyadic interactions with a close friend, mothers’ reports of friendship characteristics, the KSS security scale, a TOM, 2nd order False-belief task, and an emotion recognition measure.

Results: Mixed friendships resembled typical friendships, but differed from non-mixed friendships in that participants were more responsive to one another; exhibited greater positive social orientation and cohesion; and demonstrated more complex coordinated play. Interestingly, children with HFASD in mixed and nonmixed friendships differed only on receptive language abilities. HFASD children in mixed friendships had stronger verbal skills.

Conclusion: All children with HFASD exhibited friendships with positive qualities, however, mixed dyads were more similar to dyads of typically developing children. Exposure to typical peers appears important. Implications for school inclusion are discussed.

Sponsor: BSF

**PS5.35**

**THE PRACTICE OF SCIENCE AND THE SCIENCE OF PRACTICE:** Samuel L. Odom, Susan M. Wilczynski, Steve Lohrer, FPG Child Development Institute, University of North Carolina

The scientific evidence of the efficacy of intervention approaches for children and youth with ASD is rapidly growing. Such evidence could be the basis upon which to determine interventions that will be most useful for children and youth with ASD. Yet, efforts to translate scientific evidence of treatment efficacy into information that practitioners may use is limited. The National Standards Project, in collaboration with the California ASD Project, is conducting a comprehensive analysis of the literature on intervention and treatment research. The literature search identified over 700 articles that met inclusion criteria. Following a standardized evaluation system, a national board of expert reviewers is evaluating the methodological quality of research studies and the level of evidence provided for focused intervention approaches (e.g., discrete trial training, peer mediated intervention) and comprehensive treatment models (e.g., Denver Model, Walden Project, TEACCH). The analysis will yield quantitative information on the quality of evidence for each of the approaches, and the evidence available for children and youth with ASD at different functioning levels. The analysis is currently underway and data will be available for presentation at the IMFAR conference.

**PS5.36**

**EYEGAZE DETECTION AND FOETAL TESTOSTERONE** Emma Louise Chapman, Simon Baron-Cohen, Bonnie Au yeung, Rebecca Knickmeyer, Kevin Taylor, Gerald Hackett, University of Cambridge

**Background:** Eye contact is a salient nonverbal behaviour in human interaction and is of major importance in normal social development. Individuals with autism spectrum conditions (ASC) show abnormal eye contact. There is a sex difference in mutual gaze, with females being more likely to engage in eye contact with someone else for longer periods of time. Whilst this sex difference may reflect experiential factors, it may also reflect developmental differences in brain structure, under the influence of the early organisational effects of foetal testosterone (FT). Human studies have found FT is inversely correlated with frequency of eye contact in infancy. Male foetuses are exposed to FT levels 2.5 higher than female foetuses. Aims: To investigate gaze detection abilities in children whose FT levels are known, to test if accuracy in detecting direct vs. averted gaze is correlated with levels of FT. Methods: 91 children (49 males, 42 females) aged 6-8 years of age were presented with pictures of faces whose eyes were either direct or averted. In the averted case, there were different degrees of deviation: 1, 3, 5, 9 or 15. The child had to say if the person they saw was looking directly at or away from them. Results: There was a significant negative correlation between FT and performance on the conditions of direct and smallest gaze aversions (1 and 3 degrees). Girls also performed significantly better on these conditions. Discussion: These results suggest that whilst postnatal experience may influence social development, prenatal biology also plays an important role. This has implications for the causes of ASC, where abnormal eye gaze behaviours are characteristic, and may explain increased rates of ASC among males.

Sponsors: Nancy Lurie Marks Family Foundation, MRC

**PS5.37**

**MEASURING MIRROR-SELF RECOGNITION IN LOW-FUNCTIONING CHILDREN WITH AUTISM**

Robertina Fadda, Giuseppe Doneddu, Marinella Parisi, Gessica Saba, Maria Grazia Iacolina, Department of Psychology, University of Cagliari, Italy

**Background:** Despite the large use of mirror recognition tests in the studies of the development of self in typically developed children (TD), its interpretation as an evidence of self awareness is still controversial. Visual spatial skills as well as social abilities, like self/others differentiation, appear to be crucial for the task to succeed. Furthermore, little is still known about its validity for evaluating self-awareness in low-functioning children with autism (LF-Aut).

**Objectives:** Compare mirror image recognition in LF-Aut and in TD in three different conditions: 1) self-recognition; 2) recognition of a familiar adult; 3) recognition of an object.

**Methods:** Data were collected on 13 LF-Aut (Mean IQ=40; 10M, 2 F; Non verbal; Mean Cronological
PS5.38
SOCIAL RECIPROCITY AND THEORY OF MIND
IN HIGH FUNCTIONING PERVERSIVE
DEVELOPMENTAL DISORDER: A
PRELIMINARY REPORT. Jeremy Goldberg, Geoffrey
BC Hall, Dianne C. West, Krissya R. Doyle, Peter
Szatmari, Department of Psychiatry and Behavioural
Neurosciences, McMaster University.
Background:
Impaired social reciprocity (SR) is characteristic of the
Pervasive Developmental Disorders (PDD; American
Psychiatric Press, 1994) and abnormal theory of mind
(TOM) - which is the ability to understand the mental
states of others - is thought to underlie this social deficit
(Baron-Cohen, 2001). Despite reports of impaired TOM
in PDD (Baron-Cohen, 2001) the question of how this
relates to impaired SR is still largely unanswered.
OBJECTIVE: Compare individuals with high functioning
(HF) PDD and controls using 2 different tests of TOM
and relate this to social behavior.
Hypotheses: TOM measured with ‘the voice test’ and ‘the
eyes test’ is diminished in PDD and related to social
behavior in these individuals.
Method: Subjects were diagnosed according to DSM IV
criteria for PDD and recruited as volunteers from a local
life skills program for individuals with HF PDD. Controls
were recruited as volunteers. All participants had no
history of neurological, psychiatric or substance related
disorder. After receiving approval by the institutional
review board of McMaster University, participants were
informed of the study and signed consent. The PDD
sample consisted of 10 males aged 19 to 52 years (mean
30.8) and the controls so far include 5 males aged 19 to
29 years (mean 24.8).
Measures:
(1)Reading the Mind in the Eyes Test (Baron-Cohen,
2001) consists of showing different photographs of the
eye region of the human face to determine what the
person is thinking or feeling.
(2) Reading the Mind in the Voice Test (Rutherford,
2002) consists of listening to 40 segments of dialogue
recorded from a dramatic audio book to determine what
the person is thinking or feeling
(3) The Social Responsiveness Scale (SRS; Constantino,
2003) is a 65 item rating scale that ascertains autistic
symptoms and is used as an index of severity of social
deficits in PDD.
Results: The results indicated no between group
differences in mirror self-recognition (38% LF-Aut; TD;
U = 65; p>0.05) and in the recognition of the object
(58% LF-Aut; 61% TD; U=73; p>0.05). The recognition
of the familiar adult was significantly lower in LF-Aut
than controls (18% LF-Aut; 77% TD; U=29; p<0.05).
Conclusion: Mirror recognition of self and of objects
develops in LF-Aut at the same developmental age of TD.
Thus, mirror self-recognition seems to be a valid task in
evaluating self-awareness in LF-Aut. The atypicall pattern
in the recognition of the familiar adult in LF-Aut - a
reduced attention to human faces and gestures - needs to
be further investigated with future researches.
Sponsor: Fondazione Banco di Sardegna, Sardinia, Italy.

PS5.39
ARE CHILDREN WITH AUTISM SUSCEPTIBLE
TO CONTAGIOUS YAWNING? Molly Helt, Inge-
Marie Eigsti, Peter J. Snyder, Hilary Boorstein, Deborah
A. Fein, University of Connecticut
Background: Platek, Critton and Myers (2003) postulated
that susceptibility to contagious yawning (that is, yawning
that is prompted by the visual or auditory perception of
another’s yawn) may be dependant upon the ability to
understand what others feel. Using fMRI, researchers
have discovered that although contagious yawning does
not recruit the mirror neuron system, and thus is likely not
a form of conscious imitation requiring a detailed action
understanding, it does seem to draw on neural areas
responsible for unconscious processing of social
information (Platek, Mohammed, & Gallup 2005;
Schurmann et al. 2005).
Objectives: Given that children with autism spectrum
disorders (ASD) have difficulty processing implicit social
cues, as well as understanding the mental states of others,
we hypothesized that children with ASD may be less
susceptible to contagious yawning than their typically
developing peers. We exposed children with ASD (n=12)
(mental ages ranging from 2 years;4 months to 7 years;4
months) and typically developing children (n=24)
between the ages of three and twelve to a yawning
stimulus by reading them a story, during which the reader
would pause to yawn several times.
Results: Typically developing children were individually
matched with ASD children for chronological age (CA-
TD) and mental age (MA-TD), respectively, resulting in
two comparison groups. In contrast to the 50% rate of
contagious yawning (i.e., yawning that followed the
reader’s yawn within 90 seconds) exhibited by the CA-
TD group and the 42% rate in the MA-TD group, only
17% of the children with ASD showed contagious
yawning.
Conclusion: Findings demonstrate that children with ASD
are less likely to yawn when exposed to another’s yawn, a
difference which may be related to impairments in
implicit processing of social information.

PS5.40
ASSESSING THEORY OF MIND IN YOUTH WITH
ASPERVER'S DISORDER: IMPLICATIONS FOR
PREDICTING & PROMOTING RESILIENCY
Yvonne L. Hindes, Vicki L. Schwean, Donald H.
Background: Individuals with Asperger’s Disorder (AsD) are characterized by significant difficulties in social interaction and emotional relatedness. Additionally, these individuals have difficulties applying social-emotional and self-regulation skills in real-life situations and are at a higher risk to experience loneliness, anxiety, and depression (American Psychiatric Association, 2000; Dissanayake & Macintosh, 2003). These challenges significantly impact multiple domains including social and adaptive skill development. Deficits in Theory of Mind (ToM), the ability to conceive of and use mental state concepts to interpret and predict one’s own and others’ behaviour, are commonly advanced as an explanation for the social-emotional difficulties of individuals with Autism Spectrum Disorders (Baron-Cohen, Tager-Flusberg, & Cohen, 2000). The current literature in ToM deficits in AsD, however, has produced conflicting results with some investigators reporting that individuals with AsD have ToM deficits, while others have failed to find evidence supporting this conclusion (Baron-Cohen, O’Riordan, Stone, Jones, & Plaisted, 1999; Happe & Frith, 1996; Ziatas, Durkin, & Pratt, 1998).

Finally, although there is evidence suggesting a relationship between social cognitive abilities and resiliency in typically developing populations (Masten, Burt, Roisman, Obradovic, Long, & Tellegen, 2004), there is little literature that examines this relationship in youth with AsD.

Objectives & Methods: The purposes of this study were to examine ToM in youth with AsD, aged 17 to 21 years recruited from 3 Canadian communities, to facilitate a better understanding of the social cognitive functioning associated with AsD and to explore the ability of ToM to predict resiliency in these individuals.

Results: Results are discussed in light of recommendations for future assessment and intervention supports.

Sponsor: Alberta Centre for Child, Family & Community Research

**PS5.42**

ANTEROIOR EEG ASYMMETRY AND SOCIAL SYMPTOMS IN HFA CHILDREN

Anne Pradella

Inge, Peter C. Mundy, Heather A. Henderson, Nicole M. Kojkowski, Caley B. Schwartz, Nicole E. Zahka, Camilla M. Hileman, Drew C. Coman, Justin Dainer-Best, University of Miami

Introduction: Differences in symptom presentation in autism affect diagnosis and intervention. These differences may be associated with the motivation for behavioral activation versus inhibition. This may be measured, in part, in terms of relative left frontal or right frontal EEG asymmetry.

Objectives: Examine the degree to which anterior EEG asymmetry relates to in-vivo, direct observations of social-interaction symptoms on the ADOS, as well as parent report of symptom presentation using the SRS, and child self report of comorbid behavioral and emotional disturbance on the BASC.

Methods: As part of a larger study of 100 participants with HFA (ages 8-16 years), preliminary data were available on 13 children at the time of this abstract submission. Subjects had a previous diagnosis of an autism spectrum disorder, which was confirmed using the ADOS and additional parent report measures. EEG data were collected using a Lycra stretch electrocap with tin electrodes embedded in positions corresponding to the international 10-20 electrode system. EEG asymmetry was assessed by subtracting the natural log of the left hemisphere electrode alpha power scores from their paired right hemisphere electrode power. More positive score are indicative of relatively more left than right frontal activity at corresponding electrode sites.

Results: Relative left frontal asymmetry was associated with parent report of fewer total social symptoms, less evidence of impaired self-awareness, and less evidence of impaired social cognition on the SRS. However, left
frontal asymmetry was associated with higher scores on the Social Interaction subscale of the ADOS. In addition, left frontal asymmetry was associated with child self-report of more symptoms of anxiety and hyperactivity/inattention on the BASC.
Conclusion: These results may indicate that anxiety and hyperactivity/inattention, associated with asymmetry, influences HFA children’s ratings on the ADOS.
Sponsor: NIMH

PS5.43
DYNAMICS OF SHIFTING VISUAL ATTENTION IN CHILDREN WITH AUTISM WATCHING SCENES OF SOCIAL INTERACTION Kelley Knoch, Sarah Shultz, David Lin, Warren Jones, Ami Klin, Yale Child Study Center
Background: Previous research has shown that when watching naturalistic scenes of social interaction individuals with autism, relative to typically-developing peers, fixate more on people's mouths and inanimate objects, while looking less at people’s eyes. A different but related body of research suggests that children with autism may have difficulty shifting visual attention from one target to another. The current study seeks to connect these two lines of research by exploring the temporal dynamics of shifting visual attention within the context of natural viewing.
Objectives: To quantify the temporal dynamics of shifting visual attention in individuals with autism and in matched, typically-developing peers while viewing naturalistic scenes.
Methods: Adolescents with autism and matched controls viewed scenes of dynamic social interaction. Within the movies, scene cuts provided instances where new visual information requires a viewer to shift visual attention from an old stimulus (in the previous scene) and engage with a new target (in a new scene). Eye-tracking measures were collected during all movie scenes, allowing for measures of reaction time of shifting visual attention. Reaction times were analyzed across groups and between individuals, and also in relation to the type of visual target the viewer was engaging with or shifting from.
Results: Preliminary analyses suggest that in individuals with autism reaction times to shift attention from a visual target vary more as a function of IQ than of social disability, but that visual engagement—what type of target is first fixated after a scene cut—may be more indicative of the child's level of social functioning.
Conclusion: The present study offers a way to quantify the temporal dynamics of shifting visual attention during conditions of natural viewing. These measures offer a way to assess the manner in which shifting attention relates to social deficits and/or level of intellectual functioning.

Background: Little research addresses the self-perceptions of high functioning adolescents with autistic spectrum disorders (ASD). Understanding the areas that adolescents perceive as challenging or as strengths will help in planning interventions by understanding factors that may influence their participation in programs and areas that they perceive as meaningful to address. Addressing self-perceptions may also influence their quality of life.
Objectives: This study examines eight domains of self-perception (scholastic competence, social acceptance, physical appearance, athletic competence, job competence, romantic appeal, behavioural conduct and close friendships,) and global self-worth and the relationship between these domains as measured using Harter’s Self-Perception Profile for Adolescents (SPPA).
Method: Thirty-six adolescents, attending an inpatient psychiatry program and diagnosed with ASD, able to read at a Grade 8 level, and between the ages of 13 and 17 completed the SPPA.
Results: Self-perceptions were positive only for scholastic competence and were most negative in the domains of athletic competence, close friendships, and social acceptance. These adolescents were aware of their strengths and challenges. Scores on social acceptance, physical appearance, and romantic appeal were significantly related to perceptions of global self worth.
Conclusions: These adolescents with ASD reported lower self-perceptions in areas such as social acceptance, close friendships, and athletic competence. Their awareness of challenges can be used to encourage participation in interventions aimed at improving skills related to negative self-perceptions and building on strengths. There are implications for participation in fitness related activities. Further study with different samples is merited.

PS5.45
EFFECTIVENESS OF SOCIAL SKILLS SUMMER CAMP FOR CHILDREN WITH AUTISM SPECTRUM DISORDER Grace Mathai, Lisa Ruble, Paulette Flores
No longer considered rare, autism spectrum disorder (ASD) affects 1 in 166 children (Chakrabarti & Fombonne, 2001). In Kentucky, this number translates into approximately 6,700 children between birth and 18 years (Kentucky Census, 2000). Disordered social communication development is the hallmark feature of ASD (American, Psychiatric, & Association, 1994), including problems understanding how to carry a conversation, empathize, and make and keep friends. Laboratory based research demonstrates the efficacy of social skills interventions. This information is particularly important given that the best prognostic indicator of outcomes in adulthood is social skill development. Teaching children the rules of social behavior using specialized intervention approaches that includes opportunities to practice and rehearse skills in structured and unstructured environments will help protect children from being ostracized by peers as well as develop critical skills for the future. The purpose of this study is to report on the outcomes of SS STAR, the first study on the
outcomes of a summer social skills camp for children with ASD. Fifteen children with ASD between 9 and 14 years of age participated as well as 5 typical peers for 5 hours a day for 2 weeks. The Social Engagement Checklist (SEC), developed for this study, was used to measure the frequency of children’s initiation, maintenance, and responsiveness. Good internal consistency was observed for the SEC (Cronbach alpha coefficient of .74). A repeated measures analysis of variance as conducted for the frequency of the three types of behavior monitored over time. Significant improvements were observed over the 10 days for 2 of the 3 types of social behaviors evaluated - maintenance and responsiveness. A trend toward significance was observed for the third behavior, initiation. Parent quotes from camp as well as self reports are also provided as social validity of the intervention outcomes.

**PS5.46**

**A META ANALYSIS OF THE SOCIAL STORY INTERVENTIONS FOR CHILDREN WITH AUTISM AND OTHER DEVELOPMENTAL DISABILITIES**

*David B. McAdam, Christine R. Peterson, Jonathan Breidbord, Deborah A. Napolitano, University of Rochester School of Medicine*

Background: Developed by Carol Grey, Social Stories are designed to help students with ASD learn to better identify appropriate social responses and the likely response of other people to social situations such as having a conversation, greeting strangers, and using a quiet voice in public setting.

Objective: To conduct a meta-analysis of the social story intervention literature that used single-subject experimental designs.

Methods: Published and unpublished data-based evaluations of social stories studies that used single-subject experimental designs were identified through computer searches conducted using PsychInfo, Eric, and ProQuest electronic databases. The relevant characteristics of each article were then coded (e.g., the age, of each participant). The data for each single-subject graph was then extracted using Graphclick version 2.9 computer software. The Percentage of nonoverlapping data were then calculated for each study as a measure of effect size.

Results: The review identified 25 research studies that used single-subject experimental designs involving 68 persons with ASD or other developmental disabilities. The efficacy of social stories as an intervention for the social deficits of persons with ASD was found to have a modest overall effect size. Effect size was not found to be significantly influenced by the level of intellectual functioning of the participant or the degree to which the experimenter's adhered to social story construction rules. Social stories were found to be more effective in decreasing problem behaviors than in increasing adaptive behaviors. Additionally, studies that included additional components such as differential reinforcement of alternative behavior in the social story intervention package were found to be more effective.

**Conclusion:** The implications of the results obtained to future researchers and clinical practice will be discussed.

**PS5.47**

**WHAT'S IN A LOOK? THE SIGNIFICANCE OF SOCIAL GAZE IN AUTISM.**  
*Jessica Anne Meyer, Peter Hobson, Institute of Child Health, University College London and Tavistock Clinic*

Background: Ever since the syndrome of early childhood autism was described by Kanner in 1943, controversy has surrounded the children's atypical patterns of social gaze. How far are we justified in interpreting different qualities as well as patterns of gaze as reflecting particular kinds of engagement with others? From a methodological perspective, how far does the meaning of gaze behavior become evident only when it is considered in the context of a more 'whole person' approach to embodied social-affective communication?

Objectives: To operationalize the evaluation of different qualities of social gaze - sharing looks, guilty looks, and self-conscious looks - in semi-structured settings, and to determine whether contrasts between participants with and without autism were meaningfully related to other indices of social engagement, such as person vs. object-centred imitation and parental report of concern and self-consciousness.

Participants and Methods: Three groups of participants with autism, matched with control groups according to chronological and verbal mental age, were videotaped in three settings: when asked to imitate self/other-orientated actions, when involved in mildly guilt-inducing events, and when having their photograph taken. We also interviewed parents of groups of matched children about emotional aspects of their social engagement.

Results: The different kinds of look on videotape were rated with high inter-rater reliability. In each setting, participants with autism were rated as showing some forms of looking, but there were specific limitations in the three forms of social and self-conscious looking. Moreover, this abnormality was meaningfully related to other evidence of specific kinds of limitation in their social relatedness.

Conclusion: At least certain qualities and patterns of gaze among children with autism reflect a relative dearth of 'person-centred' engagement and identification with the feelings of others.

**PS5.48**

**PARENT AND TEACHER RATINGS OF SOCIAL SKILLS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS**  
*Donna S. Murray, Lisa Ruble, Cynthia A. Molloy, Cincinnati Children’s Hospital/University of Cincinnati*

Background: Deficits in social skills are a core feature of autism. However, social skills can have an extremely variable presentation between individuals diagnosed with ASD. These skills can also vary within individuals depending on environment and context, such as home vs. school.

Objective: Compare parent and teacher ratings of social
skills in children with ASD. Methods: Subjects (n = 45) were children diagnosed with an ASD who participated in a social skills treatment program at one of two autism treatment centers. Prior to the intervention program, the parents and the teacher most familiar with each child completed the TRIAD Social Skills Assessment (TSSA) questionnaire. Correlation coefficients were calculated to determine the strength of the relationship between parent and teacher scores on the subscales of the TSSA. A weighted kappa statistic (kw) was calculated as a measure of agreement between parent and teacher ratings on the 4 point scale for each item on the TSSA questionnaire. Mean differences between parent and teacher ratings were examined. Results: While there was significant correlation between parent and teacher ratings for the total score on the TSSA (r = 0.34; p <0.05), clear patterns of differences in reporting emerged. Parents consistently rated the children higher than teachers on measures of initiating interactions, while teachers consistently rated children higher on measures involving response to and maintaining interactions. Best agreement was observed on the affective understanding subscale (r = 0.38, p <0.05; kw = 0.033, 0.41). Conclusion: Parents and teachers observe different strengths and deficits in social skills. These skills may be more context dependent. Some skills, such as affective understanding may be less context dependent.

PS5.49
THE RELATION BETWEEN EMPATHY AND SOCIAL BEHAVIORS IN TODDLERS AT RISK OF AUTISM
Nuri M. Reyes, Agata Rozga, Angeline Dijamco, Marian Sigman, UCLA
Objectives: To examine the concurrent relation between empathic responsiveness (degree of interest and concern) to the examiner’s distress and algorithm scores on the social domain of the ADOS-G in a group of toddlers at risk of autism and a control group of typically developing infants.
Methods: Data were collected from twenty-five 24-month-old infant siblings of children with autism and 15 control infants. Children’s responses to a distressed adult were examined in a task in which the examiner pretended to hurt her finger while playing with a xylophone, and expressed verbal and nonverbal signs of distress for 15 seconds. Subjects’ expressions of interest and concern were both rated on a 3-point scale, with higher scores indicating greater responsiveness. The two ratings were summed to generate an overall empathy score (range: 0-6). Children also participated in the ADOS.
Results: Preliminary data based on 12 subjects in the autism risk group indicate a negative correlation between children’s scores on the social domain of the ADOS algorithm and the empathy, r = -0.6, p = .04. Thus, children who presented with more severe social difficulties on the ADOS received lower empathy ratings. None of the children met the overall cutoff for Autism or Autism Spectrum on the ADOS. Further analyses will be conducted comparing the autism risk group and control group on the empathy measure and examining its association with social behavior on the ADOS.
Conclusions: Infants at risk of autism who responded more empathically to another person’s distress also displayed more social engagement on the ADOS.
Funding: STAART Center Grant MH068172

PS5.50
TEMPERAMENT AND SELF-MONITORING IN HIGH-FUNCTIONING CHILDREN WITH AUTISM
Caley B. Schwartz, Anne P. Inge, Nicole Kojkowski, Nicole Zabka, Camilla Hileman, Drew C. Coman, Peter C. Mundy, Heather A. Henderson, University of Miami
Background: The study of factors influencing variability in social functioning is vital to improving our understanding of the nature, diagnosis and treatment of autism spectrum disorders.
Objectives: To examine the relations of individual differences in temperament and self-monitoring (SM) to social behavior in higher-functioning children with autism (HFA).
Methods Used: Temperament was assessed in 23 children (13 HFA, 10 Controls) using self report on the Early Adolescent Temperament Questionnaire-Revised. To assess SM participants completed a Flanker task while EEG was recorded and response-locked to correct and incorrect responses. The average negative peak amplitude within 150ms of error responses, the error-related negativity (ERN), was computed as a neurophysiological indicator of SM.
Results: Results revealed an interaction between group and temperament (p=.027) such that groups differed on measures of pleasure sensitivity (p=.015) and surgency (p=.011). HFA children endorsed higher levels of pleasure associated with low intensity activities, such as walking among trees. Control children endorsed higher levels of pleasure associated with activities involving high intensity and novelty, such as going places with large crowds. For both groups ERN amplitude was larger for error trials and was maximal at frontal/central sites. However, the control group exhibited larger ERN amplitudes than the HFA group, reflecting greater sensitivity to errors. Larger ERN amplitude was associated with self-reports of higher levels of pleasure from low intensity activities and a desire for close relationships with others. Conclusions: Results suggest that measures of temperament and SM may provide information that is important for understanding social phenotypic differences in HFA children. Implications of these results for better understanding the nature, diagnosis and treatment of autism will be discussed.
Sponsor: NIMH

PS5.51
SUGGESTED PUNISHMENT FOR MISBEHAVING: WHAT DOES IT REVEAL ABOUT UNDERSTANDING OF SOCIAL INTERACTIONS IN AUTISM?
Cory Shulman, The...
Background: The ability to judge acceptability of social behavior through proposed punishment is a measure of misbehavior which has not yet been investigated among individuals with autism.

Objectives: The present research analyzed suggested punishment for wrongdoing presented in pictures, and compared behaviors and different levels of severity among students with HFA and those with typical development.

Methods: Eighteen students with autism and 18 without autism were matched on full, verbal, and performance IQs. Autism diagnosis was ascertained with the ADI and ADOS. Each participant was shown 10 pictures, depicting everyday social interactions and asked whether the behavior illustrated was acceptable. For behaviors judged unacceptable, the students were asked: "Is there any place where such behavior would be acceptable?"; "Should the people be punished?"; "What is a suitable punishment?". All answers were transcribed.

Results: No group differences emerged in the ability to judge unacceptability. The students with typical development suggested that the unacceptability of some behaviors was dependent on the situation, whereas the students with autism did not. Similarly, typically developing students' suggestions for punishments were ranked for severity according to the seriousness of transgression, with moral transgressions receiving the most severe punishments. No such distinctions were revealed in the suggested punishments of the students with autism.

Conclusion: Results reveal the ability to judge acceptability of social behavior in interactions in everyday situations is similar for individuals with autism and typical development. The punishments suggested by the individuals with autism do not differentiate behaviors on the basis of severity and context, suggesting impairment in their ability to distinguish between different types of social transgressions.

Sponsor: NICHD

PS5.52

EYE BLINKING IN CHILDREN WITH AUTISM WHILE WATCHING SCENES OF SOCIAL INTERACTION

Sarah Shultz, Kelley Knoch, David Lin, Warren Jones, Ami Klin, Yale Child Study Center

Background: Blinking has been linked to visual information processing, yet few studies have examined blinking in autism. In typically-developing individuals, blinks are often inhibited while processing a stimulus to minimize visual information loss incurred while blinking. The probability of blink inhibition correlates positively with one's assessment of the relevance of that stimulus. Other research shows that when watching social interactions, people with autism exhibit altered patterns of visual scanning. Along with such measures, quantification of blinking may index a viewer's assessment of stimulus relevance.

Objectives: Explore patterns of blinking in autism during viewing of social interactions.

Methods: School-age children with autism and matched typically-developing peers watched films of social interaction while measures of blinking and visual scanning were collected. Blinking and blink inhibition were analyzed between groups and in relation to scene content and visual scanning.

Results: While baseline blink rates are similar between groups, timing of blink inhibition varies between groups as a function of scene content. Children with autism are more random in their blink inhibition, whereas typically-developing children inhibit blinks during socially-charged scenes and while fixating on socially relevant stimuli.

Conclusion: Blink patterns may index a person's implicit assessment of stimuli relevance, and may identify altered patterns of social information processing in autism. These measures will provide insight into a developmental cycle of altered perceived stimulus salience and a child's learning, factors which may be both cause and consequence of the social deficits in autism.

Sponsor: NICHD
Oral Session #13
Emotions and Social Interactions

Chair: Ami Klin

Speakers:
Mari S. Davies, Mirella Dapretto, Marian Sigman, Leigh Sepeta, Susan Bookheimer, UCLA
Natalia Maria Kleinhans, Todd Richards, L. Clark Johnson, Keith C. Stegbauer, Geraldine Dawson, Elizabeth Aylward, University of Washington Autism Center
Linda Melissa Quirmbach, Alan J. Lincoln, Monica J. Feinberg-Gizzo, Brooke R. Ingersoll, Siri Andrews, Center for Autism Research, Evaluation and Service (CARES)
Nah Yong Hwee, Poon Kenneth Kin-Loong, Yong Hwee, NAH, National Institute of Education, Nanyang Technological University, Singapore
Carla A. Mazefsky, Diane L. Williams, Nancy J. Minshew, University of Pittsburgh
A. Cheryl Dissanayake, Carli Growcott, School of Psychological Science, La Trobe University

ABSTRACTS

NEURAL CORRELATES OF VIEWING EMOTIONAL FACES WITH DIRECT OR AVERTED GAZE IN CHILDREN WITH AUTISM SPECTRUM DISORDERS Mari S. Davies, Mirella Dapretto, Marian Sigman, Leigh Sepeta, Susan Bookheimer, UCLA
Objective: To explore the neural correlates of direct and averted eye gaze and emotion processing in children with Autism Spectrum Disorders (ASD).
Method: While undergoing fMRI, 16 high-functioning children with ASD aged 8-17 years, and 16 age- and IQ-matched typically developing (TD) children viewed a series of faces depicting angry, fearful, happy, and neutral expressions. Half these faces displayed eyes with direct gaze and half displayed eyes with averted gaze. All faces, presented in a pseudorandom order, were preceded with crosses cueing participants’ visual fixation to the eyes in each face.
Results: Behavioral eyetracking analyses confirmed that children in both groups fixated equally on the faces’ salient features for both direct and averted gaze. Children in both groups showed increased activity in visual cortices and hippocampus during the task. Focusing on the negative emotions, we observed significant differences in activity to direct vs. averted eye gaze in the TD group, whereas neural activity was similar across the two gaze conditions in the ASD group. In response to negative emotions with direct gaze, TD children showed reliable activity in ventrolateral prefrontal cortex (VLPFC). In contrast, children with ASD showed no reliable differences when observing negative emotional faces with direct vs. averted gaze. Between-group analyses confirmed reliably greater signal change in the TD vs. ASD group in bilateral VLPFC. Conclusions: While viewing faces displaying negative emotions with direct eye gaze, TD children showed reliable activity in VLPFC, which they did not while viewing faces with averted eye gaze. In contrast, no such differential activity was observed in ASD children, who did not activate this region in either condition. These results highlight the key role of eye gaze in signaling communicative intent and suggest altered processing of the emotional significance of direct gaze in children with ASD.
Support: NICHD (PO1 HD035470)
REDUCED NEURAL HABITUATION IN THE AMYGDALA IS RELATED TO SOCIAL IMPAIRMENT IN ASD Natalia Maria Kleinhans, Todd Richards, L. Clark Johnson, Keith C. Steghauer, Geraldine Dawson, Elizabeth Aylward, University of Washington Autism Center

Background: Amygdala hyperactivity has been proposed as a potential mechanism for social impairment in autism spectrum disorders (ASD).

Objectives: To determine 1) whether level of amygdala activity during face perception is related to reduced neural habituation and 2) whether the rate of amygdala habituation is related to social impairment in ASD.

Methods: Participants included 19 adults with ASD and 20 matched controls. The ASD group met diagnostic criteria on the ADI-R, ADOS-G, and DSM-IV. We measured change in functional brain activity in the amygdala in response to faces over two FMRI runs. Face stimuli were photos of 24 adults with a neutral facial expression. Each run contained four face blocks and 48 photographs. Subjects performed a 1-back working memory task to ensure attention to the stimuli.

Results: To test whether the groups showed differential habituation over time, a paired-samples t-test was conducted comparing activation in face blocks 1-4 (run 1) to blocks 5-8 (run 2). For each amygdala voxel, a measure of neural habituation was computed, representing the decrease in activation between run 1 and run 2. Significant neural habituation was observed in the amygdala bilaterally in controls; only the left amygdala showed this effect in the ASD group. When directly comparing amygdala activation between groups, controls evidenced significantly greater habituation bilaterally than the ASD group. The ASD group showed a significant negative correlation between neural habituation and degree of severity on the ADOS social score.

Conclusions: These results suggest that previously reported hyperactivation in the amygdala in autism may be due to abnormally reduced habituation in response to socially relevant stimuli. The observed relationship between reduced amygdala habituation to affectively neutral stimuli and social severity suggests that sustained amygdala arousal may contribute to the social deficits observed in ASD.

Funding: NICHD, NIMH

SOCIAL STORIES: MECHANISMS OF EFFECTIVENESS IN INCREASING GAME PLAY SKILLS IN CHILDREN DIAGNOSED WITH AUTISM Linda Melissa Quirmbach, Alan J. Lincoln, Monica J. Feinberg-Gizzo, Brooke R. Ingersoll, Siri Andrews, Center for Autism Research, Evaluation and Service (CARES)

Background: Individuals diagnosed with autism tend to have difficulty understanding how one should behave in different social situations and identifying the context when prescribed behaviors should be implemented.

Objectives: Compare the effectiveness of a standard and directive social story intervention in improving specific game play skills in children diagnosed with autism. Also assessed the extent to which autism severity, intellectual profile, reading ability and prior game play experience related to successful game play.

Methods: 45 Participants were recruited from the Center for Autism Research, Evaluation and Service and the San Diego Autism Society. Participants were assessed with the WISC-IV, ADOS and PIAT-R, resulting in a confirmed diagnosis of Autism Spectrum Disorder. Participants were randomly assigned to standard, directive or control story formats. Children participated in two intervention sessions, spread one week apart, in which they rotated between the "Play Room" and "Reading Room" five times on each intervention day.

Results: Results demonstrated that the intervention worked successfully for children who had prior game play experience and Verbal Comprehension (VCI) scores from the WISC-IV intelligence test in the Borderline range or above. The standard format was equally as effective as a novel directive story format in improving game play skills. In addition, this study demonstrated that, relative to controls, treated participants (a) generalized their newly acquired play skills with different games, and (b) maintained their play skills over time.

Conclusion: This study supports the use of both standard and directive social story interventions to improve game play skills in children with autism ages 7 to 14 who have Verbal Comprehension Index (VCI) scores from the WISC-IV above 68.

Sponsor: Alliant International University

PERCEPTION OF SOCIAL NORMS BY CHILDREN WITH HIGH FUNCTIONING AUTISM Nah Yong Hwee, Poon Kenneth Kin-Loong, Yong Hwee, NAH, National Institute of Education, Nanyang Technological University, Singapore

Background: This study investigated the perception of social norms and justifications of responses
of children with High Functioning Autism (HFA) and typically developing children.

Objectives: To understand (1) the extent of difficulty that children with HFA have in understanding the social norms and recognizing socially inappropriate behaviors as compared to typically developing peers and (2) how do the justifications of the social inappropriateness of behaviors by children with HFA differ from typically developing peers.

Methods: Behaviors that were rated by the majority of children as socially inappropriate in a pilot study conducted in Singapore were incorporated into eight vignettes. Each vignette contained a probe after socially inappropriate event (test item) and another after a socially appropriate event (control item). For each vignette, participants were asked to rate the strangeness (on a 4-point Likert scale) of the test and control items. Justifications for each rating were also elicited. Fifteen children with HFA and 15 typically developing children (ages from 9 to 13 years old) participated in the main study.

Results: The children with HFA rated socially inappropriate behaviors in vignettes no differently from their typically developing peers. In contrast, the children with HFA rated control items as stranger relative to their typically developing counterparts. Further analyses of the justifications revealed that children with HFA had a higher tendency to provide non-social or/and bizarre justifications instead of applyingjustifications based on social norms and conventions.

Conclusion: Children with HFA are as adept as their typically developing peers to recognize socially inappropriate behaviors. However, they tend to provide non-social or/and bizarre justifications whereas their typically developing peers tend to provide justifications based on social norms and conventions.

Sponsor: Research Grant-Singapore Children’s Society

ADAPTIVE FUNCTIONING AND FAMILY HISTORY IN HIGH-FUNCTIONING AUTISM Carla A. Mazefsky, Diane L. Williams, Nancy J. Minshew, University of Pittsburgh

Background: Family history of psychiatric and broader autism phenotype (BAP) symptoms has received recent attention, but the relationship of family history to variability in autism presentation remains unclear.

Objectives: Identify family history and adaptive functioning patterns in high-functioning autism and clarify whether family history variables relate to proband adaptive functioning.

Methods: Data were pooled across studies from individuals (ages 8-39 years; mean = 17) with ADOS- and ADI-confirmed diagnoses of autism and IQ < 80. Functioning level was assessed with the Vineland Adaptive Behavior Scales (VABS). Information was gathered on family history of psychiatric and BAP symptoms using the Family History Interview (FHI).

Results: FHI data for 200 families revealed that different psychiatric disorders were present in at least one 1st degree relative at rates of 10-39% (e.g., OCD in 14% of families; depression in 39% of families). Five distinct family history factors were identified: (1) BAP, (2) internalizing disorders, (3) drug/alcohol use and antisocial behavior, (4) hyperactivity, and (5) lack of affection.

Data from 252 probands on the VABS Social, Communication, and Daily Living scales were explained by 3 clusters (~1/3 of the sample in each): (1) average in all 3 areas; (2) average in Communication, but 1 SD below in Social and Daily Living; and (3) > 2 SDs below in all 3 areas.

Stepwise discriminant analysis using family history variables predicted VABS cluster membership with ~70% accuracy, with depression, shyness, and OCD in 1st degree relatives retained as having the greatest discriminatory power above and beyond proband age and IQ.

Conclusions: Findings highlight the marked variability in functioning in an average-IQ autism sample and identified distinct family history patterns. Family history profiles appear related to child dysfunction, which could be mediated by genetics or family dynamics.

Sponsor: NICHD

THE DEVELOPMENT OF CONSCIENCE IN CHILDREN WITH HIGH FUNCTIONING AUTISM AND ASPERGER’S DISORDER A. Cheryl Disanayake, Carli Growcott, School of Psychological Science, La Trobe University

Objectives: The primary aim was to investigate the early moral development of children with high-functioning autism (HFA) and Asperger’s Disorder (AspD) by focusing on their conscience development.

Methods: Participants comprised 16 children with HFA, 16 with AspD, and 19 TD children, aged 4 to 7 years and matched on verbal and overall mental age. Children’s compliance to a prohibition and a request were observed in the presence of the experimenter who set the commands, and their internalisation of these commands was observed in her absence. Parents also completed the ‘My Child’ conscience questionnaire.
Results: The conscience development of the children with HFA and AspD was found to deviate from that of the TD children, such that they were less compliant to the experimenter’s request and failed to internalize this command. However, there were no group differences in children’s compliance to, and internalization of a prohibition. Thus children on the autism spectrum, like TD children, find it easier to comply with a prohibition than a request. Parents also reported difficulties with conscience development, although only the differences between the HFA and TD groups significant. Children with HFA were reported as less likely to show the appropriate emotional signals and affective responses prior to and following wrongdoings. As these affective responses generally guide behaviour, these children were also reported as less likely to refrain from wrongdoing and less likely to execute desirable acts. No differences were apparent between the two clinical groups on parental reports of conscience development or on the observed measures of compliance and internalization.

Conclusions: In focusing on conscience development, the results of this study enable us to chart the early moral development of children with Autistic Disorder and Asperger’s Disorder, in addition to clarifying the diagnostic boundaries between these disorders.
**Oral Session #14**  
**Repetitive Behavior**

**Chair:** Stewart Mostofsky

**Speakers:**  
Daniel J. Simmonds, Stewart H. Mostofsky, *Kennedy Krieger Institute*  
Evdokia Anagnostou, Latha Soorya, Jennifer Bartz, Danielle Halpern, Jin Fan, Eric Hollander, *Mount Sinai School of Medicine*  
Peter Szatmari, Xiao-Qing Liu, Andrew Paterson, *McMaster University*  
Kristen S.L. Lam, Tia N. Holtzclaw, Lauren M. Turner-Brown, Brian Boyd, Grace T. Baranek, James W. Bodfish, *Neurodevelopmental Disorders Research Center UNC-Chapel Hill*  
James W. Bodfish, Kristen S.L. Lam, Tia N. Holtzclaw, Lauren M. Turner-Brown, Krestin J. Radonovich, Mark H. Lewis, *UNC-Chapel Hill*  
Mary Elizabeth Stewart, Hasan Reem, Timothy D. Griffiths, Jessica M. Foxton, Jennifer Watson, Ashlie-Jane Allcock, Gregory O’Brien, *Heriot-Watt University*  

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**ABSTRACTS**

**DECREASED FUNCTIONAL CONNECTIVITY OF MOTOR SYSTEMS IN AUTISM.**  
*Daniel J. Simmonds, Stewart H. Mostofsky, Kennedy Krieger Institute*  

**Background:** Careful consideration of quantifiable and reproducible motor signs offers a valuable means of investigating the neurobiology of autism. Abnormal motor development in autism may be due to poor connectivity between regions important for motor skill learning and execution.  

**Objectives:** To examine functional connectivity of motor systems in children with autism during performance of a simple finger sequencing task.  

**Methods:** Thirteen right-handed children (11 boys) with high functioning autism (HFA) and thirteen typically developing (TD) controls (11 boys), ages 8-12 years, completed a finger sequencing task during fMRI in which participants alternated between 30 second blocks of rest, left handed finger sequencing (LHFS) and right handed finger sequencing (RHFS). Regions of interest (ROIs) were generated for each individual based on the fMRI contrasts comparing ‘LHFS vs. rest’ and ‘RHFS vs. rest’: bilateral ROIs in sensorimotor cortex, anterior cerebellum (culmen) and putamen, and an ROI in the left supplementary motor area (SMA). Time course of activation was extracted for each ROI; functional connectivity was calculated separately for LHFS and RHFS as the correlation between each ROI pair.  

**Results:** The findings showed a general underconnectivity for the HFA group across all ROI pairs (p=0.002). For both LHFS and RHFS, underconnectivity were seen primarily in two ROI pairs after Bonferroni correction for multiple comparisons: 1) SMA and contralateral cerebellum (LHFS: p=0.048, RHFS: p=0.031), 2) SMA and ipsilateral sensorimotor cortex (LHFS: p=0.025; RHFS: NS).  

**Conclusions:** Functional underconnectivity of motor systems in autism is consistent with findings of motor impairment in the disorder. Moreover, underconnectivity of motor systems for the hand not in use through the SMA may reflect poor bilateral motor regulation, and underlie impaired acquisition and execution of motor skills observed in children with autism.  

Sponsored by NIH and NAAR

**INTRAVENOUS AND INTRANASAL OXYTOCIN TARGETS SOCIAL COGNITION AND REPETITIVE BEHAVIOR DOMAINS IN AUTISM: BEHAVIORAL AND FUNCTIONAL IMAGING FINDINGS.**  
*Evdokia Anagnostou, Latha Soorya, Jennifer Bartz, Danielle Halpern, Jin Fan, Eric Hollander, Mount Sinai School of Medicine*  

**Background:** A number of animal studies have shown that oxytocin is involved social cognition, as well as grooming and repetitive behaviors. Autism is a neurodevelopmental disorder characterized by repetitive behaviors, social deficits, and language abnormalities. Given that
repetitive behaviors and social interaction deficits are core symptom domains of autism, and that oxytocin is involved in the regulation of repetitive behaviors and social cognition, we believe that oxytocin may play a role in autism.

Objective: To start examining the effect of oxytocin on brain function and behavior

Methods: In the first arm of this study we tested the effect of intravenous oxytocin on prefrontal cortex and face processing circuitry activation. We subsequently tested the feasibility and therapeutic potential of intranasal oxytocin (INOT) in the treatment of the repetitive behavior and social domains in high-functioning adults with ASD in a six week, double-blind, placebo-controlled trial.

Results: Pilot data show promising results for both increased recruitment of prefrontal cortex and face processing network post infusion of oxytocin as well as improvements in repetitive behaviors and social functioning post treatment with INOT. Specifically, there is greater reduction in repetitive behaviors (YBOCS) for the INOT group compared to placebo: t(5) =4.72, p=.005. In addition, analysis of responders and non-responders based on CGI-I-Social suggested that 75% of INOT subjects were responders (CGI-I-Social = 1 or 2) vs. 33% of placebo subjects. Similarly, responders analysis of CGI-I-Global suggest 75% of INOT subjects were responders vs. 33% of placebo subjects.

Conclusion: These preliminary findings are consistent with studies linking oxytocin to social recognition and repetitive behaviors in and provide preliminary support for the use of oxytocin in the treatment of autism.

Funded by a Seaver Foundation award to Dr Anagnostou and in part by STAART (1 U54 MH66673-01)

SEX DIFFERENCES IN AUTISM SPECTRUM DISORDER PHENOTYPES Peter Szatmari, Xiao-Qing Liu, Andrew Paterson, McMaster University

Objective: to understand sex differences associated with autism spectrum disorders (ASD).

Background: while there are important sex differences in the prevalence of ASD’s, whether boys and girls with ASD differ on cognitive functioning, language development and autism symptom severity is not known.

Method: the AGP is an international consortium of research groups studying the genetics of ASD. The sample size for this analysis of multiplex families includes 1183 boys and 323 girls with a diagnosis of ASD (autism, Asperger syndrome or PDDNOS) based on both the ADI-R and ADOS. Boys and girls are compared on measures of IQ, language development (items from the ADI-R) and the ADI domain scores of social reciprocity (SOC) and repetitive behaviours (REP). The IQ scores are stratified into three levels: IQ <50, 51-69, and >70.

Results: the sex ratio for the entire sample is (boys to girls) 3.7:1. There are no significant differences between genders on the ADI-R SOC score or the age of first words or phrases. However, on the ADI-R REP score, girls have lower scores than boys (p=.0002) after adjustment for age of ADI completion and AGP site. There is also a significant association between gender and IQ stratum (chi-square=7.51; p=.02) in that there are proportionately more girls in the mid-IQ stratum than in the other two. However in this stratum, the significant difference between the genders on ADI-R REP is not apparent (p=.12) whereas it is in the other two.

Conclusion: these results suggest there is a complex interaction between gender, IQ and ADI-R REP scores. While it is largely true that girls have fewer repetitive behaviours than boys, this effect is moderated by IQ ranges. The implication of this finding for understanding the genetics of ASD will be discussed.

Source of funding: Autism Speaks

DEVELOPMENTAL STUDY OF THE ASSOCIATION OF RESTRICTED REPETITIVE BEHAVIORS AND EXECUTIVE FUNCTIONS IN PRESCHOOLERS WITH AUTISM SPECTRUM DISORDERS Kristen S.L. Lam, Tia N. Holtzclaw, Lauren M. Turner-Brown, Brian Boyd, Grace T. Baranek, James W. Bodfish Neurodevelopmental Disorders Research Center UNC-Chapel Hill

Background: Despite the clinical significance of repetitive behaviors (RB) in autism, relatively little is known about their phenomenology, development, and neurocognitive correlates. The primary objective of this study was to compare young children with autism spectrum disorders (ASD) to two comparison groups - a typically-developing group (TYP) and a developmentally delayed group (DD) on measures of RB and executive function (EF).

Methods: Data was collected from 145 children, aged between 2-5 years (60 ASD, 62 TYP, 18 DD). Measures included the Social Communication Questionnaire (SCQ), the Repetitive Behavior
Scale-Revised (RBS-R), the Behavior Rating Inventory of Executive Function - Preschool Version (BRIEF-P), and the Nisonger Child Behavior Rating Form (NCBRF). Longitudinal data were collected using the same battery of measures 1 year later in a subset of cases.

Results: A wide variety of RBs (ranging from motor stereotyped to restricted interests) were significantly more prevalent in children with ASD beginning at age 2. Developmental comparisons of the groups revealed the RB increased in severity from age 2 to 5 in the ASD group but decreased in severity in the TYP group during this time. In children with ASD, a significant association between RB and deficits in EF was found.

Conclusion: Our findings suggest that a variety of RB emerge quite early in children with autism and that executive dysfunction could play a role in their expression. The severity of RB and EF deficits appears to increase markedly between 2 and 5 years of age in children with autism suggesting that this time period may be an a key developmental window to target for intervention.

Supported by: NIH R01 MH73402, NIH T32 HD40127

BEYOND EXECUTIVE FUNCTIONING IN AUTISM: COMPONENT COGNITIVE AND MOTOR PROCESSES ASSOCIATED WITH REPETITIVE BEHAVIOR PHENOTYPES

James W. Bodfish, Kristen S.L. Lam, Tia N. Holtzclaw, Lauren M. Turner-Brown, Krestin J. Radonovich, Mark H. Lewis, UNC-Chapel Hill

Background: Although aspects of executive functioning (EF) are impaired in autism, less is known about the components of EF that are most impaired and how these components interact to produce specific patterns of autistic symptoms. Further, EF processes are involved in the control of cognitive and motor responding consistent with the functional subdivisions of the fronto-striatal pathways that appear to sub-serve EF. We hypothesized that specific patterns of cognitive and motor control deficits may account for phenotypic differences in repetitive behaviors (RB).

Methods: A high functioning ASD sample (n=30) and a gender, age, and IQ matched control sample (n=30) were compared on (a) a set of RB measures (Repetitive Behavior Scale-Revised, Interview for RB, Interests Scale); (b) a set of motor tasks (Bruininks Test, Motor Exam Protocol, eye blink); and (c) a set of cognitive tasks (Object Uses, Dimensional Card Sort, Random Numbers, Visual Exploration, BRIEF).

Results: We found that a specific pattern of cognitive control processes (visual search, generativity, shifting) were impaired in persons with ASD and that impairments in these types of cognitive processes were significantly correlated with higher-level RB (insistence on sameness, circumscribed interests). In contrast, evidence of impairments on motor control measures were primarily correlated with lower-level RB (motor stereotypy, self-injury).

Conclusion: These results suggest that processes that are involved in inhibiting prepotent responding in order to produce an arbitrary or novel response may be impaired in autism and may underlie the types of higher-level repetitive behaviors that are most characteristic of autism.

Supported by: NIH R01 MH73402, T32 HD40127

WEAK CENTRAL COHERENCE: IS IT APPARENT ACROSS SENSORY DOMAINS AND IN THE BROADER PHENOTYPE?

Mary Elizabeth Stewart, Hasan Reem, Timothy D. Griffiths, Jessica M Foxton, Jennifer Watson, Ashlie-Jane Alcock, Gregory O’Brien, Heriot-Watt University

Background: Evidence for a local processing bias in ASD is from a range of sources including visual perceptual tasks, reading homographs in context and enhanced local processing in melodies (1-4). If this processing style hopes to explain behaviours in ASD we would expect it to be apparent across modalities and across the IQ spectrum.

Objectives: This study assesses whether there is local processing bias: across auditory and visual domains in individuals with ASD; and in the broader phenotype using 'autistic' traits (5).

Methods: Study 1: 13 students with Autism Spectrum Disorder and 15 matched control subjects were recruited. Subjects were tested on three tests assessing whether perception of the 'local' feature was susceptible to interference from the 'global' whole. WCC tests were in both visual and auditory domains.

Study 2: 28 students who scored either high or low on the AQ were tested using an adapted block design test. Groups were matched on age and IQ.

Results: Study 1: Differential performance was found on the auditory test but not on the visual tests in those with ASD. There was no relationship between performance across the domains. However, those who scored high on AQ were less affected by the global structure in the block design test than those who scored low on AQ [F(1,26) = 11.12, P < 0.005].

Conclusion: There is not a general bias towards local processing across modalities. However, there
does seem to be a local processing bias across the IQ spectrum. This may be due to differential developmental trajectories.

Sponsor: Wellcome Trust and Northgate & Prudhoe NHS Trust.

Oral Session #15
Education, Community-Based Services and Treatment

Chair: David Mandell

Speakers:
Kathleen C. Thomas, Robert McConville, Alan Ellis, Carolyn McLaurin, Julie Daniels, Joseph Morrissey, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill
Pat Mirenda, Karen D. Bopp, University of British Columbia
Aubyn C. Stahmer, Sarah Reed, Rady Children’s Hospital, San Diego
Isabel M. Smith, Susan E. Bryson, Daniel Openden, Robert L. Koegel, Lynn K. Koegel, Dorothy Chitty, Reginald Landry, Dalhousie University / IWK Health Centre
Jessica Suhrheinrich, Laura Schreibman, University of California, San Diego

ABSTRACTS

MANDATES FOR INSURANCE COVERAGE OF AUTISM IN THE U.S. Kathleen C. Thomas, Robert McConville, Alan Ellis, Carolyn McLaurin, Julie Daniels, Joseph Morrissey, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill

Background: Health insurance is an important source of funding for autism services. Despite holding insurance, families continue to pay substantial amounts out-of-pocket.

Objectives: This study identifies characteristics of insurance mandates and Medicaid plan features in the U.S. and how combined legislation can influence who pays for autism.

Methods: Mandates for private insurance coverage for autism and Medicaid plan features were collected for all states. Each state was characterized in terms of the insurance coverage for autism that could be available. Four scenarios were developed to describe typical expenditures for a child/adult with high functioning/classical autism. Family and private, state and federal insurance expenditures are described under each scenario. Data from a statewide survey of families with a child with autism living in North Carolina (n=383) are used illustratively.

Results: Seven states have autism-specific mandates, ten have mental health parity mandates that address autism, and two have both. All states have home and community based care waivers, however, only 20 states have no waiting lists for individuals with developmental disabilities. In North Carolina, where there are waiting lists for Medicaid waiver programs and no mandates, families contribute to the majority of services used, while private insurance contributes to 41% of services used and Medicaid to 23%. Care from specialist providers, sensory/motor therapies, or medications are more likely to be covered by insurance. Behavioral therapies are more often paid for by families.

Conclusions: Mandates for private insurance coverage paired with Medicaid plan features have the potential to cover a broad range of needed services for individuals with autism. Gaps in services remain due to ERISA-exempt insurers and lack of clarity over responsibility for services that have both educational and medical features.

Sponsors: NIMH (R21 MH066143), CDC through NC-CADDRE

BEHAVIOR PREDICTORS OF PARENTING STRESS IN MOTHERS OF CHILDREN WITH AUTISM OVER TWO YEARS Pat Mirenda, Karen D. Bopp, University of British Columbia

Background: Little is known about how the problem behaviors of young children with ASD impact maternal parenting stress over time.

Objectives: To examine the impact of inattentiveness; social unresponsiveness; and problematic eating, acting-out, stereotypic motor, and insistence on sameness (IS) behaviors on parenting stress over 2 years.

Method: Standardized test data were collected for 62 children with ASD prior to intervention (T1)
and 6 (T2), 12 (T3), and 24 months (T4) later. Their mothers completed the Parenting Stress Inventory-Short Form. Six behavior predictor variables were constructed using cross-test items endorsed by an expert jury. Structural equation modeling was employed to examine T1 behavior variables and changes in behavior variables from T1-T2 and T1-T3 as predictors of the rate of change (ROC) of parenting stress between T1 and T4.

Results: Behavior scores at T1 did not predict parenting stress over 2 years. However, children whose IS behaviors decreased between both T1-T2 and T1-T3 had mothers who were less stressed (i.e., had a greater decrease in the ROC of parenting stress) over 2 years. Changes in acting-out behavior and social unresponsiveness appeared to affect maternal stress in unexpected ways.

Conclusion: Changes in child problem behavior have implications for parenting stress and for supports that might be required.

Sponsor: BC Ministry of Children and Family Development; HELP; NAAR/Autism Speaks

PRACTICE VARIABLES ASSOCIATED WITH CHILD ENGAGEMENT IN COMMUNITY EARLY INTERVENTION PROGRAMS FOR CHILDREN WITH ASD
Aubyn C Stahmer, Sarah Reed, Rady Children’s Hospital, San Diego

Background: There has been little investigation of community implementation of interventions for children with autism. An examination of community practices may assist researchers in facilitating knowledge transfer to practice settings.

Objectives: This study examined program variables and teaching techniques in community early intervention programs in relationship to child engagement (which associated with improved learning).

Method: Ten teachers serving children with autism ages 3-5 were videotaped in their classrooms for two hours/day across two days. Videos were scored by trained observers for provider type, activity, intervention techniques and level of child engagement. Multivariate analyses of variance (MANOVA) were used to examine the relationship between each factor and child engagement.

Results: Community programs provided one-on-one (22%) and small group instruction (23%), circle time (27%), snack (8%) and free play (11%). Children were most likely to be engaged during one-on-one and small group activities. Rate of engagement with peers was very low overall (17%). Rates of engagement were highest with the classroom teacher (78%). Lead teachers provided instruction only 23% of the time. Instructors typically chose the activity (86%), used primarily verbal instructions (46%) and provided very little feedback to students (28%).

Conclusions: High rates of child engagement demonstrate that the instructors were successfully engaging children in educational activities. Antecedent instructional strategies were used nearly three times as often as feedback techniques (consequences). The high rate of verbal instruction to the near exclusion of other instructional strategies reveals that teachers are not necessarily following best practice guidelines. Recommendations for translation of treatment research into community practice are discussed.

Sponsor: Career Development Award from NIMH K01 MH065325

A NOVEL COMMUNITY-BASED EIBI PROGRAM FOR AUTISM: ONE-YEAR OUTCOMES
Isabel M. Smith, Susan E. Bryson, Daniel Openden, Robert L. Koegel, Lynn K. Koegel, Dorothy Chitty, Reginald Landry, Dalhousie University / IWK Health Centre

This province-wide community-based program of early intervention for young children with autism uses PRT (Pivotal Response Training), rather than discrete trial teaching, as the fundamental teaching strategy. PRT, an ABA-based naturalistic intervention, targets core autism deficits in motivation and social-communication.

Objective: To evaluate child and family outcomes for the first cohort of children after one year in the NS EIBI program.

Methods: An initial community cohort of 27 preschoolers with autism [mean CA = 4-3; mean Merrill-Palmer-Revised (M-P-R) Developmental Index = 53] participated in a PRT-based EIBI program. The parent-training model was supplemented by 15 hours/week of naturalistic behavioural intervention by trained 1:1 interventionists, in the home and/or preschool settings. Assessments of children’s progress were conducted prior to, and following 6 and 12 mo of intervention by independent examiners.

Results: By 6 mo, significant age-equivalent gains were observed in multiple domains, most strikingly 7- to 10-mo gains on language measures (PLS, PPVT III, M-P-R Receptive Language). Of 6 nonverbal children, 4 acquired some functional speech within 6 mo. Collateral changes were observed: decreases in behaviour problems (CBCL) and autistic symptoms (SRS), as well as child-related parental stress (PSI). At 1 yr, clinically and statistically significant gains were
evident on global measures (M-P-R Developmental Index, Vineland ABC).

Conclusion: One yr post-intervention, significant and substantial improvement was observed in both specifically targeted (communication) skills and in other untargeted areas of child and parent functioning.

Sponsor: NS Dept of Health; NS Health Research Foundation

EFFECTIVENESS OF A PRT TRAINING PROGRAM FOR TEACHERS Jessica Suhrheinrich, Laura Schreibman, University of California, San Diego

Background: Teachers who are certified in special education often do not receive specific training in teaching children with autism. Pivotal Response Training (PRT) is a naturalistic behavioral intervention that has been shown to increase the language, play and social skills in children with autism in individual settings. This study investigated the effectiveness of a training model for instructing teachers to use PRT in the classroom setting and the maintenance of participants’ implementation of PRT at follow-up.

Methods: Participating teachers (n=7) attended a 6-hour training workshop and received 30-minute classroom training sessions individually until each teacher met a standard mastery criterion for fidelity of implementation (FI). FI of PRT in a classroom setting was measured at baseline and at each classroom visit. Additionally, after follow-up periods of 1-month (n=3), 3-months (n=2), or 5-months (n=2), teachers’ FI was assessed.

Results: The amount of training time required for each teacher to reach the mastery criterion for implementation of PRT varied, with a range of 7-12 hours. In the 1-month follow-up group, all three teachers continued to meet the mastery criterion for FI. In the 3-month follow-up group, one of the two teachers continued to meet the mastery criterion for FI. Neither of the two teachers continued to meet the mastery criterion for FI in the 5-month follow-up group.

Conclusions: The effectiveness of this PRT teacher training program will be discussed. These results indicate the importance of on-going monitoring to maintain teaching skills. Discussion will include how improved maintenance may be achieved.
Poster Abstracts – 6
1:00 – 4:30 pm
Themes: Animal Models Neurotransmitters and Neurochemistry, Early Development Nonverbal
Communication, Epidemiology, Repetitive Behavior

PS6.1
PHENOTYPIC DIFFERENCES RESULTING FROM WHETHER THE HETEROZYGOUS
DISRUPTION OF MOUSE GABRB3 GENE OCCURS ON THE PATERNAL OR MATERNAL
ALLELE Timothy M. DeLorey, Ezzat Hashemi, Peyman
Sahbaie, Molecular Research Institute
Background: The GABRB3 gene, which encodes the β3
subunit of the GABA A receptor, is a strong candidate for
involvement in autism spectrum disorder (ASD). Mice
lacking the gabrb3 gene, exhibit numerous phenotypic
traits common to ASD.
Objectives: To determine whether a phenotypic difference
exist between mice that have a heterozygous disruption of
the gabrb3 gene on the paternal versus the maternal allele.
Methods: Parent-of-origin defined heterozygous mice
were evaluated for sociability and social novelty by the
three compartment, stranger mouse protocol and for
tactile sensitivity using von Frey fibers. Additionally,
mRNA expression levels of the gabrb3 gene were
examined in heterozygous and control mice, at birth and
in adulthood.
Results: As expected, both paternally and maternally
derived heterozygous mice exhibited a significant
reduction in gabrb3 gene expression as compared to
controls. However, gabrb3 gene expression differed
between the paternally and maternally derived
heterozygous mice. Disruption of the gabrb3 gene on the
paternal allele, rather than the maternal one, produced a
more robust effect, in regards to social behaviors and
tactile sensitivity.
Conclusion: When evaluating the phenotype associated
with a heterozygous gene disruption, one must also
consider the possibility that the parental allele, containing
the disruption, may likewise influence how the phenotype
manifests.
Research funded by NIMH RO1 MH065393.

PS6.2
INTRAVENTRICULAR INFUSIONS OF PROPIONIC ACID BUT NOT CONTROL
COMPOUNDS INDUCES INCREASED LOCOMOTOR ACTIVITY AND INNATE
NEUROINFLAMMATORY CHANGES IN RATS
Jennifer Hoffman, Roy Taylor, Yalda Mohammad Asef,
Francis Boon, Donald-Peter Cain, Martin Kavaliers,
Klaus-Peter Ossenkopp, Derrick F. MacFabe, The
University of Western Ontario
Background: Dietary, digestive system and
immunological factors have been implicated in the cause
and symptoms of autism spectrum disorders (ASDs).
Propionic acid (PPA) is a short chain fatty acid, a product
of enteric bacteria, and a common food preservative. PPA
has widespread effects on cellular metabolism,
intracellular pH and immune function. We have found
PPA can elicit consistent behavioural and
neuropathological changes in rodents and may be a model
for human ASDs.
Objectives: To evaluate the behavioural and
neuropathological effects of chronic intraventricular
infusions of PPA and structurally similar compounds in
rodents.
Methods: Adult rats received intraventricular infusions of
pH 7.5 buffered PPA (500ug/ul), isomolar 1-propanol,
sodium acetate or PBS vehicle (0.1M) twice daily for 7
treatment days. Immediately following microinfusion,
animals were individually placed into an automated open
field (Versamax) and a variety of locomotor activity
variables were assessed for 30min. Afterwards, animals
were sacrificed and brains examined
immunohistochemically for markers of innate
neuroinflammation.
Results: Animals treated with PPA, and to a lesser extent
acetate, showed significant increases in locomotor activity
and turning behaviour, compared to controls.
Immunohistochemical analyses of brain revealed an
innate neuroinflammatory response (GFAP, CD68, IbA1)
only in PPA treated animals.
Conclusions: Only PPA infusions produced behavioural
and neuroinflammatory in rats reminiscent of ASDs,
suggesting a specific short chain fatty acid/pH dependent
effect of this compound. PPA infusions in rats may model
some aspects of ASDs, and may provide a plausible
dietary/gut/CNS link to this disorder.
Sponsor: GoodLife Charities

PS6.3
INTRAVENTRICULAR INFUSIONS OF PROPIONIC ACID INDUCES INCREASED
LOCOMOTOR ACTIVITY, NEUROINFLAMMATORY EFFECTS, FATTY
ACID TRANSPORT AND BLOOD BRAIN
BARRIER CHANGES IN RATS
Derrick Fraser
MacFabe, Jennifer E. Hoffman, Roy Taylor, Donald-
Peter Cain, Francis Boon, Martin Kavaliers, Klaus-Peter
Ossenkopp, The University of Western Ontario
Background: Neuroinflammatory changes, alterations in
fatty acid metabolism and blood brain barrier (BBB)
permeability may be involved in the pathophysiology of
autism spectrum disorders (ASDs). Propionic acid (PPA)
is a short chain fatty acid, a by-product of many enteric
bacteria, and a food preservative. PPA is actively taken up
transported by monocarboxylate transporters in the gut
and CNS, and has widespread effects on cellular
metabolism and immune function. We have found PPA
can elicit behavioural and neuropathological changes in
neuroinflammatory markers. Following were tested on the balance beam task and in the water for 1 hr during the dark phase in counterbalanced order.

Methods: Adult Long-Evans Hooded rat pairs were of behavioral tasks. Following behavioural analyses, animals were sacrificed and brains examined immunohistochemically.

Results: PPA treated animals showed increases in locomotor activity and repetitive stereotypes. Immunohistochemical analyses of brain revealed an innate neuroinflammatory response (GFAP, CD68, IbA1), increased monocarboxylate transporter I immunoreactivity, and increased BBB permeability (IgG, rat whole serum).

Conclusions: Chronic PPA in rats increases locomotor activity, induces neuroinflammatory, fatty acid transport, and BBB changes, and may model human ASDs.

Sponsor: GoodLife Charities

PS6.4 INTRAVENTRICULAR INFUSIONS OF PROPIONIC ACID REVERSIBLY IMPAIR SOCIAL BEHAVIOR AND INDUCE NEUROINFLAMMATORY CHANGES IN LONG EVANS RATS Sandy Shultz, Derrick F. MacFabe, Shannon Scratch, Jordana Jackson, Jennifer Whelan, Samantha Martin, Francis Boon, Roy Taylor, KP Ossenkopp, Donald P. Cain, University of Western Ontario

Background: Clinical observations suggest that certain dietary factors may transiently worsen symptoms in autism spectrum disorders (ASDs). Propionic Acid (PPA) is a short chain fatty acid, an enteric bacterial by-product, and a common food preservative. We have recently found PPA can elicit neurobehavioral, electrophysiological and neuropathological changes in rodents consistent with human ASDs. PPA may thus be a possible target compound linking diet, gastrointestinal physiology and behavior.

Objectives: The present study examined the effects of repeated intraventricular infusions of PPA using a variety of behavioral tasks.

Methods: Adult Long Evans Hooded rat pairs were infused with 4µl of either PPA or PBS vehicle into the lateral ventricle. Rat pairs were then immediately placed in an open-field arena for 1 hr during the light phase and for 1 hr during the dark phase in counterbalanced order. Observations of social behaviour were quantified using Ethovision software. Following social testing, animals were tested on the balance beam task and in the water maze to evaluate other behavioral deficits. Following behavioral analyses, animals were sacrificed and brains were examined immunohistochemically using a variety of neuroinflammatory markers.

Results: PPA-injected rat pairs reported impairments in social behaviour when compared to control pairs. These effects were transient and attenuated within approximately 30 min post-infusion. Furthermore, PPA rats were impaired in the water maze and balance beam tasks in a manner reminiscent of human ASDs. Neuropathological analysis of rat hippocampus and white matter showed reactive astrogliosis (GFAP) and activated microglial (CD68) response with increased blood brain barrier permeability (IgG).

Conclusions: PPA infusions induce reversible behavioral impairments and neuroinflammatory changes consistent with human ASDs.

Sponsor: GoodLife Charities

PS6.5 A HYPOTHESIS ON A DIETARY LINK BETWEEN AUTISM SPECTRUM DISORDERS AND CENTRAL NEUROTRANSMISSION: SHORT CHAIN FATTY ACIDS AND CATECHOLAMINERGIC NEUROTRANSMISSION

Bistra B. Nankova, Derrick F. MacFabe, Edmund F. La Gamma, New York Medical College & Maria Fareri Childrens Hospital

Background: Dietary or gastroenterological factors have been implicated in autism spectrum disorders (ASD s). Short chain fatty acids (SCFA) such as butyric (BA) or propionic acid (PPA) are present in diet or are produced by enteric bacterial fermentation. PPA can elicit neuroactive effects reminiscent of ASD’s in rodents (MacFabe et al. 2006). Furthermore BA can induce tyrosine hydroxylase gene expression (TH; rate limiting enzyme in biosynthesis of monoamine transmitters dopamine, epinephrine and norepinephrine) in a PC12 cell model (Santosh 2006). Since increased monoamine concentration in the brain and blood of ASD patients and animal models is observed (Narita 2002), we hypothesize that SCFA’s may influence brain catecholaminergic pathways.

Objectives: To determine whether SCFA’s with known behavioral effects and putative links to ASD’s (PPA; valproate, VPA) can regulate TH gene expression

Methods: Site-directed mutagenesis was used to introduce point and deletion mutations into the wild-type TH promoter driving the expression of luciferase reporter gene. After transfection and treatment with SCFA, PC12 cells were harvested and reporter activity measured along with endogenous TH mRNA and TH protein.

Results: SB, PPA & VPA induced TH promoter over a wide concentration range. The canonical CREB transcription factors were found necessary for the transcriptional activation of TH gene by all SCFA tested. Physiologically relevant concentrations of SCFA caused accumulation of TH mRNA and immunoreactive protein. Intraventricular infusions of SB produced behavioral change similar to those evoked by PPA (MacFabe, 2006).

Conclusion: Our data are consistent with a molecular mechanism through which environmental signals such as fatty acids can modulate animal behavior through effects on central catecholaminergic systems and are consistent
with their hypothetical role in ASD’s.
(Support: Mead Johnson, GoodLife Charities)

**PS6.6**

**SENSORY THRESHOLDS AND DRUG METABOLISM IN AN ANIMAL MODEL OF SELF-INJURIOUS BEHAVIOR**

Amber M. Muehlmann,
Jennifer A. Wilkinson, Darragh P. Devine, University of Florida

Background: Self-injurious behavior (SIB) is highly prevalent in autism, and this behavior disorder is modeled in rats with daily injections of pemoline. We have demonstrated that stress-hyper-responsive rats (HR) are particularly vulnerable, whereas less stress-responsive rats (LR) do not exhibit pemoline-induced SIB.

Objectives: We are continuing to characterize individual differences in vulnerability to acquire SIB. In the current studies we have examined 1) mechanical and nociceptive sensory thresholds in HRs and LRs before and during pemoline treatment, and 2) the pharmacodynamic relationship between pemoline and SIB onset.

Methods: Rats were injected with pemoline at 150mg/kg/day for 5 days. 1) VonFrey fibers and a hot plate were used to test mechanical and nociceptive thresholds in independent groups of rats. 2) Blood was sampled repeatedly from jugular catheters, and pemoline was analyzed by HPLC-UV.

Results: 1) All the pemoline treated rats exhibited higher mechanical thresholds (vonFrey) and more jumping, but less licking and guarding (hot plate) than did the vehicle treated rats. 2) Plasma pemoline concentrations did not differ between self-injurious and non-injurious rats.

Conclusions: Pemoline-induced alterations in mechanical and nociceptive sensory processing may contribute to the acquisition of SIB in rats. However, individual differences in vulnerability are not due to differences in drug metabolism. Rather, vulnerability for SIB appears to result from individual differences in neurochemical responses to the pemoline regimen. We are further examining the biochemical basis of individual differences in vulnerability for pemoline-induced SIB. Implications for self-injury in autism will be discussed.

Support: Autism Speaks (NAAR and CAN)

**PS6.7**

**ENGRAILED2 (EN2), AN AUTISM-ASSOCIATED GENE, PROMOTES POSTNATAL CEREBELLAR GRANULE NEUROGENESIS**


Background: Given that EN2 association with autism spectrum disorder (ASD) has been replicated in three datasets, and mouse En2 mutants display cerebellar abnormalities similar to ASD neuropathology, we have been defining En2 function. En2 postnatal expression occurs as cerebellar granule neuron precursors (GNP) exit the cell cycle and differentiate, suggesting En2 plays a role in regulating these processes.

Objective: To determine the ontogenetic role of En2 in postnatal GNPs by over expression.

Methods: En2 cDNA was cloned into an EGFP-containing over expression vector, as described previously (Benayed et al 2005). Cultured rat cerebellar GNPs were transfected with GFP alone (control) or En2+GFP (En2), and fixed 24h later. Proliferation was assessed using thymidine analog BrdU administration and immunocytochemistry. Differentiation was assessed by morphology, with neurons defined as cells with processes measuring > 2-cell bodies. GFP+ cells were immunostained for markers of proliferation and cytoskeletal proteins, and assessed by fluorescence microscopy.

Results: En2 over expression reduced mitotic markers, including BrdU labeling by 67%, and PCNA+ neurons by 50%, suggesting that En2 facilitates cell cycle exit. Further, over expression elicited a 2-fold increase in GNPs exhibiting neuronal processes, as well as increased expression of neuron-specific cytoskeletal proteins MAP1B and beta-III-tubulin. En2 transfection did not alter cell survival.

Conclusion: Over expression of En2 facilitates GNP cell cycle exit and neuronal process outgrowth, indicating that the gene promotes the transition from proliferation to differentiation. These data are consistent with En2 postnatal expression patterns in vivo, and support our previous findings that in the absence of En2, GNPs remain proliferative longer than wildtype cells, and resist differentiation.

Support: NS048649-01, ES11256; R01 MH076624; USEPA-R829391.

**PS6.8**

**AUTISM: OXIDATIVE STRESS AND MERCURY COMPOUNDS.**

Elizabeth Maria Sajdel-Sulkowska, Boguslaw Lipinski, Herb Windom, Tapan Audhya, Woody McGinnis, Department Psychiatry, Harvard Medical School and BWH

Background: It has been suggested that oxidative stress and/or mercury compounds play an important role in the pathophysiology of autism.

Objectives: To evaluate the possible contribution of mercury compounds to oxidative stress and autistic pathology.

Methods: Formation of hydroxyl radicals (HRs) by mercury compounds (Hg-Cs) was measured by carboxy-3-coumarin fluorescence assay. The effect of mercury compounds on glial (C6) cells in culture was measured with the Non-Radioactive Cell Proliferation Assay. Cerebellar tissue homogenates were prepared in the presence of protease inhibitors. Cerebellar 3-nitrotyrosine (3-NT) was determined using commercial ELISA assay (OxisResearch).

Results: We report here for the first time that Hg-Cs generate HRs with methyl mercury (Me-Hg) being five times more effective than mercury chloride (Hg-Cl). Addition of Hg-Cs to rat glial cells in culture inhibits cell proliferation; Me-Hg is more potent than Hg-Cl with IC50 at 3µM and 30µM respectively. This effect can be counteracted by the addition of HR scavengers, sodium selenite (100mM) and salicylic acid (10mM), suggesting
that the effect of mercury is mediated by oxidative stress. We also report here for the first time the level of 3-NT, an oxidative stress marker, in postmortem cerebellar tissue. In the control cerebellar tissue (n=5; age range: 7-34 years) the concentration of 3-NT ranged from 9.80 to 36.26 picomoles per gram of tissue. In contrast, the concentration of 3-NT in autistic cases (n=8; age range: 6-33 years) ranged from 7.76 to 785.62 picomoles per gram of tissue. Furthermore, analysis of autistic brain samples suggests an association between elevated mercury, decreased selenium and increased oxidative stress.

Conclusions: Preliminary data from this study suggest the role of mercury in oxidative stress and oxidative stress-induced damage in autistic pathology.

Sponsor: Autism Research Institute, San Diego CA

**PS6.9**

**THE ANTICONVULSANT VALPROIC ACID (VPA) STIMULATES FOREBRAIN NEUROGENESIS DURING EMBRYONIC DEVELOPMENT VIA CELL CYCLE REGULATION**

*Emanuel DiCicco-Bloom, UMDNJ/RWJ Medical School*

**Background:** Exposure of the developing human embryo to VPA can induce an array of developmental defects. Previously, we found that VPA stimulated proliferation of cerebral cortical precursors in vitro. We now examine VPA effects on cortical proliferation in embryos in utero, which may be relevant to forebrain enlargement noted in some children with ASD.

**Objective:** Define the effects of VPA on cortical neurogenesis in vivo.

**Methods:** Five doses of VPA (300mg/kg twice each day) were injected into pregnant rats starting on embryonic day 16.5. DNA synthesis was analyzed using mitotic marker [3H]thymidine and BrdU via scintillation spectroscopy and immunohistochemistry, whereas second messenger and cell cycle proteins were assayed by Western blot. Total brain cells were counted on P21 by stereology. Results: Maternal treatment with VPA stimulated embryonic cerebral cortex DNA synthesis by 23%, reflecting a 16% increase in the number of proliferative cells engaged in mitotic S phase on E18.5. The prenatal stimulation of precursor proliferation resulted in a 16% increase in the number of cerebral cortical cells by postnatal day 21. VPA stimulated cell cycle regulators cyclin D3 and E levels at 24h, suggesting that rapid changes cycle mechanisms enhance neurogenesis. Further, similar to in vitro studies, VPA increased levels of acetylated histone H3 and activated P-ERK,

**Conclusion:** VPA exposure maintains forebrain precursors in the cell cycle and increases cerebral cortical cell numbers. VPA acts via histone acetylation and cyclins D3 and E to promote forebrain neurogenesis, effects that may be relevant to brain enlargement should similar effects occur during human development.

Support: HD23315; ES11256; USEPA-R829391; NJ Gov Council on Autism

**PS6.10**

**DYNAMIC MISREGULATION OF CHROMOSOME 15 AUTISM CANDIDATE GENES BY THE ANGELMAN SYNDROME IMPRINTING CONTROL CENTER (AS-IC)**

*Laura .B Herzing, Kelly Barry, Northwestern University*

ATP10A and UBE3A are maternally expressed imprinted genes within the autism candidate region 15q12-q13. Their expression is similarly affected by Angelman Syndrome-imprinting center (AS-IC) deletions and by MeCP2 mutations in cortex from Rett Syndrome (RS) patients. UBE3A and ATP10A expression may be regulated by antisense transcription arising from the IC, which may in turn be affected by loss of MeCP2. In the mouse, imprinted expression of these genes is less strict, and effects of loss of MeCP2 are modulated by strain, gender and age.

**Objective:** To determine whether strand-specific expression of imprinted chromosome 15 autism candidate genes is correlated and/or is affected by loss of MeCP2 in mouse.

**Methods:** Sense and antisense transcripts were generated by strand-specific RT-PCR. Relative gene expression between MeCP2-deletion/ wt littermates was quantitated using Real-Time RT-PCR. Allele-specific expression was quantitated using sub-cloning and sequencing of RT-PCR products from animals carrying polymorphisms of known parental origin.

**Results:** In both human and B6x129 mouse male cortex, loss of MeCP2 is coordinate with a decrease in maternal UBE3A, ATP10A and in GABRB3 expression and with an increase in total and relative proportion of maternal antisense expression. In older female (MeCP2+/−) animals and on an outbred background, both total and paternal antisense expression is increased, resulting in a net gain of imprint for anti-Atp10a expression. Characterization of gene and strand-specific expression changes throughout postnatal development is ongoing.

**Conclusions:** We provide further evidence that loss of MeCP2 disrupts regulation of transcripts and autism-candidate genes controlled by the AS-IC. In mouse, the great majority of animals exhibit abnormal total or allele-specific expression or both, and multiple variables impact the effects of loss of MeCP2. Absent expression of these genes may contribute to the overlap between RS, AS and autism.

**PS6.11**

**GENERATIVITY IN YOUNG CHILDREN WITH AUTISM**

*Costanza Colombi, Susan L. Hepburn, Sally J. Rogers, M.I.N.D. Institute/University of California, Davis*

**Background:** Generativity is one of Rogers’ GENE functions (EF) and refers to the ability to generate novel ideas and to direct efforts toward future-oriented accomplishments. Generativity may be specifically impaired in autism. The present study examined generativity in young children with autism.

**Objectives:** (1) To determine whether young children with autism are impaired on generativity. (2) To explore the relationships between generativity and other impaired
areas in autism. Method: Four generativity tasks were administered to 33 young children with autism (mean CA = 34.13, SD = 4.18) and 18 young children with other developmental disabilities (mean CA = 33.1, SD = 5.73), matched on nonverbal abilities. Results: Preschool children with autism showed fewer novels acts in comparison to children with other developmental disabilities (t = -2.62; p < .05). Preliminary analyses indicate a relationship between generativity abilities and spontaneous play. Conclusions: Results showed that young children with autism may be specifically impaired in generativity, suggesting that generativity may be a cognitive underpinning of more advanced social-cognitive skills. Sponsor: NICHD #U19 HD35468-08 & #PO1 HD35468

PS6.12 PROSPECTIVE DATA ON EARLY TEMPERAMENT IN INFANTS AT HIGH RISK FOR AUTISTIC SPECTRUM DISORDER Nancy M. Garon, Jamesie Coolican, Isabel Smith, Lonnie Zwaigenbaum, Jessica Brian, Wendy Roberts, Susan Bryson, IWK Health Centre and Dalhousie University Background: Currently, autistic spectrum disorder (ASD) is rarely diagnosed prior to 2–3 years of age, despite evidence of symptoms as early as 12-18 months (Bryson et al., in press). One potentially fruitful way of identifying infants at increased risk for ASD is to better understand early differences in temperament. While temperamental differences are implicated early in life (Gomez & Baird, 2005), there are as yet no prospective studies of infants who develop ASD. Objectives: The goal of this study was to examine the development of temperament in high-risk infants (n=75) with a sibling with ASD (hereafter, infant siblings), and control infants (n=34). Methods: Infants were assessed prospectively at 6, 12, and 24 months using the Infant Behavior Questionnaire and the Toddler Behavior Assessment Questionnaire. At 36 months, an independent diagnostic assessment for ASD was conducted blind to all previous assessment results. Results: Analyses focused on early 6- to 12-month temperamental differences among 3 groups: infant siblings subsequently diagnosed with ASD, non-ASD siblings and controls. The ASD-positive infant siblings were distinguished by high Fear at 6 and 12 months, and by increased Orienting Duration (visual fixation) between 6 and 12 months. Prolonged visual orienting and reduced smiling at 12 months were particularly strong predictors of outcome at 36 months, as indexed by IQ, receptive language, other adaptive skills, and ADI-R scores. Conclusions: Taken together, evidence is provided for early differences in temperament that may index infants at particularly high risk of developing ASD. Sponsors: The Canadian Institutes of Health Research and Autism Speaks

PS6.13 DEVELOPMENTAL OUTCOMES IN YOUNG CHILDREN WITH AUTISM AND DEVELOPMENTAL DELAY Kylie M. Gray, Bruce J. Tonge, Deborah J. Sweeney, Stewart L. Einfeld, Monash University Background: Anecdotal reports suggest that in young children with developmental problems and children with autism, parents are often primarily concerned about language and cognitive development and behaviour problems. Objectives: To determine if early markers of cognitive, social, communication, play ability, and behavioural adjustment in young children with autism and developmental delay predict subsequent developmental and behavioural outcome. Methods: One-hundred and ten children with developmental delay were followed-up 2 years after their initial assessment and diagnosis. At initial assessment the children were aged 18–48 months, and approximately two-thirds received a diagnosis of a Pervasive Developmental Disorder. Information on symptomatology, behaviour problems, developmental level, expressive and receptive language ability, adaptive behaviour, parent mental health, stress and family functioning was collected at both time points. Results: Data will be presented on the stability of diagnosis in young children with developmental delay and on their cognitive and language development at follow-up. Associations between early developmental level, diagnosis, development of symptomatology over time, behaviour problems, and outcome will be explored along with associations with early gesture, play, and imitation skills. Conclusion: Identification of skills potentially associated with better developmental outcomes for preschool children, may result in the development of targeted intervention programmes for infants. Sponsor: National Health and Medical Research Council of Australia (NHMRC) and Australian Research Council (ARC)

PS6.14 PARENT REPORTED CONCERN COMPARED TO STANDARDIZED TEST RESULTS IN YOUNG SIBS OF CHILDREN WITH AUTISM Christine Reiner Hess, Rebecca Landa, Julie Rusyniak, Kennedy Krieger Institute Center for Autism and Related Disorders Background: Numerous studies have used retrospective reports to assess the timing and types of concerns that parents first report about children later diagnosed with autism. Problems associated with this method emphasize the need for prospective studies. Objectives: Examine the nature and timing of parent-reported developmental concerns about children at-risk for autism in relation to standardized test results using a prospective, longitudinal design. Methods: Parents and younger sibs of probands with autism participated in developmental evaluations at 14
Results: ASD-sibs and TD-sibs did not differ in the proportion of time spent gazing at their parent’s face. Instead, ASD-sibs shifted gaze to and from their parent’s face less frequently than TD-sibs, p < .05. These gazes tended to have longer mean durations than those of TD-sibs, p = .06. More ASD-sibs had ‘long’ (> median, 10.92 seconds) mean gaze duration times than TD-sibs, p < .05. Conclusion: As early as six-months of age, ASD-sibs seem to show deficits in disengagement as they shift their gaze less frequently and are more likely to have a ‘long’ mean duration time. ASD-sibs may be exhibiting the ‘sticky’ attention frequently observed in older autistic individuals.

Sponsors: NICHD, NAAR/Autism Speaks, Marino Autism Research Institute

PS6.16
JOINT ATTENTION IN 2-YEAR-OLD TODDLERS WITH PERVASIVE DEVELOPMENTAL DISORDERS Naoko Inada, Yoko Kamio, Department of Clinical Psychology, Kyushu University,

Objectives: Examining the features of joint attention (JA) in 2-year-old toddlers with pervasive developmental disorders (PDDs).

Methods: The study involved 15 PDD (mean age: 23.9 months, developmental quotient (DQ): 80.2), 5 non-PDD, and 9 typically developed (TD) toddlers; the three groups were of the same age. The PDD and non-PDD groups were screened at an 18-month health checkup; using DSM-IV-TR and CARS-TV, they were diagnosed as having PDD or non-PDD at 2 years of age. Each of the two types of JA tasks was conducted four times: (1) the examiner gazed at a toy and (2) the examiner pointed toward it. Two examiners coded whether or not the toddler looked toward the toy, recorded the frequency of his/her looking back at the examiner, and assigned the JA scores. The DQ and developmental age (DA) were computed using Enjoji’s developmental tests.

Results: The DA scores of the PDD group were significantly low as compared with the TD and non-PDD groups. The DQ and CARS-TV scores were related to the JA scores in the PDD group, but did not appear to be related in the non-PDD group; the ceiling effect was revealed in the TD group. Compared to the TD group, the PDD group did not exhibit any deficit in point following but did show deficits in gaze following and looking back at the examiner. All toddlers in the TD group, 4 (more than DA 20 months) from the non-PDD group, and 3 (over DA 23 months with a CARS-TV score below 27.5) from the PDD group followed the examiner’s gaze.

However, with regard to looking back at the examiner, after repeating the JA task four times, each toddler in the TD and non-PDD groups showed an average of 75%-100% achievement; the PDD toddlers showed an average of 33% achievement.

Conclusion: Although some 2-year-old toddlers with high-functioning PDD follow others’ gazes, their frequency of looking back at them is low.

Sponsor: RISTEX (Research Institute of Science and
PS6.17
TEMPERAMENT IS ASSOCIATED WITH LANGUAGE, BEHAVIOR PROBLEMS, AND SOCIAL FUNCTIONING IN TODDLERS WITH AUTISM SPECTRUM DISORDERS Nina B. Leezenbaum, Lucia M. Cicciolla, Alice S. Carter, Boston University School of Medicine

Background: Although individual variation in temperament may influence the course of autism symptoms and general functioning in children with autism spectrum disorders (ASD), limited research has focused on temperament in relation to changes in language, behavior problems or social functioning.

Objectives: Examine associations between temperament and language, behavior problems and social functioning concurrently and at a 1-year follow-up.

Methods: Upon enrollment (N=155) and at a 1-year follow-up (n=82) mothers rated their 18 to 33-month old toddlers with ASD on the Toddler Behavior Assessment Questionnaire (TBAQ) and Infant-Toddlers Social and Emotional Assessment (ITSEA) and were interviewed with the ADI-R and Vineland Adaptive Behavior Scales. Toddlers were assessed with the ADOS-G and Mullen Scales of Early Learning.

Results: Concurrently, temperament was associated with language, behavior problems and social functioning. High Activity, Anger, and Object Fear were positively associated with behavior problems but also with higher social functioning and higher language scores. Attention, Inhibitory Control, Pleasure and Soothability were negatively associated with behavior problems. Temperament at year 1 was associated with change in language and socialization from year 1 to 2. Children rated higher on Activity Level and Pleasure showed greater gains in expressive and receptive language and socialization. Children rated lower on Anger also made greater language gains.

Conclusions: Temperament was associated with children's functioning concurrently and predicted change in language and socialization. In early childhood, a greater range of emotional expression and higher activity may serve to engage the child with the caregiver, promoting language development and socialization. Implications for these findings suggest that assessing temperament may inform individualized services plans for toddlers with ASD.

Sponsor: NIMH

PS6.18
VOCABULARY DEVELOPMENT IN TODDLERS WITH AUTISM SPECTRUM DISORDER Rhiannon J. Luyster, Susan Risi, Rachel Petrak, Catherine Lord, University of Michigan Autism and Communication Disorders Center

Background: Communication impairment is a defining feature of autism spectrum disorders (ASD). The rate of vocabulary acquisition has not yet been thoroughly addressed. The question of the current paper is whether children with ASD demonstrate non-linear growth (a ‘vocabulary spurt’), as has been observed in typically developing children.

Methods:
Thirty children between the ages of 8 and 36 months of age who are at risk for ASD participated in this longitudinal study. Children were evaluated monthly. Vocabulary size was measured using the MacArthur-Bates Communicative Development Inventory (MCDI; Fenson, 1989). To date, data have been analyzed for 13 participants who have been given a working diagnosis of ASD based on the results of standardized diagnostic measures and consideration of DSM-IV criteria.

Preliminary results:
MCDI was used to create a total number of words said for each child at every monthly assessment. Regression models tested the slope of vocabulary acquisition from one month to the next. In order to test a non-linear slope, we fit a second-order polynomial. Results indicated that the second-order term was significant (p < .001), suggesting that the present sample of toddlers showed evidence of a nonlinear path of vocabulary development.

Conclusions:
The preliminary findings reported above suggest that toddlers diagnosed with ASD experience a ‘vocabulary spurt.’ This is an important finding for theories of word learning which implicate the use of social information in learning new words. ASD is defined by impairments in social interaction, and previous research has shown that children with ASD are not able to recruit social cues in learning new words (Baron-Cohen et al., 1997). Future research will need to explain how children with ASD show acceleration in their ability to learn new words.

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PS6.19

Background: Disturbed neurogenesis has been suggested in the pathogenesis of autism, and altered levels of growth factors and neuropeptides that regulate neurogenesis have been detected in sera, CSF and brains in autism. Because neuronal progenitor cells (NPCs) can differentiate in culture after stimulation with serum, we hypothesized that altered neurogenesis would be detected in cell cultures of human NPCs stimulated with sera from children with autism. We propose that such alterations could reflect the disturbances of brain development that lead to autism.

Objectives: To generate a cell culture model to study neurogenesis in autism.

Methods: Neurogenesis was studied in human NPCs that were stimulated in culture with sera from normal children

200
and from children with autism: (1) aged less than 3 years (N=7 and N=6, respectively) and (2) between 3 and 5 years (N=5 and N=6, respectively). Cell proliferation, formation of neuronal colonies, cell migration, and the formation of cell processes and synapses were analyzed by morphometry, immunocytochemistry and Western blotting.

Results: Neurospheres of NPCs treated with sera for 72 hours formed colonies of neuron-like cells. Sera from children with autism had different effects than control sera on: (1) proliferation, (2) migration, (3) differentiation into neurons, and (4) formation of neuronal processes and synapses. These effects of sera were dependent on the age of the serum donor.

Conclusions: We have developed a cell culture model of neurogenesis in autism in which differential growth effects are seen. This model may be useful to help identify the mechanisms of altered neurogenesis in autism and to develop a test for early diagnosis of autism.

Sponsors: NYS Office of Mental Retardation and Developmental Disabilities, the March of Dimes Defects Foundation, grant #12-FY03-42, and the NYS Special Legislative Grant for Autism Research, #M40438.

PS6.20
PREDICTING VARIABILITY IN ASD SYMPTOMATOLOGY AMONG YOUNGER SIBLINGS OF CHILDREN WITH AUTISM
Caitlin McMahon, Wendy L. Stone, Vanderbilt University, Department of Psychology
Background: Autism is a highly heritable neurodevelopmental disorder with a sibling recurrence risk estimated to range from 4%-10%. The outcomes of later-born siblings of children with autism are quite heterogeneous, with some receiving diagnoses of autism, some exhibiting language delays, and others demonstrating no observable symptomatology.

Objective: To identify early social and communicative predictors of later autism symptomatology among younger siblings of children with ASD.

Methods: Participants included 38 younger siblings of children with ASD (Sibs-ASD). At Time 1 (Mean CA=16.5 mos; range=12-23 mos), social-communication measures included the STAT, DAISI, and MCDI gestures. At follow-up 1 year later (Mean CA=29 mos; range=24-37 mos), ASD symptomatology was measured with the ADOS Module 1 total algorithm score and the CARS total score. Correlation and regression analyses were used to examine the relation between Time 1 social-communicative behaviors and Time 2 symptomatology.

Results: As expected, considerable variability in autism symptomatology was observed at Time 2, with ADOS scores ranging from 0 to 16 (Mean=4.0, SD=4.6) and CARS scores ranging from 15 to 29.5 (Mean=19.6, SD=4.2). Time 2 CARS and ADOS scores were significantly correlated (r = .70). Time 1 correlates of later CARS score were STAT play, requesting, and directing attention, MCDI gestures, and DAISI total. Time 1 correlates of total ADOS score were STAT directing attention and DAISI total. Multiple regression analyses revealed MCDI gestures to be the only independent predictor of the later CARS score. STAT directing attention and DAISI scores were each independent predictors of the later ADOS score.

Conclusion: Parental report measures of gesture use (MCDI) and infant sociability (DAISI) as well as an observational measure of directing attention (STAT) predicted later autism symptomatology in younger siblings of children with ASD.

Sponsors: NICHD R01HD043292; T32HD07226

PS6.21
IMITATION IMPAIRMENTS IN THE FIRST THREE YEARS OF LIFE AND THE BROADER AUTISM PHENOTYPE
Allison Hunt O’Neill, Rebecca J. Landa, Kennedy Krieger Institute
Background: There is a documented impairment in imitation skills in children with autism.

Objectives: Examine cross-sectional and longitudinal imitation behavior of infant siblings of children diagnosed with autism.

Methods: 77 infant siblings of children with autism completed 15 imitation tasks at 14, 24, and 30 or 36 months of age. The tasks were grouped into manual, object, or oral facial imitation. The siblings were given an outcome diagnosis of autism spectrum disorder, Broader Autism Phenotype (BAP; social and/or language impairment), or non-BAP (no social or language impairment) at 30 or 36 months of age.

Results: At 14 months, there were no group differences in imitation ability. At 24 months and the outcome visit, there were significant group differences in manual, object, oral facial, and total imitation scores (p’s<.05), even when fine motor ability (score on Mullen Scales of Early Learning) was accounted for as a covariate. Toddlers in the BAP group performed as well as those in the non-BAP group, but those in the ASD group performed worse than both other groups.

Conclusion: Differences in imitation ability are present by 24 months of age, even after accounting for possible fine motor deficits. The lack of observed differences at 14 months could possibly be due to floor effects.

Sponsor: NIH: MH 59630 and STAART MH066417-01A2

PS6.22
SENSORY PROCESSING IN TODDLERS AT RISK FOR AUTISM SPECTRUM DISORDERS
Rosalind S. Oti, Catherine Lord, University of Michigan Autism and Communication Disorders Center
Background: Parents often report the presence of sensory interests and sensory aversions in children with autism. However, little is known about the occurrence of these behaviors in children prior to the age of three.

Objectives: The current study examines how sensory seeking/ sensory avoiding behaviors differ in those who are later diagnosed with ASD versus those who are typically developing. The study also examines how these behaviors change over time.

Methods: Data were collected as part of an ongoing
longitudinal study of infants and toddlers at high risk of having autism. Analyses included children between the ages of 7 and 36 months of age, whose parents completed the Toddler Sensory Profile.

Results: Data have been collected for 53 toddlers. An average of 3.6 (s.d. = 3.03) sensory profiles have been collected for each participant. Preliminary analyses indicate that the number of sensory domains in which there are group differences (ASD versus typical development) increases over time. At the youngest ages (7-12 months) there were no significant group differences. However, by 13-18 months of age, there was a significant difference in the area of auditory processing, with the toddlers with ASD having a greater number of abnormal behaviors. By 31-36 months of age, the two groups were significantly different in the domains of auditory, visual, and oral sensory processing.

Conclusions: Abnormal sensory behaviors are present early in development for children with ASD. While at very young ages there were no differences between those with ASD and those with typical development, significant differences were found after 12 months of age. This has important implications for early diagnosis and assessment of very young children.

Sponsors: Simons Foundation, Department of Education

PS6.23 EARLY DEVELOPMENTAL TRAJECTORIES IN CHILDREN AT RISK FOR AUTISM SPECTRUM DISORDERS Jennifer Richler, Somer L. Bishop, Mia Coffing, Rhiamon Luyster, Rachel Petrak, Catherine Lord, University of Michigan

Background: Little is known about early developmental trajectories in children who are later diagnosed with Autism Spectrum Disorders (ASD). Researchers have suggested that some children diagnosed with ASD show developmental 'worsening' as toddlers.

Objectives: Describe early patterns of social and communication development in children at risk for ASD.

Methods: Children enter the study at approximately 12 months of age and are assessed monthly or every 6 months (depending on the project from which they have been recruited), until they are 36 months old. The assessment includes an experimental version of the Autism Diagnostic Observation Schedule for toddlers.

Results: Data have been analyzed for 87 children (68 male, 19 female; 52 ASD, 23 non-spectrum developmental disorder (DD), 12 typical/no diagnosis, based on most recent assessment.) A linear mixed model with age, diagnosis, and the interaction between the two as predictors, and ADOS algorithm score as the outcome, found a significant effect of diagnosis, F(3, 75) = 37.4, p < .001. The estimated marginal mean for children with autism (M = 19.1, sd = .8) was significantly higher than for children with PDD-NOS (M =11.6, sd = .9) DD (M = 8.7, sd = .9), and TD (M = 6.0, sd = 1.3). There was not a significant effect of age or of the interaction between age and diagnosis. A greater proportion of children in the ASD group (i.e. autism and PDD-NOS) showed worsening scores than in the nonspectrum (i.e. DD and TD) group. In the nonspectrum group, 2/3 of children showed improving scores and one child showed worsening.

Discussion: Children with ASD follow a variety of early developmental trajectories. Worsening symptoms over time may be characteristic of a subgroup of children with ASD.

Sponsor: Department of Education, Simons Foundation

PS6.24 LINKS BETWEEN IMITATION AND PRETENCE IN PRE-SCHOOLERS WITH AUTISM Josephine Gardiner Ross, Susan Leekam, Helen McConachie, University of Durham, Department of Psychology

Background: Imitative abnormalities in autism have been frequently reported and it has been suggested that these play a key role in a failure to identify with others. Meanwhile, findings on imagination are puzzling: these children are capable of pretence but appear disinclined to do it voluntarily. Clarification of the role of imitation in early pretence could improve understanding of imaginative difficulties in autism.

Objectives: 1To explore differences in imitation, social behaviour and pretend play among children with diagnoses of autism, ASD and language-delay in tasks designed to test imitation and imagination within the Autism Diagnostic Observation Schedule.

2To identify any correspondences between performance on imitative and pretence tasks.

Method:

Children's behaviour during elements of the ADOS was recorded. These were: Free Play (section 1); Functional and Symbolic Imitation (section 8), and Birthday Party (section 9).

Videotapes of ADOS assessments with 43 children, (mean age 36m, autism: 14; ASD: 13; language delay: 16) were scored. Dependent measures were children's scores on spontaneous functional and pretend play during free play (section 1); children's spontaneous and prompted pretence during a scripted doll's-birthday scenario (section 9), imitation of functional actions with a toy car and pretend actions with a substitute object (section 8).

Results:

Results indicate that autism groups score lower on both imitation and pretence. In addition, imitation scores were predictive of pretence scores in ADOS section 9. Pretend play was less likely to be accompanied by communicative behaviour in autism. There were no group differences in spontaneous functional and pretend play in the free-play session.

Conclusion: Propensity to engage in pretence may originate in imitation. These findings have implications for understanding developmental delay in autism relative to typical development.

Funding: ESRC

PS6.25 EARLY IMITATION PROBLEMS IN CHILDREN
WITH AUTISM SPECTRUM DISORDERS MEASURED WITH THE PRESCHOOL IMITATION AND PRAXIS SCALE: PRELIMINARY DATA. Marleen Vanvuchelen, Herbert Roeyers, Willy De Weerdt, Department of Rehabilitation Sciences, Faculty of Kinesiology and Rehabilitation Sciences, K.U.Leuven (Belgium), Department of Health Care Sciences, REVAL, P.H.Limburg (Belgium)

BACKGROUND: Imitation has become important in the early identification of autism spectrum disorders (ASD). Nevertheless, a comprehensive exploration of imitation with a reliable and valid imitation test adapted for preschoolers with ASD is not yet available.

OBJECTIVES: The Preschool Imitation and Praxis Scale (PIPS) is a reliable and valid developmental imitation test. This study aims to explore the feasibility of the PIPS for children with ASD.

METHODS: In this study 15 children, referred to University Autism Clinics, are matched on chronological (CA) and mental (MA) age: 9 with autistic disorder AD (mean CA 37.5m; mean MA 30.4m) and 6 with PDD-NOS (mean CA 37m; mean MA 31.7m). Diagnoses are based on clinical consensus and ADOS-G. The PIPS includes 40 gestural, procedural and facial imitation tasks. In 400 typically developing children the association between age and PIPS score is high. Cronbach’s alpha is 0.97. There is a high agreement both within and between raters for the PIPS total scores (ICC > 0.996) and item scores (Kappa values > 0.48).

RESULTS reveal that all children with AD and PDD-NOS were able to fulfill the PIPS in less than 20 minutes. Analysis indicates no between-group difference in PIPS score (U = 23.0 p=0.68). The performance of all children was below the age equivalents of typically developing children (Wilcoxon Z = -2.6 p=0.008).

CONCLUSION: Although there is still not enough information to draw any firm conclusions, preliminary findings indicate that imitation development of both children with AD and PDD-NOS is retarded. Subject recruitment and data collection in four University Autism Clinics is ongoing. Further analysis will explore the relationship between imitation and social-communicative, mental, motor and language abilities of young children with autism.

Vanvuchelen M e.a., Preschool Imitation and Praxis Scale (PIPS). PhD Dissertation, Department of Rehabilitation Sciences, K.U.Leuven, Belgium

SPONSOR: MM Delacroix

PS6.26
THE ASSOCIATION BETWEEN JOINT ATTENTION, SYMBOLIC PLAY, LANGUAGE, AND PERSPECTIVE TAKING ABILITIES IN PRESCHOOLERS WITH AUTISM SPECTRUM DISORDER Petra Warreyn, Herbert Roeyers, Ghent University

Background: Joint attention, symbolic play, language and perspective taking abilities (or theory of mind) all seem impaired in children with autism spectrum disorder (ASD). However, the relationship between these abilities is not yet clear.

Objectives: To compare these abilities and their interrelations between children with and without ASD

Methods: Nineteen preschoolers with ASD and 19 preschoolers without ASD, matched on chronological age, IQ, receptive and expressive language were tested with the ADOS-G to confirm presence/absence of ASD. We used an active-toy task for eliciting initiating joint attention, the Test of Pretend Play for measuring symbolic play abilities, the Reynell Developmental Language Scales for assessing language development and a set of visual, affective, and cognitive perspective-taking tasks.

Results: As expected, children with ASD performed below the control group level on all measures (except for language). While there was a strong association between symbolic play, language, and perspective taking abilities in both groups of children, no significant association with joint attention was found.

Conclusion: The current results support the idea that language, symbolic play, and perspective taking or theory of mind abilities may rely on the same underlying capacity to form second-order or meta-representations. Joint attention may however be based on different cognitive processes.

Sponsor: Ghent University Research Fund

PS6.27
DEVELOPMENTAL PROFILES IN YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER Chin Chin Wu, Chung Hsin Chiang, Yuh Ming Hou, Jiun Horng Liu, Department of Psychology, National Chung Cheng University

Background and objectives: Although the West had demonstrated some screening and diagnostic tools for young children with autism spectrum disorder (ASD) (for example, CHAT, STAT, and ADOS, etc.), research work for these tools are just beginning in Taiwan.

The first purpose of this study was to use Chinese Child Development Inventory (CCDI) for examining developmental profiles in young ASD children who were under three years of age. This study will further compare developmental domains between young ASD children and developmental delay children. The second purpose was to find which developmental domains can discriminate the young ASD children from developmental delay children. We predict that domain of personal relation is the best one to discriminate these two groups.

Methods: participants were recruited from Department of Psychiatry Chia-Yi Christian Hospital. All children were assessed and diagnosed by multidisciplinary team including psychiatrist, pediatrician, and psychologist. The Mullen Scales of Early Learning was administered to match mental age of the two groups. The CCDI is a parent reporting scale to assess several developmental abilities profiles in both groups.

Results: Data were collected on 35 autistic children and 27 developmental delay children. Relative to developmental delay children, the ASD children showed weaker self help and personal social abilities and greater discrepancies between expressive language and
chronological age. The developmental profiles in young ASD children were different from those profiles in developmental delay children. The personal social was the greatest powerful index to discriminate the two groups. Conclusion: The results revealed that CCDI may be a useful tool to provide information for assisting early screening and intervention in young ASD children. The personal social ability could provide discriminating validation to difference diagnosis between young ASD children and developmental delay children.

PS6.28
PATERNAL AGE AND AUTISM ARE ASSOCIATED IN A FAMILY BASED SAMPLE Rita M Cantor, Jeong Lim Yoon, Jocelyn Furr, Clara Lajonchere, David Geffen School of Medicine at UCLA
A recent, large epidemiological study (Reichenberg, et. al. 2006), conducted on data from members of the Israeli army, found that the older the father at the birth of a child, the more likely it is that the child would develop autism. We were interested to see if this association between paternal age and autism would also be found in our US sample of families in the Autism Genetics Research Exchange (AGRE) repository (Geschwind et. al., 2001). To be in AGRE, families must have 2 members with autism, and a willingness to participate in the repository. Because of these ascertainment restrictions, we could not conduct a direct epidemiological study like the one reported. However, the AGRE sample allowed us to construct a distribution of paternal ages at the birth of an autistic child. With no well-matched comparison group within the AGRE repository, an appropriate distribution of paternal ages was needed to act as a control. A published US Caucasian age distribution of over 2 million fathers at the birth of their first child (Basso and Wilcox, 2006) was identifi ed and used. Every effort was made to match the AGRE study sample and this sample on factors that could introduce a bias.

Comparison of these age distributions revealed that the first time fathers of children with autism were older than the first time fathers in the 'control' group (p<.005), providing evidence of an association between paternal age and autism and extending this association to Caucasians in the United States. Both genetic and environmental factors may contribute to the increased risk of autism in children of older fathers, and large epidemiologic studies will be needed to identify the specific causes.

PS6.29
TRENDS IN AUTISM PREVALENCE;
DIAGNOSTIC SUBSTITUTION REVISITED Helen Coo, Hélène Ouellette-Kuntz, Jennifer E.V. Lloyd, Liza Kasmara, Jeannette J.A. Holden, M.E. Suzanne Lewis, Department of Community Health and Epidemiology, Queen's University; Autism Spectrum Disorders - Canadian-American Research Consortium
Background: It has been suggested that diagnostic substitution may partially account for increases in the administrative prevalence of autism. There is little evidence to support this hypothesis, although most studies have relied on group-level data for the analysis.
Objective: To quantify the impact of diagnostic substitution on changes in the administrative prevalence of autism among British Columbia school children between 1996 and 2004, using individual-level data.
Methods: The study population comprised all school children 4 to 9 years of age who had an autism code in at least one year between 1996 and 2004, inclusive (n=2198). The point prevalence of autism was calculated for each year of the study period by dividing the number of children with an autism code as of September 30 (the prevalence date) by the total number of 4- to 9-year-olds enrolled in the school system on the prevalence date. The contribution of diagnostic substitution to the yearly change in autism prevalence was determined by including in the numerator the number of children with a special education code other than autism in the previous year who had an autism code on the following year’s prevalence date, and using the total school population of 4- to 9-year-olds on the prevalence date as the denominator. The cumulative impact of diagnostic substitution on the change in autism prevalence over the study period was then estimated by summing the results for each year.
Results: The administrative prevalence of autism increased from 12.3/10,000 in 1996 to 43.1/10,000 in 2004; 51.9% of this increase was attributable to children switching from another special education classification to autism (16.0/10,000). The reverse situation also occurred, with some children with an autism code switching to another special education category (5.9/10,000).
Conclusion: Diagnostic substitution accounted for a net increase of 32.8% in the administrative prevalence of autism over a nine-year period.

PS6.30
Background: Autism is thought to result from disruption of normal neurobiological mechanisms in the prenatal and early postnatal period.
Objective: To identify prenatal biologic markers for autism in maternal peripheral blood collected during midgestation.
Methods: The study population was drawn from the cohort of pregnant women who participated in the prenatal alphafetoprotein screening program (AFP) in Orange County, California, and who delivered a live born infant July 2000 - September 2001. Three groups of children born to women in the cohort were identified: 1) autism (AU, n=94); 2) mental retardation (MR, n=53); and 3) general population controls randomly sampled from the birth certificate and matched to AU cases on age and gender (GP; n=179). Several analytes known or suspected to play a role in early brain development were
examined in stored AFP specimens, including antibodies to infectious agents, cytokines, chemokines, hormones, and metals. Risk of AU and MR associated with log-transformed levels of individual analytes was estimated by odds ratios (OR) from multivariable logistic regression models.

Results: Mothers of children with AU had significantly higher mid-pregnancy levels of IFN-γ (ORadj=1.4, 95% Confidence Interval 1.1-1.7) and IL-4 (ORadj=1.4, 95% CI 1.1-1.9) and significantly lower levels of IgG antibodies to toxoplasmosis gondii (ORadj=0.65, 95% CI 0.47-0.89) compared to mothers of GP controls. IFN-γ and IL-4 levels were similarly elevated for the MR group. Maternal levels of TSH were significantly lower for MR vs. GP controls (OR=0.44, 95% CI 0.23-0.87). Maternal levels of mercury were similar across study groups.

Conclusion: Maternal infection and inflammation during pregnancy may be indicative of an adverse environment for fetal brain development and may contribute to social and cognitive impairments in offspring. Further study is needed to validate these findings.

Sponsor: NIMH 5 R01 MH072565-03

PS6.31
THE RELATIONSHIP AMONG SEX, AGE OF FIRST EVALUATION, AGE OF FIRST ASD DIAGNOSIS, AND BEHAVIORAL PROFILES IN CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD) Ellen Giarelli, Jennifer Pinto-Martin, Susan E. Levy, David Mandell, Russel Kirby, Lisa D. Wiggins, Catherine Rice, University Of Pennsylvania

Studies report male to female rates of 4:1 to 8:1. It is not clear if the difference lies in innate sex-based genetic factors or in diagnostic expectations of normal versus abnormal behaviors based on gender. The objectives were to 1) describe the relationship among sex of the child, age at first identified evaluation, and age at first ASD diagnosis and 2) characterize behavioral profiles of children , by gender. The study population was identified from an ASD surveillance dataset pooled from 14 sites across the U.S. Evaluation were abstracted from educational and clinical sources at each site and forwarded to trained clinician reviewers who applied a standardized coding scheme to determine ASD surveillance case status. Trained clinician reviewers also captured age at first identified evaluation, age at first identified ASD diagnosis, and behavioral data when applying the coding scheme. Children (n=2568) who were 8 years old in 2002 and met surveillance case definitions for ASD. Diagnostic data were limited to 1497 subjects in the study sample. Males were 82% of the sample. The male to female ratio was 4.7:1. The mean age at first identified evaluation was 46 months for girls and 47 months for boys, F = 1.68, p = ns. The mean age at first identified ASD diagnosis was 59 months for girls and 61 months for boys, F = 2.44, p = ns. Behavioral data was limited to 1522 subjects in the study sample. Boys showed more aggression, $\hat{C}^2 = 7.36$, p = .004, and hyperactivity or attention deficits, $\hat{C}^2 = 8.38$, p = .003, than girls. Age at first identified evaluation and age at first identified ASD diagnosis were not influenced by sex of the child. Boys were rated as having more externalizing clinical behaviors, which suggests a gender bias may exist when noting comorbid features of ASD. Gender bias did not effect age at first identified evaluation and age at first identified ASD diagnosis, we conclude that the diagnosis of ASD is more sex based than gender biased.

PS6.32
PREVALENCE OF AUTISM REPORTED BY THE CALIFORNIA DDS SYSTEM AND CHANGING EXPOSURE TO THIMEROSAL-CONTAINING VACCINES Judith K. Grether, Robert Schechter, California Dept. of Health Services

Background: The exclusion of thimerosal from childhood vaccines in the U.S. was accelerated between 1999-2001. If exposure to thimerosal was a major contributor to the occurrence of autism, it should now be possible to observe a reduction in prevalence among young children. Objective: To determine whether trends in DDS autism client data support the hypothesis that thimerosal exposure is a primary cause of autism.

Methods: We obtained data from the California Department of Developmental Services for active status clients from January 1995-September 2006. Denominator data for calculating prevalence of autism and prevalence for any DDS-reported condition was obtained from live birth files and, as an age-specific estimate of children living in California, from the California Department of Finance. We calculated the estimated prevalence of autism for children at each year of age from 3-12 years and also the estimated prevalence of autism for children 3-5 years of age for each quarter from January 1995 through September 2006.

Results: When viewed either as the estimated prevalence by year of age or as the estimated prevalence for children 3-5 years of age during each reporting quarter, there is no observable decrease in DDS-reported autism. Conclusion: Prevalence trend estimates based on DDS-reported autism do not support a major role for thimerosal-containing vaccines in the occurrence of autism. Limitations of the DDS database and lack of individual exposure data prevent conclusions, based on these data, about thimerosal as a cause or modifier of autism in a specific subgroup or child.

Funding: California Department of Health Services

PS6.33
PBDE CONCENTRATIONS IN THE CHARGE STUDY PARTICIPANTS Irvan Hertz-Picciotto, Åke Bergman, Britta Fängström, Paula Krakowiak, Robin Hansen, Isaac Pessah, UC Davis, M.I.N.D. Institute & Dept Public Health Sciences

Background: Polybrominated diphenyl ethers (PBDEs) are flame retardants used widely in electric, electronic and textile products. PBDE levels in human tissues have risen to concentrations even higher than the PCBs in several cases. PBDEs cross the placenta and adversely affect neurodevelopment in experimental animals, inducing altered spontaneous behaviors, learning and memory...
prevalence of autism by age groups. ASD prevalence was calculated annually from 2001 to 2006 for all children combined and by age groups. ASD prevalence was defined as the proportion of currently-enrolled children who had ever received a diagnosis of autism, Asperger Disorder or Pervasive Developmental Disorder Not Otherwise Specified.

Results: ASD prevalence among children 2-18 doubled from 3.9 per 1,000 in 2001 to 7.8 per 1,000 in 2006. Prevalence increased 127% for children ages 2-4 (from 2.9 to 6.6 per 1,000), 75% for children ages 5-9 (from 5.3 to 9.3 per 1,000), 110% for children ages 10-14 (from 4.1 to 8.6 per 1,000), and 136% for children ages 15-18 (from 2.5 to 5.9 per 1,000). The rate of increase accelerated after the opening of the first KP ASD Center in mid-2004. From 2005 to 2006 the largest prevalence increases were observed for the youngest children. Rates increased 75% for 2-year olds, 31% for 3-year olds, 23% for 4-year olds, and 16% for 5-18 year olds.

Conclusion: The implementation of the KP ASD program has resulted in increased detection and earlier identification of children with ASD.

Sponsor: KFRI

**PS6.35**

**EFFECTS OF MATERNAL AND PATERNAL AGE IN SINGLETON BIRTHS WITH AUTISM SPECTRUM DISORDERS (ASD)**

**Benjamin J. Priestley, Li-Ching Lee, Andrew W Zimmerman, Johns Hopkins Bloomberg School of Public Health and Kennedy Krieger Institute, Baltimore Maryland**

Background: Previous research studies have suggested that both advanced maternal and paternal age increase the risk of ASD in children.

Objectives: To examine the combined and independent effects of maternal age and paternal age in ASD.

Methods: The case group consisted of 513 ASD singletons born from 1983-2002. All cases were evaluated at the Kennedy Krieger Institute. The matched control group was randomly selected from singleton births in the State of Maryland during 1983-2002. Cases and controls were matched to the child’s gender and birth year using a frequency match of 5:1 controls to cases. Maternal age and paternal age at the index child’s birth were categorized as: <25, 25-29, 30-34, >=35 for maternal age; and <30, 30-34, 35-39, >=40 for paternal age.

Results: Using maternal age <25 and paternal age <30 as the reference, the odds ratios (OR) for maternal age >=35 group ranged from 6.45 to 7.26 (all p<0.0001) across 4 paternal age levels; and the OR for maternal age 30-34 group ranged from 4.90-5.40 (all p<0.0001) across 4 paternal age levels.

Conclusion: Advanced maternal age significantly increases the risk of having a singleton child with ASD, regardless of paternal age. Paternal age does not independently predict ASD. Because maternal age and paternal age are highly correlated, the effect is mostly from maternal age but not paternal age itself. Further analyses will be performed to confirm if these observed patterns also occur in families with ASD multiple births and in different ASD subtypes. Results of these further analyses will be presented.

Supported by Dr. Barry and Mrs. Renee Gordon.

**PS6.34**

**AUTISM PREVALENCE TRENDS AT A LARGE HMO IN CALIFORNIA**


Background: Early identification and timely intervention for autism spectrum disorders (ASD) leads to improved outcomes. Systematic changes in routine health care delivery for very young children may contribute to an increase in earlier detection of ASD.

Objectives: To investigate the age-specific trends in ASD prevalence in a large, group model health plan over a 5-yr period during which a regional ASD program was implemented.

Methods: The study population was comprised of children between the ages of 2-18 who were members of Kaiser Permanente (KP) in Northern California (N~700,000). In 2004, KP inaugurated a regional ASD program which encourages routine ASD screening at the 24-month well baby visit, and provides a continuum of care that supports referrals from generalists to ASD Centers staffed by specialists for in-depth diagnostic evaluation and treatment planning. ASD prevalence was calculated annually from 2001-2006 for all children combined and by age groups. ASD prevalence was defined as the proportion of currently-enrolled children who had ever received a diagnosis of autism, Asperger Disorder or Pervasive Developmental Disorder Not Otherwise Specified.

Results: ASD prevalence among children 2-18 doubled from 3.9 per 1,000 in 2001 to 7.8 per 1,000 in 2006. Prevalence increased 127% for children ages 2-4 (from 2.9 to 6.6 per 1,000), 75% for children ages 5-9 (from 5.3 to 9.3 per 1,000), 110% for children ages 10-14 (from 4.1 to 8.6 per 1,000), and 136% for children ages 15-18 (from 2.5 to 5.9 per 1,000). The rate of increase accelerated after the opening of the first KP ASD Center in mid-2004. From 2005 to 2006 the largest prevalence increases were observed for the youngest children. Rates increased 75% for 2-year olds, 31% for 3-year olds, 23% for 4-year olds, and 16% for 5-18 year olds.

Conclusion: The implementation of the KP ASD program has resulted in increased detection and earlier identification of children with ASD.

Sponsor: KFRI
PS6.36
PREVALENCE OF PERSPECTIVE DEVELOPMENTAL DISORDERS (PDD) IN ATIBAIA _ SP - BRAZIL_ A PILOT STUDY Sabrina Helena Bandini Ribeiro, Marcos Tomanik Mercadante, Cristiane Silvestre de Paula, Rosane Lowenthal, Presbiteriana Mackenzie University
Background: The prevalence of pervasive developmental disorders has increased in recent years. The PDD are characterized by marked impairments in reciprocal social interaction, language, and communication and by the presence of repetitive and stereotypic patterns of behavior and interests. The PDD refers to a class of disorders that is composed of several diagnoses, including autistic disorder, PDD not otherwise specified, Asperger Syndrome and childhood disintegrative disorder. There are no epidemiological studies of the prevalence of PDD in the Brazilian population.
Objective: The aim of this work is to verify the feasibility of our approach and protocol for a PDD prevalence study in Atibaia. The study is focus on 07 to 12 years old children, who are living in the rural and urban area of Atibaia, a 120,000 population town, nearby Sao Paulo city, Brazil.
Methods: all the health care services of the town had been screening and we had found: 19 health care centers, 2 private hospitals, 5 specialists doctors in PDD, 3 private special schools and 17 non-profit organizations. In the educational field, Atibaia has 97 schools and 1 center for treatment of PDD and learning disabilities. Five services were selected: 2 public schools, 2 health care centers and the center for treatment of PDD and learning disability.
Two steps evolutions were applied: Stage 1: screening of the cases with the Autism Screening Questionnaire (ASQ). Stage 2: children suspected of having PDD were assessed with standardized diagnostic measures (ADI-R, CARS, ABC, PDD-MRS) and psychometric assessment (WISC-III).
Results: Right now, we are proceeding the research. By the occasion of the congress, it will be concluded. It is important to verify the prevalence of PDD in Brazil, in order to support the health policy.

PS6.37
Background
The National CADDRE Study: Child Development and Autism (NCS) is a multi-year, multi-site study of several thousand families. NCS will be the largest study to date elucidating the etiology of autism in the United States. MSU serves as the data coordinating center for the NCS, and develops and hosts the CADDRE Information System (CIS). This poster exhibit presents the design concepts and principles of the CIS.
Objective
Implement a secure, centralized, web-based, automated workflow system to improve study quality by standardizing workflows and processes across all sites and providing end-to-end data management.
Methods and Discussion
Use Case Analysis identified the functional requirements. Individual- and role-based task lists and a flexible event generation system provide workflow automation. An Entity-Attribute-Value data collector provides meta-data and codebook management for the rapid deployment of forms and CATI interviews. Integration with ISAAC supports data collection of copyrighted instruments and automated scoring, with all data exported to the CIS at regular intervals.
CIS supports all study activities such as batch import, recruitment, subject tracing, tracking, mailings, incentives, reimbursements, barcodes, data entry (double-data entry and CATI), instrument scoring, biosample management, medical record abstraction and request tracking, scheduling, QC workflows, data management tools, and many study management and QC reports.
The workflow-oriented CIS represents a modern multi-site study information system that enforces standardized study procedures with the expectation of improved data quality and consistent study execution.
Sponsor: CDC, USA

PS6.38
THE RELATIONSHIP BETWEEN DEVELOPMENTAL REGRESSION AND DEVELOPMENTAL PLATEAU AMONG CHILDREN WITH AN AUTISM SPECTRUM DISORDER (ASD) Lisa D. Wiggins, Catherine E. Rice, Jon Baio, Battelle Centers for Public Health Research and Evaluation
Background: Regression during toddler hood is often reported by parents of children with ASD. Yet little data exist to distinguish regression and a leveling off of developmental milestones, or developmental plateau.
Objective: To examine the relationship between regression and plateau among children with ASD identified by a comprehensive surveillance system.
Method: 285 ASD surveillance cases were identified from a population-based surveillance system at the Centers for Disease Control and Prevention. Surveillance records were identified from educational and clinical sources and sent to trained clinicians who applied a standardized coding scheme to determine ASD case status. Clinicians also coded the presence or absence of regression, plateau, and cognitive impairment (CI); and the age at which regression and/or plateau occurred.
Results: Regression was noted in 49 (17%) records;
plateau was noted in 22 (8%) records. The presence or absence of regression and plateau was significantly correlated, \( r = .43, p < .01 \). Of the 22 children who did not progress in skill development, 16 were also noted to lose skills; meaning that regression and plateau were more likely to co-occur than to exist separately, \( \chi^2 = 51.64, p < .001 \). Children who experienced either regression or plateau were more likely to have CI, \( \chi^2 = 3.87, p < .036 \).

When both concerns were noted in surveillance records, the mean age at time of plateau and regression was 24 and 25 months, respectively.

Conclusions: Our results suggest that regression and plateau in ASD are significantly correlated and may reflect a manner of viewing and reporting a similar developmental phenomenon. Most notations of plateau were accompanied by notations of regression. Children were also found to plateau and regress, on average, at almost the exact same age. Future analyses should measure early behavioral changes with standardized instruments to further elucidate the relationship between regression and plateau in ASD.

PS6.39
THE IMPACT OF METHODOLOGICAL FACTORS ON THE PREVALENCE OF AUTISM SPECTRUM DISORDERS Judith Pinborough-Zimmerman, Robert Satterfield, Judith Miller, Deborah Bilder, Shaheen Hossain, George Delavan, William McMahon, University of Utah

Background. Despite clear increases in the numbers of children with an Autism Spectrum Disorder (ASD) identified for services, there is wide variability in the prevalence of the ASDs across the United States. This may be due to differences in case ascertainment.

Objective. To determine the impact of access to health and education records on estimating the population-based prevalence of ASDs within an 8-year-old study population.

Methods. Children with possible ASD were identified through a review of health and education records, representing a population of 26,108 eight-year-old children in 2002. ASD case status was assigned if the child had a previously documented ASD diagnosis by a qualified provider; or a special education classification of autism; or if, after an expert review of available data, DSM-IV-TR criteria for Autistic Disorder, Asperger Disorder, or Pervasive Developmental Disorder Not Otherwise Specified was met. Data was available either from health records only, school records only, or from both school and health records.

Results. The prevalence rate of ASD varied from .1 to 2.6 times lower depending on the data available to determine case status. ASD prevalence utilizing an expert clinician review process was significantly impacted by access to health and/or educational records, with the highest prevalence utilizing a combination of health and education records (7.5 per 1,000) compared with utilizing health records only (4.52 per 1,000) or school records only (3.06 per 1,000). Twenty-eight percent of cases would have been missed without an expert clinician record review process.

Conclusion. This study found that complete participation from both school and health sources yielded a significantly higher prevalence rate than either data source alone. In addition, clinician review of records identified many children who may have a previously undiagnosed ASD.

Sponsor: Centers for Disease Control and Prevention.

PS6.40
ABNORMALITIES IN SIGNAL TRANSDUCTION IN AUTISM Ved Chauhan, Abha Chauhan, Ira L. Cohen, Ashfaq Sheikh, NYS Institute for Basic Research in Developmental Disabilities

Background: We have previously reported increased oxidative stress and abnormalities in membrane lipids in autism (Chauhan et al. Life Sci. 75 (2004) 2539-2549; Life Sci.74 (2004) 1635-1643). It was envisioned that such alterations might affect various enzymes involved in signal transduction pathways in autism.

Objective: To study the activities of Ca2+/Mg2+-ATPase (that regulates intracellular calcium concentration) and protein phosphorylating enzymes, namely, protein kinase C (PKC) and protein kinase A (PKA) in erythrocytes membrane or lymphoblasts from autism and controls.

Methods: Erythrocyte membrane was prepared by hemolyzing the erythrocytes in hypotonic buffer, followed by repetitive washing. Ca2+/Mg2+-ATPase activity was measured in the erythrocyte membrane by measuring inorganic phosphate released from ATP in the presence of calcium. PKC and PKA activities were measured in the lymphoblasts using Protein kinase non-radioactive assay kits.

Results: The activity of membrane Ca2+/ Mg 2+-ATPase was higher in autism as compared to control siblings. The results suggested that intracellular calcium levels might be increased in autism. We then measured the PKC activity in lymphoblasts from autism and control subjects. PKC activity was increased in both cytosolic and membrane fractions in autism as compared to controls. On the other hand, the activity of cAMP-dependent PKA was decreased in autistic lymphoblasts as compared to control lymphoblasts.

Conclusion: It is proposed that imbalance in calcium homeostasis may affect the activity of PKC in autism, and that signal transduction may be abnormal in autism.

Sponsors: This study was supported by the funds from NYS Legislative Grant for Autism Research and NYS Office of Mental Retardation and Developmental Disabilities.

PS6.41
LOCALIZED METABOLIC DEFICITS IN AUTISM ASSESSED BY PROTON SPECTROSCOPIC IMAGING Tim J. DeVito, Dick J. Drost, Nagalingam Rajakumar, Richard Neufeld, Peter C Williamson, Rob Nicolson, Lawson Health Research Institute
Background: Proton magnetic resonance spectroscopic imaging (1H-MRSI) allows for the non-invasive quantification of metabolite levels from many brain regions in a single experiment. The few autism studies to date using this methodology have reported disparate localized metabolic deficits, though findings have been rather inconsistent.

Objective: To characterize the metabolic profile of various localized brain structures comprising limbic and language circuits in a sample of male children with autism using 1H-MRSI.

Methods: Twenty-six male patients with autism (aged 6-17) and 29 healthy males (aged 6-17) participated in this study. All images were acquired using a 3.0-tesla head-only MRI system. Localized proton spectra were acquired from two 9-mm thick oblique-axial slices using a spin-echo 1H-MRSI sequence (TE=135 ms). Individual spectra from 16 ~1-mL voxels in various limbic and language regions were analyzed, including cingulate cortex, hippocampus, thalamus, superior temporal gyrus, and Wernicke’s area.

Results: Linear mixed model repeated measures analysis revealed significant group differences in metabolite profiles (p=0.005). Associated univariate tests indicated that observed differences were confined to the metabolites NAA and glutamate + glutamine (Glx). Post-hoc ANCOVA tests revealed that autism patients exhibited reduced levels of Glx in the thalamus (p<.03), and trendwise NAA reductions in hippocampus (p<0.1).

Conclusions: Significant deficits of Glx were observed in the thalamus of autism patients, indicating abnormalities of the glutamatergic system or metabolic rate. Hippocampal regions showed reduced levels of NAA in patients, indicative of neuronal loss or dysfunction.

Sponsors: Ontario Mental Health Foundation, Hospital for Sick Children Foundation, Autism Society Ontario, Child and Parent Resource Inst., NSERC.

**PS6.42**

**INCREASED NEUROTROPHIN 4 LEVELS IN BLOOD OF CHILDREN WITH AUTISM**

Pankaj D. Mehta, Bruce Patrick, Ira Cohen, Edmund Jenkins, Ted Brown, Institute for Basic Research

Background: Studies have reported that the levels of neuropeptides and neurotrophins were increased in neonatal blood of children with autism. However, there are no reports published on the concentrations of these substances in blood from children diagnosed with autism. Brain derived neurotrophic factor (BDNF) is a growth and survival factor for neuronal populations including Purkinje cells, and is expressed in hippocampus and amygdala. Neurotrophin 4 (NT4) supports the growth and survival of sympathetic neurons, and basal forebrain cholinergic neurons.

Objectives: To examine the concentrations of NT4 and BDNF in blood from children with autism and normal controls.

Methods: We quantitated serum levels of NT4 and BDNF in 27 children with autism and 23 normal controls using a sensitive enzyme linked immunosorbent assay.

Results: Levels of NT4 were significantly increased in children with autism (Median 2.55 ng/ml; range 0.74 - 10.6 ng/ml) than controls (1.46 ng/ml; 0.5 - 2.9 ng/ml) (p<0.01). However, BDNF levels in children with autism and controls were similar. There was no significant relationship between age or sex and BDNF or NT4 levels in both groups.

Conclusion: Further quantitation of NT4 levels in additional samples of children with autism, and various control groups (unrelated normal age-matched controls, attention deficit disorders, learning disabilities, cerebral palsy, etc) are needed to evaluate the usefulness of NT4 as a marker to aid the diagnosis of autism.

Sponsor: New York State Office of Mental Retardation and Developmental Disabilities

**PS6.43**

**NEUROTRANSMITTER LEVELS IN HUMAN AMYGDALA ARE ASSOCIATED WITH AMYGDALA VOLUME DURING TYPICAL DEVELOPMENT**

Brendon M. Nacewicz, Kim M. Dalton, Lisa Angelos, Ronald Fischer, Andrew L. Alexander, Richard J. Davidson, University of Wisconsin Madison

Studies show abnormal amygdala volume in individuals with autism, but the significance of volumetric differences is largely unknown. Furthermore, typical amygdala development continues into the third decade of life, with linear increases in volume. To understand these age-related differences in volume, we developed a high-field (3T) magnetic resonance spectroscopy (MRS) technique to isolate the amygdala from hippocampus and surrounding structures.

Objective: To establish reliable measurements of amygdalar biochemistry, including neurotransmitters, in typically-developing adolescents and to test for a relationship with amygdala volume.

Methods: For reliability, 12 adults age 20-53 y (mean+SD: 28.1+9.4 y) underwent 2 MRS sessions, at least 7 days apart, and metabolite concentrations were estimated with LCModel.

For volume comparisons, 7 typically-developing males age 11-23 y (mean+SD: 16.8+5.1 y) underwent a single MRS session. Metabolite levels in right amygdala were compared to previously acquired amygdala volumes.

Results: The MRS technique produced metabolite measurements that were stable over the 1 week inter-scan period, including highly reproducible estimates of both raw GABA and GABA/Cre (GABA/Cre: ICC=.67, p = 0.006).

In the adolescents, we carried out planned comparisons with the GABA/glutamate ratio; this index of relative inhibitory/excitatory tone was significantly correlated with age- and brain volume-corrected amygdala volumes (r = .89, p = 0.04). This relationship was driven by GABA (GABA/Cre: r = .87, p = 0.056). No other metabolites significantly correlated with volume in this small sample.

Conclusions: Amygdala neurotransmitter levels can be...
relatively estimated at 3T and are closely tied to volume in typically-developing adolescents. Similar methods could relate amygdala volume differences in autism to specific transmitter systems. Funded by NIMH STAART grant U54MH066398 (Davidson, Project PI) and a NARSAD Distinguished Investigator Award (Davidson).

PS6.44
AUTISM-ASSOCIATED SEROTONIN TRANSPORTER VARIANTS CONFER GAIN OF FUNCTION PHENOTYPES ARISING THROUGH DISTINCT MECHANISMS James S. Satcliffe, Harish C. Prasad, Randy D. Blakely, Vanderbilt University The human serotonin (5HT) transporter (hSERT) is responsible for 5HT inactivation in the CNS and peripherally. Alterations in SERT activity are implicated in multiple brain disorders, including major depression, obsessive-compulsive disorder (OCD), and autism. We recently identified multiple autism-associated variants in the SERT gene (SLC6A4), including four rare coding variants (Gly56Ala, Ile425Leu, Phe465Leu and Leu550Val). These four variants are significantly associated with more severe OC behaviors in carriers with autism. Other studies found Ile425Val in subjects with Asperger’s syndrome and OCD. We previously showed that Gly56Ala shows elevated basal SERT activity and phosphorylation, and insensitivity to PKG/p38 MAPK regulation. We now report on further studies measuring total and cell surface SERT binding, 5HT uptake, and response to regulation by PKC, PKG and p38 MAPK signaling pathways. HeLa cells transfected with Ile425Leu, Ile425Val, Phe465Leu, and Leu550Val encoded SERT display elevated basal 5HT uptake, resulting from an elevated Vmax. Contrasting Gly56Ala, which shows elevated transport without changes in surface density, the other variants display elevated surface expression that parallels changes in 5HT uptake, suggesting changes in constitutive transporter trafficking. Additionally, Ile425Leu, Ile425Val, Phe465Leu and Leu550Val respond to PKG, p38 MAPK and PKC stimulation similar to wildtype hSERT. Additional studies probing PKG/p38 MAPK regulation of Gly56Ala SERT will be presented. Overall, these studies indicate two distinct ways in which these variants result in increased 5HT transport activity, suggesting that inappropriately elevated 5HT clearance and diminished extracellular 5HT may be a critical determinant of risk mediated by autism- and OCD-associated SERT alleles. Considering phenotypes associated with the Ile425Val mutation, our findings further support the premise that autism, OCD, and related disorders share etiological factors.

PS6.45
GAZE-FOLLOWING PERFORMANCE IN TODDLERS WITH AUTISM SPECTRUM DISORDERS AND DEVELOPMENTAL DELAY Sarah Hannigen, Paula Ogston, Suzanne L. Macari, Katarzyna Chawarska, Yale University School of Medicine, Child Study Center Background & Objectives: Gaze following (GF) deficit is one of the defining features of autism in toddlers. This study examines spontaneous and learned GF of toddlers with autism (AD), PDD-NOS (PDD), global developmental delay (GDD), language delay (LAN), and typical controls (TD). Method: Participants (M= 25 m, SD= 6.5) (AD: N=24, PDD: N=14, LAN: N=16, GDD: N=19, TD: N=40) were assessed with the Mullen Scales,ADOS-G, and ADI-R. GF was assessed using a contingency learning task adapted from Corkum & Moore (1998). The GF responses were divided into: spontaneous GF (above chance at baseline and test), mastery (above chance GF at test only), improvement (some increase from baseline to test), and no improvement. Results: The proportion of children in each of the GF categories differed by diagnostic group, x2(12)=57.2, p<.001. At baseline, the percentage of spontaneous gaze followers was: TD=85%; LAN=75%; GDD=39%; PDD=36%; AD=9%. Of those who did not follow gaze spontaneously at baseline, 100% of TD, 75% of LAN, 64% of GDD, 89% of PDD, and 24% of AD groups mastered the task after training. There was no improvement in 27% of GDD, 11% of PDD, and 47% of the AD group. Toddlers with PDD and AD who mastered the contingency after training differed from those who failed both at baseline and test by having higher nonverbal DQ scores, ES = 0.39, p < .005, higher verbal DQ scores, ES = 0.34, p<.005; and lower ADOS Social/Communication scores, ES = 0.28, p<.05 (ES=effect size). Conclusions: The AD group had the most severe and pervasive deficits in spontaneous GF; however, the PDD group showed similar rates of spontaneous GF as GDD toddlers. Thus, while the frequency of spontaneous GF differentiates those with AD from other developmental disabilities, those with PDD are less likely to show profound GF difficulties. Children with PDD also showed rapid response to the contingency training. Contingency learning was related to verbal, nonverbal, and social skills. Sponsor: NICHD, NAAR

PS6.46
THE RELATION BETWEEN REQUESTING AND COMMENTING IN YOUNGER SIBLINGS OF CHILDREN WITH ASD Elizabeth Malesa, Tedra A. Walden, Wendy L. Stone, Vanderbilt University Background: Both commenting and requesting demonstrate a child’s developing ability to direct others’ attention and thus establish joint reference. Research has demonstrated a relation between commenting and requesting in typically developing (TD) children. Though limited evidence suggests that this relation is present in ASD as well, the nature of this relation is unknown in siblings of children with ASD who not only are at an elevated risk for developing ASD themselves, but also exhibit difficulties in many of the same areas as children with ASD albeit to a lesser degree.

Objective: To examine the relation between requesting and commenting abilities in younger siblings of children with ASD (SIBS-ASD) as compared to younger siblings of TD children (SIBS-TD).
Methods: The Screening Tool for Autism in Two-Year-Olds (STAT) was administered to 66 SIBS-ASD (mean CA=16.5 mos, range 12-24 mos) and 42 SIBS-TD (mean CA=16.2 mos, range 12-23 mos). STAT items designed to assess commenting and requesting were used in analyses.

Results: Commenting and requesting abilities were significantly correlated in both SIBS-ASD (r=.30, p=.01) and SIBS-TD (r=.34, p=.03). The strength of relation is comparable between groups (Z=4.6, p=.32). Both of these abilities are, however, lower in SIBS-ASD than in SIBS-TD, with commenting significantly lower (t=-.07, p=.04) and requesting marginally significantly lower (t=-1.76, p=.08).

Conclusion: The relation between requesting and commenting found in TD children and in children with ASD is also observed in SIBS-ASD. Furthermore, the SIBS-ASD as a group demonstrate a pattern analogous to that of children with ASD, with significantly lower levels of commenting and relatively similar levels of requesting, in comparison to TD children. This finding supports the utility of the STAT for obtaining qualitative developmental information.

Sponsor: NICHD R01HD043292; T32HD07226

PS6.47
MUSICAL INTERACTION TO FACILITATE COMMUNICATION IN CHILDREN WITH AUTISTIC SPECTRUM DISORDER Baishali Banerjee Mukherjee, University Of Strathclyde

Background: Engaging in communication presents a core difficulty for individuals with an autism spectrum disorder (ASD).

Objective: To describe the facilitation of communication by children with ASD through musical interaction and communication.

Methods: Individual descriptive case studies of ten children with ASD aged between 3 and 7 years were combined in a collated group design. No child had previous exposure to musical intervention. Indian lullabies and Indian classical tunes were selected for improvised musical interaction and communication in individual sessions of 20-30 minutes duration.

Analysis: A descriptive category system was developed, based on principles of research on mother-infant communication and improvised music therapy, to analyze the facilitation of communication and interaction skills from videos. Micro-analysis of selected episodes of musical interaction described children's responses to music.

Results: Children's progress in communication was charted using the category system. Micro-analysis identified vocal and bodily responses to expressive narratives of communication in music. Acoustic analysis of vocal interactions with the record of timing in movements showed children's intentional responses and expressions of emotions to music: e.g. modulation of voice to express emotion, matching pitch or rhythm to achieve synchrony, turn-taking to continue an interaction, filling a gap to cooperate in interaction, giving physical comfort to express sympathy etc.

Conclusion: Music attracted and motivated expressive communicative responses in children. The facilitated musical interaction helped children with ASD to develop interpersonal communication with the therapist.

Sponsor: Strathclyde University Award for 2003-2006

PS6.48
OBSERVING THE COMMUNICATIVE FORM AND FUNCTION OF YOUNG CHILDREN WITH AUTISM IN THE CLASSROOM Greg Pasco, Kate Gordon, Patricia Howlin, Tony Charman, St George's, University of London

Background: The Classroom Observation Schedule to Measure Intentional Communication (COSMIC) was designed to provide measures of children's early social communication skills in a naturalistic context

Method: Ninety-one children with autism who were nonverbal or in the early stages of language development were observed for 30 minutes in a number of classroom settings and their intentional communication rated using COSMIC. Children were also assessed using the ADOS-G

Results: Forty-six children used some degree of speech during the observed sessions, whereas the remaining 45 used no speech. The use of speech in unstructured settings corresponded with ADOS language level ratings for all but 7 children. Children who used speech used significantly more spontaneous gestures than the nonverbal children (p<.01), but there were no differences between the two groups in terms of the spontaneous use of picture/symbols or vocalisations. All but 4 of the nonverbal children and all but 7 of the verbal children used picture/symbols to communicate. There were no differences between the two groups in the frequencies of requests for objects or social routines, but the nonverbal children made significantly fewer comments than those who used speech (p<.001). Only one (verbal) child used picture/symbols to express a comment

Conclusion: Naturalistic observation can reveal important information about the way in which children with autism express communicative functions. Children with emerging speech are more likely than their nonverbal counterparts to comment. Whilst access to symbols enables children with autism in the early stages of language development to communicate their needs, the use of symbols may not facilitate joint attention or commenting

This study was funded by the 3 Guineas Trust

PS6.49
MOTHER-CHILD EMOTIONAL AVAILABILITY AND JOINT ATTENTION IN CHILDREN WITH AUTISM SPECTRUM DISORDER, DOWN SYNDROME AND TYPICAL DEVELOPMENT Simona De Falcó, Paola Venuti, Department of Cognitive Science and Education, University of Trento

Background: There is a consensus that joint attention deficit is an early, specific and crucial symptom of
Autism Spectrum Disorder (ASD). Although it has been hypothesized that dyadic interaction difficulties are pivotal to joint attention deficit, very few studies have investigated the relation between this skill and the affective quality of mother-child interaction.

Objectives: Explore the relationship between dyadic emotional availability and joint attention skills during unstructured mother-child interaction.

Methods: 10 children with ASD aged 3-6 years and their mothers participated in this study. MLU and language age matched Down syndrome (DS; n = 10) and typically developing children (TD; n = 10) served as comparison groups. Children and their mothers were videotaped during free play and their interactions were coded with the Emotional Availability Scales (EAS, Biringen, Robinson, Emde, 1998) and with a coding system that included Initiating of Joint Attention (IJA) behaviours, Responding to Joint Attention (RJA) behaviours and Active Joint Engagement (AJE) episodes.

Results: ASD showed lower duration of IJA and AJE compared to both control group and lower duration of RJA only compared to TD children. No significant differences were found between groups in the 4 maternal dimensions of the EAS (Sensitivity, Structuring, Nonhostility, Nonintrusiveness). In ASD group the Structuring Scale from the EAS showed significant positive correlation with RJA and AJE.

Conclusion: The findings of this study support the hypothesis that specific aspects of affective interaction are relevant to the expression of JA skills and point to the necessity of deeply investigate the features of mother-child interaction in ASD children.

PS6.50
PERCEPTION OF POINTING FROM BIOLOGICAL MOTION POINT-LIGHT DISPLAYS IN AUTISM
Annamicelle Remington, Juan-Carlos Gomez, Dagmara Annaz, Rose Fletcher, Katy Laing, Elizabeth Milne, Ruth Campbell, Mike Coleman, John Swettenham, University College London

It is now well established that children with autism are delayed in the development of joint attention skills such as following another person’s point. It has also been suggested that the lack of joint attention skills early in development may underlie impairments in language and theory of mind development. Recent research also suggests an impairment in coherent motion perception in autism, and a difficulty to distinguishing point-light biological motion displays from point-light scrambled motion displays.

Our aim is to examine whether older (aged 8 to 13 years) children with autism can follow a pointing gesture, and if so, whether they can use the motion in the point as a cue. We will examine this by using point-light biological motion and point-light scrambled motion displays (which includes the same motion information but out of synchrony).

14 children with autism (8 -13 years) and 14 typically developing children (matched for CA and MA) are first tested on the ‘point-following’ item from the ADOS.

They then participate in a computer presented task. There are three conditions (50 trials each): i) a person pointing, ii) biological motion pointer, and iii) scrambled motion pointer. On each trial a brief video sequence (pointing left or right) is followed by a target appearing at the indicated location (valid) or not (invalid). Reaction time (RT) and accuracy in locating the target (by key press) are recorded.

Our preliminary results suggest that participants from both groups make few errors in locating the target. RT to locate validly cued versus invalidly cued targets will be presented for each group by condition.

Our prediction is that typically developing children will be more strongly cued by the social cues (person and biological motion pointer) than non-social cue (scrambled pointer), whereas children with autism will not differ in their response to biological motion and scrambled motion displays.

Sponsor: ESRC

PS6.51
PRENATAL MATERNAL CONDITIONS AND SPECIFIC BEHAVIORS IN CHILDREN WITH AUTISM
Ruth Kessler Abramson, Alicia V. Hall, Sarah A Ravan, Michael L Cuccaro, John Gilbert, Margaret Pericak-Vance, Harry H Wright, Ruth K. Abramson, University of South Carolina School of Medicine

BACKGROUND: Leonard, 2006, in a population study identified common maternal prenatal conditions that increase the risk of AD in the offspring. Given a child with AD, little is known about whether these prenatal factors affect expression of AD.

HYPOTHESIS: The aim of this study is to examine if prenatal conditions are associated with specific behaviors in children with AD.

METHODS: Subjects (n=149) were from the Duke/USC molecular study of AD. The ADI-R, Pregnancy Assessment Monitoring System (PRAMS), the ABC, and the Repetitive Behavior Scale-Revised (RBS) were completed for each child. Four prenatal factors were identified: infectious illness, F1; bleeding/early loss, F2; hypertension-edema- preeclampsia, F3; and diabetes, F4.

RESULTS: One-way multivariate ANOVA revealed no significant results for the dependent variables of ADI-R.

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RESULTS: One-way multivariate ANOVA revealed no significant results for the dependent variables of ADI-R.

Q19 -Speech and Insistence on Sameness Factor, or ABC scores. There were significant results for F1 and RBS subscales Compulsive Behavior -CB, F(1,149)=9.143, p=.003; Ritualistic Behavior -RB, F(1,149)=4.465, p=.036; and Sameness Behavior -SAB, F(1,149)=13.584, p=.000. There were significant results for F3 and RBS subscales Stereotyped Behavior -SB, F(1,148)=11.09, p=.001 and Restricted Behavior -REB, F(1,148)=8.707, p=.004, and for F4 and SB, F(1,148)=26.757, p=.000; CB, F(1,148)=8.703, p=.004; and REB, F(1,148)=21.414, p=.000. There was a significant interaction between F3 and F4 for SB, F(1,148)=19.358, p=.000 and REB, F(1,148)=9.951, p=.002. Pearson correlations were significant between Fland CB, r=.197, p=.016; RB, r=.206, p=.012; and SAB, r=.273, p=.001; between F4 and SB, r=.270, p=.001; CB, r=.202, p=.014; and REB,
Background: Perseveration in autism is frequently observed as stereotypic behaviors and includes object, action and verbal perseveration. It is one of the key diagnostic criteria in autism. Inquiry into the social-communication domain in autism is extensive (Mundy & Sigman, 1989; Mundy, Sigman & Kasari, 1990; Grossman, Carter & Volkmar, 1997; Wetherby, Prizant & Hutchinson, 1998) while less attention has been given to perseveration, the form it assumes and the function it serves.

Objectives: This study attempts to explore the types of action, object and verbal perseveration and obtain a measurement of the different perseverative categories exhibited by children with autism.

Methods: The subject pool (n=37) used was from an existing dataset of an intervention project (Kasari, Freeman & Paparella, 2001) for preschool children with autism. All subjects had a diagnosis of autism and their chronological ages ranged from 29-73 months. The Timed Stereotypies Rating Scale, Revised (Luce, 2003) will be used as the assessment tool. Perseveration was coded as frequency counts over 5 second intervals by independent coders. Reliability of >80% was established between coders.

Results: Varied examples of action, object and verbal perseveration were displayed in this population. The highest frequency of perseveration was demonstrated in the verbal domain with the lowest frequency in action perseveration.

Conclusion: Perseveration occupies a large portion in the life of individuals with autism (Rapin & Katzman, 1998), it is vital that researchers improve their understanding of perseveration by studying this phenomenon in children with autism and its relationship to other variables in a developmental framework. This furthers the means to designing developmentally suitable and appropriate interventions to address the differences in perseveration among different children with autism.

Funding: Personally funded

PS6.54
RELATIONSHIP BETWEEN SENSORY FEATURES AND REPETITIVE BEHAVIORS IN CHILDREN WITH AUTISM Brian A. Boyd, Grace T. Baranek, Linda R. Watson, Elena Gay, Michele Poe, University of North Carolina at Chapel Hill

Background: Sensory features and repetitive behaviors are thought to be inextricably linked. Examining their relationship could provide insight into pathogenesis, shared or differential treatments, or diagnostic criteria for the 3rd category of core autism features.

Objectives: Examine the relationship between sensory features and repetitive behaviors in children with autism, and identify differential associations for developmentally delayed (DD) or typically developing (TD) children.

Method: Data were collected from 106 children with AUT (n=50), DD (n=28), or TD (n=28), ages 1-7, using two parent-report and two observational sensory measures. Construct scores were derived for hypo- and
hyperresponsiveness and sensory seeking. The Repetitive Behavior Scales-Revised (RBS-R) factor scores were used to measure repetitive behavior.

Results: In the AUT and TD groups, hyperresponsiveness was significantly correlated with RBS-R. This relationship weakened for the TD group after controlling for mental age (MA) but maintained for the AUT group. For the DD group, only sensory seeking behaviors were significantly correlated with RBS-R, even when controlling for MA. Mixed model regression analyses will be run to further characterize relationships between sensory constructs and RBS-R subscales.

Conclusion: These preliminary findings suggest differential relationships between sensory features and repetitive behaviors in children with autism versus comparison groups, and provide some evidence as to the specificity of these behaviors in autism with implications for differential mechanisms underlying these relationships.

Sponsor: NICHD HD42168

PS6.55 CHANGES IN RESTRICTED REPETITIVE BEHAVIORS OVER TIME IN HIGH-FUNCTIONING ADULTS ON THE AUTISM SPECTRUM Monali Chowdhury, Betsey A. Benson, Ashleigh Hillier, Department of Psychology, Nisonger Center, Ohio State University, Columbus, OH, USA

Background: Previous research suggests that core symptoms of autism spectrum disorders (ASDs) abate to some degree during adulthood. However, substantially fewer studies have examined changes in Restricted, Repetitive Behaviors (RRBs) over time than in other domains.

Objective: To describe changes in RRBs from childhood to adulthood in a sample of high-functioning adults with ASDs.

Method: Participants were recruited from previous studies conducted at OSU where they were assessed with the ADI-R. This study used the Repetitive Behavior Scale-Revised (RBS-R; Bodfish et al., 2000) - a 43-item informant-based questionnaire intended to assess six dimensions of RRBs. Two forms were used: the standard form asked whether the behavior has been present over the last month, and for this study a ‘lifetime form’ was added which asked whether the behavior had been ever present, especially around ages 4-5. The RBS-R was mailed to parents of participants.

Results: A total of 34 individuals (mean age= 22.5; mean nonverbal IQ= 98.8) and their parents participated. Results indicated that there was significant improvement on all subscales except Self-injurious Behavior. The greatest proportion showed improvements in Compulsive Behavior (76%), while many (35%) did not improve in Restricted Behavior. Some subjects never manifested particular RRB symptoms suggesting a low base rate for high-functioning individuals with ASDs. All subjects manifested Sameness and Restricted Behavior at some point, suggesting that these sub-categories are among the core RRB symptoms in this population.

Conclusion: There is differential degree of improvement over time in different sub-categories of RRBs, with some symptoms being more central than others.

Sponsor: None

PS6.56 OBSESSIVE COMPULSIVE BEHAVIORS IN AUTISM SPECTRUM DISORDERS Michelle K. DeRamus, Laura G. Klinger, Mark R. Klinger, University of Alabama

Background: There is limited research describing repetitive behaviors in ASD and comparing these behaviors to other groups of children.

Objectives: The current study examined repetitive thoughts and behaviors in children with ASD and children with typical development (TD) using the Children’s Yale-Brown Obsessive-Compulsive Scale (CY-BOCS), a measure typically used in children with OCD.

Methods: 14 participants with ASD and 14 participants with TD were recruited from the University of Alabama ASD Clinic. The ADI-R and the ADOS-G were used to confirm diagnosis in children with ASD. Parents were administered the CY-BOCS, reporting on their children’s repetitive thoughts and behaviors, and completed behavioral questionnaires about their children.

Results: Repetitive behaviors were higher than repetitive thoughts in children with ASD, and children with ASD had more repetitive behaviors than children with TD. A qualitative comparison between children with ASD and the literature on children with OCD indicated that both groups showed high rates of contamination obsessions and repeating and ordering/arranging compulsions. However, aggressive obsessions and washing/cleaning, checking, and counting compulsions were lower in children with ASD than is typically reported in children with OCD. The CY-BOCS was correlated with other measures of repetitive behaviors in ASD, indicating convergent validity and was correlated with measures of social and communication impairment in ASD, indicating that these 3 areas of impairment are related in ASD.

Conclusion: Children with ASD showed high rates of contamination obsessions and repeating and ordering/arranging compulsions that are typical in children with OCD. Children with ASD did not show the high rates of aggressive obsessions or washing/cleaning, checking, and counting compulsions that are typical in children with OCD. The CY-BOCS showed promise as a reliable measure of repetitive behaviors in ASD.

Sponsor: None

PS6.57 INVESTIGATING THE RELATION BETWEEN SENSORY PROCESSING IMPAIRMENTS AND RIGID/REPETITIVE BEHAVIORS (RBs) IN AUTISM SPECTRUM DISORDERS (ASD) Robin Lea Gabriels, John A. Agnew, Edward Goldson, Jane Gralla, Xiaoxing Pan, Dina E. Hill, Lucy J. Miller, University of Colorado at Denver & Health Sciences Center/The Children’s Hospital
Background: ASD individuals have significantly greater rates and ranges of atypical sensory response compared to control groups regardless of age or ability level. RBs make up one of three core autism diagnostic features and have been classified into ‘lower-order’ (sensory/motor behaviors) and ‘higher-order’ (cognitively rigid behaviors) types, with ‘lower-order’ associated with global development delays. Definitions and measures of RBs and atypical sensory processing often overlap, increasing the difficulty in discriminating these two variables.

Objectives: Examine the relation between sensory processing impairments and RBs, controlling for IQ and age and accounting for overlapping measurement items.

Methods: Total scores on the Sensory Profile (SP) and Repetitive Behavior Scale-Revised (RBS-R) were examined for 63 children with ASD (mean age = 10.6 ± 3.96 years; mean IQ = 83.2 ± 27.7; Autism = 44; Asperger’s = 13; PDD-NOS = 6). RBS-R data were analyzed both with and without 9 items that overlapped with Sensory Profile items (‘lower-order’ RB items).

Results: RBS-R total score was significantly correlated (r = -.61; p<.001) with the sum of the SP Sensory Processing subscales (Auditory, Visual, Vestibular, Touch, Multisensory, & Oral). Significance remained when overlapping items were removed from the RBS-R (r = -.53, p<.001). Significance remained when IQ and age were controlled for (r = -.53, p<.01).

Conclusions: As RBs increase so do the severity of reported sensory problems. Results have implications for further study of sensory, cognitive, and genetic aspects of ASD and raise questions: Should sensory processing issues be part of the ASD diagnostic criteria, and if so, how do they relate to existing RB criteria? What are the neuropsychiatric underpinnings of RBs and sensory problems? Do sensory problems exist in family members of this population?

Sponsor: RESEARCH INSTITUTE/THE CHILDREN’S HOSPITAL of Denver, Colorado

PS6.58
CROSS-CULTURAL EVIDENCE FOR THE HETEROGENEITY OF THE RESTRICTED, REPETITIVE BEHAVIOURS AND INTERESTS DOMAIN OF AUTISM: A GREEK STUDY Vaya Papageorgiou, Stelios Georgiades, Venos Mavreas, Department of Psychiatry, University of Ioannina School of Medicine

Background: It is now evident that the Restricted, Repetitive Behaviours, and Interests (RRBI) domain of autism is heterogeneous, consisting of two factors: Insistence on Sameness (IS) and Repetitive Sensory and Motor Behaviours and Interests (RSMB) (Cuccaro et al., 2003; Szatmari et al., 2006).

Objectives: To replicate this 2-factor structure in a sample of Greek individuals with a diagnosis of Pervasive Developmental Disorder (PDD).

Methods: Eight items from the RRBI domain of the ADI-R were selected for analysis. These items were selected based on their high loadings on the IS and RSMB factors reported in two previous studies conducted by Cuccaro et al. (2003) and Szatmari et al. (2006). Principal Components Analysis with Varimax rotation was used to analyze data from 153 individuals with a PDD diagnosis.

Results: By using item factor loadings with absolute value > .60 we concluded that the RRBI domain of the ADI-R can be best described using two factors: Insistence on Sameness (IS), and Repetitive Sensory and Motor Behaviours (RSMB). Only two Eigenvalues were larger than 1.0. The selection of the number of factors to extract was also confirmed based on conceptual interpretability and use of the ‘scree-plot’. As a result, a 2-factor solution was selected, with 8 out of 8 items loading on the two factors. The two extracted components accounted for 52% of the variance.

Conclusion: Our findings confirmed the two-factor structure, providing cross-cultural evidence for the heterogeneity of the RRBI domain of autism and the clear distinction between IS and RSMB symptoms in individuals with PDD. Finally, we propose the Symptom Phenotype Structure Hypothesis (SPSH): The more languages/cultures replicate the structure of a symptom phenotype, the more valid and robust that structure is.

Sponsor: University of Ioannina School of Medicine

PS6.59

Stereotypical motor movements form one of the most disruptive classes of behaviors occurring in children with ASD. Engagement in these behaviors can lead to social stigmatization and complicate social interaction. Moreover, if a stereotypy becomes a dominant behavior in an individual’s repertoire, it can interfere with the performance of established skills and acquisition of new skills, and may lead to self-injurious behavior. Unfortunately, the lack of accurate and timely measures of these behaviors has slowed the development of interventions to reduce or prevent stereotypical behaviors. This presentation will describe preliminary data from an ongoing research project that evaluates the use of wireless accelerometers and pattern recognition software to automatically detect stereotypical motor movements such as body rocking and hand flapping in children with ASD in real-time. This innovative assessment strategy could have significant clinical implications. First, reliable recording of stereotypy would enable researchers to study what functional relations may exist between stereotypy and specific antecedents and consequences. These relations may arise differentially in various environmental settings, in the presence of demand tasks, or in the presence of physiological influences. Second, documentation of stereotypical behaviors before and after an experimental treatment would facilitate efficacy studies of behavioral and pharmacologic interventions intended to decrease the incidence or severity of stereotypy. Third, if successful, future work could incorporate wireless sensors and computerized pattern
recognition algorithms into a portable, wireless device that records stereotypy; enabling teachers, therapists, and caregivers to monitor movement behavior and gather data that can assist with treatment decisions.

PS6.60
INCREASING RESPONSE DIVERSITY IN CHILDREN WITH AUTISM
Deborah A. Napolitano, Tristram Smith, Jennifer R. Zarcone, Karen Goodkin, David B. McAdam, Strong Center for Developmental Disabilities, University of Rochester School of Medicine

Background: Relative to the widespread research in social communication in autism, investigation on the core feature, repetitive behavior, has been limited.

Objectives: To examine if differential reinforcement could be used to increase diverse responses of six children with ASD. Diverse Lego building was evaluated by either a novel form or a novel color building response, using a single-subject reversal design.

Method: Initially, the child was praised for building, regardless of the forms or colors displayed. In the first intervention condition, the therapist put the Lego blocks in front of the child and said, "build something different." If the child built a novel form or color response, they were provided with a reinforcer. If after three intervention sessions reinforcement failed to result in an increase of diverse responding, a training session was conducted. In the training phase, the therapist modeled and/or verbally or physically prompted the child to build either a different form or using a different color.

After training, the child was encouraged to build differently. If variation in color or form was shown, the child was reinforced. A second baseline and intervention condition was then conducted.

Results: Data showed that the intervention was successful for all 6 participants. Four of six participants demonstrated clear reversals between the baseline and intervention conditions. One participant who displayed a relatively high rate of diverse responding in baseline, did not significantly increase his novel form building in intervention. Another participant’s diverse responses failed to return to baseline rates after the first intervention.

Conclusion: Reinforcement with preferred items was found to be a successful strategy to increase varied Lego building for five of the six participants. This suggests that reinforcing diverse responses may be a useful intervention for persons with ASD.

Sponsor: Strong Children’s Research Center

PS6.61
"CIRCUMSCRIBED ATTENTION" IN AUTISM: EVIDENCE FROM A NOVEL VISUAL EXPLORATION TASK
Noah J. Sasson, Tia N. Holtzclaw, Kristen S.L. Lam, Lauren M. Turner-Brown, James W. Bodfish, UNC-Chapel Hill

Background: Although circumscribed interests (CI) are a hallmark characteristic of autism, providing a means for quantifying functional impairment related to CI has proven difficult.

Methods: We developed a novel visual exploration eye-tracking task to measure aspects of visual attention in 27 children with ASD and 21 typically developing (TD) controls. Task stimuli included 16 arrays with 24 images each matched for social and nonsocial images, which included items related to CIs (e.g. trains) as well as common items (e.g. furniture). Visual exploration was quantified by the total number of images fixated within each array.

Results: Repeated-measures ANCOVAs with IQ covaried were conducted separately on social and object arrays. Results indicated that the ASD group explored fewer social images ($F(1,45)=8.78, p<.01$) and fewer total object images ($F(1,45)=8.80, p<.01$) than the TD group. Within object arrays, however, a significant group-$X$object type interaction emerged ($F(1,45)=4.60, p<.05$), indicating that the ASD group disproportionately explored CI-type objects. Furthermore, the ASD group averaged a greater number of fixations per image viewed relative to the TD group for object ($F(1,45)=8.80, p<.01$) but not social ($F(1,45)=11.1, p=.74$), indicating that the ASD group tended to perseverate on non-social images.

Conclusions: These findings suggest that an innate bias towards nonsocial features may exist in autism that may serve as an attentional marker of CI. Further, in persons with autism this pattern of ‘circumscribed attention’ appears to be most pronounced in situations where social and nonsocial stimuli compete for attention and thus may provide an index of combined deficits in social cognition and executive functioning in autism.

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CHILDHOOD RITUALS AND THEIR RELATIONSHIP TO EXECUTIVE FUNCTIONS IN TYPICAL DEVELOPMENT AND IN AUTISM

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Background: Repetitive and ritualistic behaviours are present in a number of neurodevelopmental conditions but are also a feature of typical development. Executive dysfunction has been implicated in the aetiology of these behaviours, yet this relationship remains unclear in autism spectrum disorder (ASD), and is largely unexplored in typical development.

Objectives: To investigate the relationship between repetitive behaviours and several aspects of executive function in typical development and in older children with ASD.

Method: Typically developing children between (3-9 years) were recruited from schools in south west England. Adolescents with ASD (14-16 years) were recruited from the Special Needs and Autism Project (SNAP) cohort. All children completed a battery of cognitive tasks and parents completed the Childhood Routines Inventory (CRI); a questionnaire designed to measure the frequency of repetitive and ritualistic behaviour in children.

Results: Results from the normative sample showed highly significant correlations between a measure of cognitive flexibility (the number of errors on a card sorting task) and parent reports of ritualistic behaviour. In contrast, no relationship was found between levels of
ritualised behaviour and performance on tasks measuring generativity and inhibitory control.
Conclusion: Results suggest that the development of executive functions, in particular cognitive flexibility, may be important in the aetiology of normative childhood rituals. Data collection is ongoing with the ASD cohort. Sponsor: Child Health Research Appeal Trust (CHRAT), UK
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Autism Speaks was founded in 2005 by Suzanne and Bob Wright and is committed to aggressively funding biomedical research, raising public awareness about autism, and bringing hope to all who deal with the hardships of autism spectrum disorder. In 2006, Autism Speaks merged with the National Alliance for Autism Research (NAAR), creating the largest non-profit organization in the nation dedicated to accelerating the pace of autism research. In its ten year history, NAAR has committed nearly $30 million to fund over 270 autism research projects, fellowships and collaborative programs worldwide. This investment has been leveraged to attract more than $53 million in autism research awards by the National Institutes of Health (NIH) and other funding sources. For more information, please visit www.AutismSpeaks.org

Cure Autism Now is an organization devoted to accelerating research to prevent, treat and cure autism. In its ten year history, Cure Autism Now has provided more than $31 million for autism research programs. This includes the establishment and ongoing support of the Autism Genetic Resource Exchange (AGRE), the largest open-access repository of genetic and clinical information for autism. In addition, Cure Autism Now advocacy and funding have resulted in an overall leveraged investment of autism that exceeds $170 million. Granting programs include Young Investigator, Pilot Project, Treatment and Innovative Technology awards, as well as support of various targeted initiatives and conferences. Cure Autism Now has 18 chapters across the country with national headquarters in Los Angeles. More information about Cure Autism Now can be found at www.cureautismnow.org.

ASA is the oldest and largest grassroots organization dedicated to autism in the world. Today, more than 100,000 members and supporters are connected through a working network of over 150 chapters nationwide. ASA is dedicated to increasing public awareness about autism and the day-to-day issues faced by individuals with autism, their families and the professionals with whom they interact. For more information on autism or ASA, visit www.autismsociety.org or call 1.800.3AUTISM (1.800.328.8476).