The abstracts included in the Conference Proceedings were submitted under guidelines for the 2010 Call for Abstracts. Guidelines have changed for the 2011 Call for Abstracts. Please consult www.nypta.org for updated guidelines.
# Platform Presentations

<table>
<thead>
<tr>
<th>Primary Author</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter Douris, PT, DPT, Ed.D.</td>
<td>The Effects of Fatiguing Aerobic and Anaerobic Exercise on Balance.</td>
<td>3</td>
</tr>
<tr>
<td>Gerard G. Fluet PT, DPT</td>
<td>Robotically Facilitated Virtual Rehabilitation of Arm Transport</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Integrated With Finger Movement in Persons with Hemiparesis.</td>
<td></td>
</tr>
<tr>
<td>George D. Fulk, PT, PhD</td>
<td>Identifying different functional postures in people with stroke</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>using pressure and acceleration data from a shoe based sensor.</td>
<td></td>
</tr>
<tr>
<td>Patricia Quinn McGinnis, PT,</td>
<td>Community-Based Wellness Program for Individuals with Parkinsons</td>
<td>6</td>
</tr>
<tr>
<td>MS, PhD</td>
<td>Disease.</td>
<td></td>
</tr>
<tr>
<td>Jean Timmerberg, PT, MHS, OCS</td>
<td>Variability of force, displacement, and orientation of the hand</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>during simulated joint mobilizations performed by skilled Physical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Therapists.</td>
<td></td>
</tr>
<tr>
<td>Sam K. Yohannan, PT, MS</td>
<td>The Wii™ Gaming System for Rehabilitation of an Adult with Lower</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Extremity Burns: Case Report.</td>
<td></td>
</tr>
<tr>
<td>Sam K. Yohannan, PT, MS</td>
<td>Burn Survivors’ Perspectives on Rehabilitation.</td>
<td>9</td>
</tr>
</tbody>
</table>
The Effects of Fatiguing Aerobic and Anaerobic Exercise on Balance


Purpose: There are many studies that have examined the effects of selectively fatiguing lower extremity muscle groups with various protocols and they have all shown to significantly decrease or impair balance. There is a gap in the literature on the specific effects of upper vs. lower body exercise and aerobic vs. anaerobic on balance. The purpose of our study was to investigate the effect of aerobic vs. anaerobic fatigue, upper vs. lower body fatigue will have on balance, and if so, which combination will affect balance to a greater degree.

Study Design: Fourteen healthy subjects, seven men, and seven women age (mean age 23.5 ±1.65) took part in this study. The study design was a repeated measures design. The effect on balance was documented following the four fatiguing conditions: 1) Aerobic lower body (ALB) 2) Aerobic upper body (AUB) 3) Anaerobic lower body (WLB) 4) Anaerobic upper body (WUB). The aerobic conditions utilized an incremental protocol and the anaerobic utilized the Wingate protocol.

Methods: Balance was measured as a stability score using the Biodex Balance System. A stability score for each subject was recorded immediately following each of the four conditions. A repeated measures ANOVA with the pretest score as a covariate was utilized in order to analyze the effects of the four fatiguing conditions on balance.

Results: There was significant difference between the four conditions (p=. 02). Post hoc analysis revealed there was significant difference between the AUB, mean score 4.98±1.83, and the WUB, mean score 4.09±1.42 (p=. 014) and between AUB and ALB mean score 4.33±1.40 (p=. 029). The higher the score reflects a greater the balance deficit.

Conclusions: The aerobic upper body condition produced the greatest balance deficit. The physiological mechanism to explain our results may be that fatiguing aerobic exercise could fatigue a greater percentage of Type I and II fibers combined whereas the anaerobic conditions selectively fatigued the Type II fibers. Our results also suggest the important role of the upper body and trunk for maintaining balance that has been previously overlooked in the balance literature.
Robotically Facilitated Virtual Rehabilitation of Arm Transport Integrated With Finger Movement in Persons with Hemiparesis

Fluet GG, Merians AS, Qiu Q, Saleh S, Lafond I, Adamovich SV

Purpose: One of the issues that may contribute to less than satisfactory outcomes for patients with upper extremity hemiparesis is the complexity of sensory processing and motor output involved in normal hand function. In this paper we report on a study that used gaming simulations and adaptive robots to test the assumption that training the entire upper extremity as a unit will improve hemiparetic upper extremity function as measured by improvements in kinematic measures of coordinated upper extremity movement during practice and transfer of these improvements to untrained real world arm/hand activities.

Methods: Eleven subjects (7 male, 4 female) with a mean (SD) age of 58 (14) years and a mean (SD) time post stroke of 6 (5) years, with a range of 9 months to 15 years participated. Subjects were at least 6 months post-stroke having wrist extension of at least 20° and finger extension of 10°. Exclusion criteria included severe aphasia, hemi spatial neglect and botox injections within the past 3 months. Subjects trained for 2-3 hour sessions on four robotically facilitated simulations for eight days. All four simulations incorporated movements that involved the coordinated use of proximal and distal effectors in complex, haptically rendered three-dimensional virtual environments. Adaptive algorithms were employed to maintain training intensities at a level just within the subject’s ability. Total training time started on training day one at two hours and increased in fifteen minute increments during Week One. Training time started and remained at three hours on all four days of Week 2. The primary dependent measures were the Jebsen Test of Hand Function (JTHF), the Wolf Motor Function Test (WMFT), and the 9-Hole Peg test were assessed the day before and the day following training. Kinematic measurements were assessed during performance of two of the four simulations that were performed daily.

Data Analyses: Repeated Measures ANOVA were utilized to establish clinically significant changes in all outcome measures. Effect sizes were calculated by dividing the difference in means by the square root of the sum of squares.

Results: Subjects made statistically significant improvements in measures of trajectory smoothness, stabilization during hand movement and finger flexion indviduation. Subjects also demonstrated statistically significant improvements in WMFT, JTHF, and NHPT times that remained statistically significant at follow-up. Effect sizes for robotically collected kinematics ranged from moderate to large, NHPT and WMFT effects sizes were large. JTHF effect size was small. Mean improvement for WMFT of 16.93 seconds exceeded the published minimum detectable change of 4.6 seconds. Each of the 11 subjects’ changes in WMFT time (range 5.9-33.2 seconds) exceeded the published minimum clinically important difference of 2.3 seconds.

Relevance to Physical Therapy: This approach to training demonstrated measurable improvements in motor function in a relatively short training period (eight, three-hour sessions over two weeks). The lack of a control group makes it difficult to identify the cause of these changes. We feel that future studies controlling for the integrated versus isolated training, the adaptive robotic facilitation and the brief intensive intervention dose are indicated.
Identifying different functional postures in people with stroke using pressure and acceleration data from a shoe based sensor.
George D. Fulk, PT, PhD and Edward Sazonov, PhD

Background/purpose Recovery of mobility in the home and community is an important focus of rehabilitation for individuals who have experienced a stroke. As such, it is important to have accurate information on what the individual's mobility performance is outside the clinic in order to provide behavioral enhancing feedback and for goal setting. The purpose of this study was to assess the ability of a novel, shoe based, sensor to detect different functional positions in people with stroke.

Methods Our novel, shoe based sensor uses plantar pressures and heel accelerations measured from an insole with pressure sensing elements built from conductive foam and a two dimensional Micro Electric Mechanical System (MEMS) accelerometer. Pressure and acceleration data were collected from six individuals with chronic stroke as they assumed five different positions: sitting, standing, walking, ascending and descending stairs. Individual models were developed for each subject using a Support Vector Machine (SVM) neural classifier. Total accuracy and class specific accuracy and precision were calculated for each position.

Results The average total accuracy for the six subjects was 98.18% (range: 97.26% to 99.30%). Class specific accuracy and precision for individual positions ranged from 100% (sitting) to 78.04% (ascend stairs).

Discussion Our novel, shoe based sensor that uses plantar pressure and heel acceleration data is capable of identifying commonly performed activities in people with stroke. This unobtrusive sensor may provide an effective means of measuring activity level of people with stroke in order to provide behavioral enhancing feedback and as a measure of community mobility in order to assess the effectiveness of rehabilitation interventions.
Community-Based Wellness Program for Individuals with Parkinson's Disease.  
McGinnis PQ, Barile M, Kilgallen J, Miersch J, Murphy M, Handler J, Brick P

Purpose: Each year, 60,000 Americans are diagnosed with Parkinson’s disease, for which there is currently no known cure. Current medical treatment for Parkinson’s disease does not address postural instability. The purpose of this pilot study was to explore the effects of a comprehensive community-based wellness program on physical function, balance, and quality of life of adults with Parkinson’s disease.

Participants: Participants were included in the study if they were classified as being in Hoehn and Yahr Stage I (n=3), II (n=6), or III (n=2), and if they received medical clearance from their doctors. Thirteen adults with Parkinson’s disease agreed to participate in the study, and 11 completed the program. Mean age was 70.9 years (range: 48-87), including 6 females and 5 males.

Methods: The 16-week program consisted of 4 weeks of balance classes 2x per week, 6 weeks of Tai Chi classes 2x per week, and 6 weeks of a fitness center membership for strength training and aerobic conditioning. A mixed method study design was used. Qualitative methods included transcribed interviews based on responses to open-ended questions and observation of participant interactions during classes. Quantitative methods included pre- and post-test measures: Functional Reach (FR), Berg Balance Scale, Timed Up and Go (TUG), 6 Minute Walk Test (6MWT), and the PDQ-39. Additional data sources included exercise logs and fall logs which participants maintained during the 16 weeks.

Analyses: Qualitative data analysis software was utilized during a process of open and axial coding, followed by thematic analysis. Credibility of findings was established by use of low inference data and triangulation among participants and data sources. Quantitative data analysis was performed using paired t-tests on SPSS version 16.0.

Results: Following the program, scores on the PDQ-39 improved significantly (-8.08) (p=.013). Improvements were noted in the following measures that approached, but did not reach, statistical significance: 6MWT (+39.17m) (p=.073); FR (+1.5 inches) (p=.086); TUG (-2.34 sec) (p=.088). Mean scores on the Berg also increased by 3.27 (p=.18). Nine participants demonstrated notable improvements in outcome measures while two either maintained or experienced a decline in measures. The value of a sense of camaraderie and the opportunity for interaction with other individuals with Parkinson’s disease emerged as a prominent theme from interviews and observations. Participants noted the benefits of physical activity as well as the opportunity to share experiences with peers that lessened a sense of isolation early in the disease process.

Conclusion: A community-based wellness program is an effective way to improve quality of life in individuals with Parkinson’s disease. Results of this pilot study establish the feasibility of the program, which appears to offer promising benefits for balance and physical function. Given that Parkinson’s disease is a degenerative disorder, measures of physical function would be expected to decline over time. Therefore, maintaining baseline status or demonstrating improvements on the outcome measures is clinically important.

Application to Physical Therapy: Physical therapists have a role to play early in the disease process in promoting wellness for individuals with Parkinson’s disease. Incorporating balance, strength, and aerobic exercises into the treatment plan can produce clinically significant improvements in quality of life and physical function. Participants perceived significant benefits from various forms of physical activity and the social support provided by this program.
Variability of force, displacement, and orientation of the hand during simulated joint mobilizations performed by skilled Physical Therapists.

Jean Timmerberg, PT, MHS, OCS, Susan Edmonds, PT, DSc, OCS, Hamid Bagce, B.S., Eugene Tunik, PT, PhD

PURPOSE: Joint mobilizations are widely used to treat various musculoskeletal dysfunctions. In spite of this, the literature suggests that forces applied by physical therapists (PT) are variable, even when performing a common grade. We tested the hypothesis that the variability in force may be attributed to variance in spatial parameters of the mobilization (direction and orientation of motion of the mobilizing hand).

STUDY DESIGN: Cross sectional.

METHODS: Eight PTs, experienced in joint mobilization, applied unconstrained posteroanterior mobilizations (grades II-IV) over pads of three stiffness’ (simulating different tissue encountered in patients). A force transducer and motion capture system measured the amount of vertical force and movement (x, y, z, yaw, pitch, roll), respectively. We calculated the coefficient of variation for each grade and tissue resistance.

RESULTS: The mean peak force across grades ranged from 3.3-17.2 pounds. The mean displacement in the x, y, z, yaw, pitch, roll axes ranged from 1.0-2.7mm, 3.5-12.0mm, 0.8-2.5mm, 1.6-4.9°, 2.8-4.7°, 1.3-4.0° respectively. Notably, the coefficient of variation was generally more than twice greater in the orientation and some of the displacement measures than the force measure.

CONCLUSIONS: Our data confirm previous work that force production may be variable among skilled clinicians performing unconstrained joint mobilization. Additionally, our data are first to demonstrate that this may be attributed to even higher variance in direction and orientation of the applied force. This data may help explain previous findings of high variance in force production among clinicians and guide educational programs geared at teaching joint mobilization skills.
The Wii™ Gaming System for Rehabilitation of an Adult with Lower Extremity Burns: Case Report
S.K. Yohannan, PT, MS, E. Schwabe, PT, MS, G. Sauro, PT, C. Polistena, BA, D. Gorga, PhD, R.W. Yurt, MD, FACS

Purpose: To compare outcomes between standard of care in combination with Wii™ (SOC-w) versus standard of care (SOC) alone.

Case Description: A 47 year old male was admitted with 15% total body surface area full-thickness circumferential flame burn to the legs. His complicated medical course contributed to decreased standing balance and function, and limited motivation and interest.

Examination: A computerized force plate measured reaction time (RT), maximal excursion (MXE), movement velocity (MV) and directional control (DCL) at baseline and 3 intervals. Administered at the end of each treatment session were the Timed Up and Go (TUG) test and a questionnaire assessing motivation and interest.

Diagnosis and Prognosis: Decreased balance; improved function.

Interventions: The variable introduced for a select portion of therapy was Wii™, with SOC remaining in place for the entire rehabilitative course.

Outcomes: Composite RT improved and MXE scores were higher during SOC-w. Changes in MV and DCL were negligible. On average, the subject completed the TUG test faster during SOC-w. Finally, the subject exhibited an increase in motivation during SOC-w, and a similar trend was seen in interest level. Carryover of these benefits after SOC-w was not evident.

Clinical Relevance to Physical Therapy: The WGS may be a valuable addition to traditional therapy. Its benefits for balance and functional mobility in a short interval did not represent a carryover effect in this case, however, trends noted with motivation and interest for the WGS may suggest its advantage to elicit further engagement during burn therapy.
**Purpose, rationale and/or hypothesis:** To understand the efficacy of burn therapy interventions from retrospection of burn survivors.

**Study Design:** Survey.

**Methods:** Subjects: A convenience sample of burn survivors ≥ 18 years with English as their primary language and whose injury occurred ≥ 2 years was surveyed. Procedure/Outcome Measures: Demographics were collected and interventions of interest included splinting, positioning, therapeutic exercise, group therapy, and pressure garments. The contribution of acute burn rehabilitation toward reintegration to family roles, community, and work was rated. Data Analysis: Basic statistics and correlations. (Qualitative data pending).

**Results:** Total N = 164 (response rate of 44%). Eighty-two percent of respondents agreed that splinting and positioning during hospitalization helped them eventually move better. Survivors agreed (94%) that exercise in the hospital helped them move better in time. Participation in group therapy was rated helpful towards post-burn socialization by 77% of respondents. Eighty-one percent of respondents concurred that acute burn rehabilitation prepared them to return home and function within the family, while 76% agreed that therapy helped with reintegration into community. Fifty-seven percent felt therapy was beneficial for return to work. Respondents also agreed that pressure garments helped scars look better (85%), feel better (65%), and improved their movement (71%) over the long term.

**Conclusion:** The overwhelming majority of burn survivors are in accord that rehabilitation interventions were effective for long-term physical & psychosocial outcomes. Patient perspectives may be viewed as a fundamental measure to support the value of burn rehabilitation.
Poster Presentations

<table>
<thead>
<tr>
<th>Primary Author</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew S. Bartlett P.T., M.P.A.</td>
<td>A home-based exercise program augmented by a self-management home health monitor for individuals with type 2 non-insulin dependent diabetes</td>
<td>11</td>
</tr>
<tr>
<td>Kathryn Baxter, SPT</td>
<td>The Wii Fit: An effective intervention for balance deficits in community-dwelling adult</td>
<td>12</td>
</tr>
<tr>
<td>Mary Lou Galantino, PT, PhD, MSCE</td>
<td>Effect of yoga on cognition and quality of life during chemotherapy in women with early stage breast cancer: A randomized controlled trial</td>
<td>13</td>
</tr>
<tr>
<td>Martha Macht Sliwinski, P.T., Ph.D</td>
<td>The effects of the Wiitm on functional activities: A case study</td>
<td>14</td>
</tr>
<tr>
<td>Doreen M Stiskal, PT, PhD</td>
<td>Influences of different backpack loads on knee motion during gait</td>
<td>15</td>
</tr>
</tbody>
</table>
The impact of a home-based exercise program along with the use of self-management home health monitor for older individuals with type 2 diabetes.

Andrew S. Bartlett, P.T., M.P.A, Bini Litwin PT PhD, MBA, Maureen Friedman RN, Phd, Rebecca Rosenthal PT, MS, JD

Purpose: The purpose of this study was to determine whether the use of an eight week home-based combined aerobic and resistive exercise program along with the use of a telehealth unit can improve self efficacy, self management of exercise, health status, physical therapy outcome measures and reduce the value of modifiable cardiovascular for individuals with type 2 diabetes.

Design: A one group pre-post design was used and analyzed using the Wilcoxon Signed-Ranks Tests and Spearman’s rank correlation coefficients tests. Dependent variables: self-efficacy, self management exercise and health status (self reported measures), 30-second sit to stand, 30-second arm curl test, 2 minute step test, timed up and go (physical therapy outcome measures), body mass index, waist circumference, heart rate, systolic and diastolic blood pressure, total cholesterol, triglycerides, HDL, LDL, cholesterol/HDL ratio, and hemoglobin A1c (cardiovascular measures).

Methods: A home-based eight week combined aerobic and resistive exercise program augmented by the use of a telehealth unit (Health Buddy) and behavior intervention strategies was completed by 15 individuals with type 2 diabetes. Subjects were interviewed post eight weeks to determine barriers and contributing factors to compliance.

Results: Self reported, physical therapy outcome measures, and waist circumference was statistically significant. A trend toward improved glycemic control, decrease in cholesterol, cholesterol/HDL ratio, and an increase in HDL was reported. Self efficacy and health status were found to have a positive correlation.

Conclusions: Behavior interventions strategies facilitated accountability which led to improvement in self efficacy, self management and improvement in outcome measures.
The Wii Fit: An effective intervention for balance deficits in the community-dwelling adult.
Baxter, Kathryn; D'Antonio, Lauren; DeLuca, Rebecca; Lerner, Addison, Mottola, Mike; Stalnaker, Brian; Evans, Dawn; McVay, Denise.

**Purpose:** Falls among the elderly, related to balance deficits often lead to physical injury, loss of self-confidence and even death. Balance training with virtual reality (VR), for example the Wii Fit is one technique that has previously demonstrated improvements in balance, range of motion and functional mobility through feedback and motivation in treatment. With little research currently available utilizing the Wii Fit, this study explores this tool as an effective intervention for addressing balance deficits in the elderly.

**Study Design/Methods:** This research study was a single participant, A-B-A design where the participant was tested with traditional physical therapy balance tools: The Berg Balance Scale (BBS), Timed Up and Go (TUG) and Dynamic Gait Index (DGI), to provide baseline measurements. Participant then went through four weeks of balance interventions utilizing the Wii Fit via activities including balance, strength, yoga and aerobic games, three times a week for 45 minutes. Participant was then re-tested using same traditional balance tools, to compare to baseline. Data was analyzed utilizing a times series graph, trend line and correlation coefficients to determine a gross change in balance.

**Results:** Baseline measurements from weeks one and three were compared to data collected in weeks ten and twelve to determine the effectiveness of the Wii Fit. TUG results decreased in average time by .57s, the BBS results increased in average score by 3.25 points, and the DGI results increased in average score by 1.75 points. Therefore, these results show a decreased risk for falls in our participant.

**Conclusion:** The Nintendo Wii Fit was found to be an effective intervention for improving balance and motivating community dwelling adults, expanding the link between traditional therapeutic interventions, and innovative interventions in the clinic. This resulted in improved motivation and attitude toward further health and wellness interventions and opens up doors for further research.
Effect of Yoga on Cognition and Quality of Life During Chemotherapy in Women with Early Stage Breast Cancer: A Randomized Controlled Trial

Galantino ML, Daniels L, Dooley B, Muscatello L, O’Donnell L

Purpose: Adjuvant chemotherapy for women with breast cancer has significantly improved the cure rate, however it has been associated with cognitive function impairments. Previous studies have shown the benefits of exercise to cognitive health, including the efficiency of decision-making, memory and problem solving. The literature provides preliminary support for the feasibility and efficacy of yoga interventions for cancer patients, however controlled trials are lacking and no studies have examined the effect of yoga on cognition.

Methods: Forty women with a diagnosis of early stage breast cancer prior to chemotherapy treatment were administered the following psychological measures at baseline: Profile of Mood States (POMS), FACT-B (QOL), FACIT-F (fatigue), and FACIT-NX (pain from neurotoxicity). Physiologic measures included Forward Reach test (balance) and Sit and Reach test (flexibility). Primary outcomes of cognition were measured with the Perceived Cognition Questionnaire (PCQ) and CogState, a computerized measurement of cognition. Women were randomized to an Iyengar yoga (IY) or regular activities of daily living. All measurements were taken at 6 and 12 weeks during chemotherapy, and 1 and 3 months after the conclusion of the study. Qualitative questionnaires were also administered after the study.

Results: No statistically significant differences were found between the IY group and the control group. However, cognitive data trends measured by CogState showed greater concentration levels, speed and accuracy for the IY group. Qualitative frequency of responses noted the most challenging aspect of participation in the yoga classes were physical limitations including fatigue, range of motion and pain. Participants noted that the classes were helpful and some continue practicing yoga aspects of relaxation, breathing and stretching.

Discussion: This randomized controlled trial depicts trends in cognitive, physical, and QOL measures in a 12-week Iyengar yoga program. Although no statistically significant differences were found, trends suggest the cognitive benefits of minimum exposure to yoga. There was high attrition in this study which needs to be addressed in future studies. This study supports the need for further research on the effects of yoga on cognition for women with breast cancer undergoing adjuvant chemotherapy treatment.
The Effects of the Wiitm on Functional Activities: A Case Study

Martha Macht Sliwinski, P.T., Ph.D., Christopher Hayes S.P.T., David Jou S.P.T., Anat Yehushua S.P.T.

PURPOSE: The objective of this single case study was to determine if Wii™ training improves dynamic stability status-post ACL reconstruction.

CASE DESCRIPTION: 22 y/o male 8 month’s status-post right ACL reconstruction with a patellar-tendon graft and lateral meniscus repair. He had completed physical therapy and was training to return to recreational rugby.

EXAMINATION: The Noyes’ Hop Tests (one-legged single hop for distance, one-legged 6m timed hop, one-legged triple hop for distance, and one-legged crossover hop for distance) were administered in accordance to validated protocol.

DIAGNOSIS AND PROGNOSIS: The diagnosis is impaired joint mobility, motor function, and muscle performance associated with soft tissue surgery. The prognosis is full participation by 8 months. Wii™ training was added to improve high level balance strategies for prevention of re-injury returning to rugby.

INTERVENTIONS: Three, 30 minute sessions on the Wii™ Fit and Sports were completed weekly for 6 weeks. Sessions included 2 yoga, 2 balance activities and one game.

OUTCOMES: The single limb hop test improved (10cm) on the non-operative limb (NOL), but not on the operative limb (OL), time decreased with the NOL (-28.84%) but increased with the OL (+4.05%). The Triple Hop Test distance decreased with the OL (67cm), but completed the test in 2 trails from initially 7. The Cross-Over Hop Test improved in both distance (38cm OL) and 1 trial from 2.

CLINICAL RELEVANCE TO PHYSICAL THERAPY: The improvements in trial error may be attributed to changes in the neuromuscular system with increased efficiency with movements from Wii™ training.
Influences of Different Backpack Loads on Knee Motion During Gait
Doreen M Stiskal, PT, PhD; Joann Borawski, SPT; Jacob Schuck, SPT; James Tholany, SPT; Peter Torcivia, SPT; Victoria Walter, SPT; Hanbit Yeon, SPT.

Purpose/Hypothesis: Carrying a backpack is a part of everyday life. Heavier backpack loads cause individuals to assume flexed postures. While studies describe the effects of loaded backpacks in gait on trunk and pelvic kinematics, few have examined the kinematics of the knee. The purpose was to explore how four backpack loads influenced knee ROM during treadmill walking.

Design: Repeated measures

Methods: Twenty healthy college students walked on a treadmill at 1.5 m/s while carrying a backpack for five conditions: 0%, 5%, 10%, 15%, and 0% of body weight (BW) as a six-camera, computerized motion analysis system recorded movements of subjects' pelvis and LEs. Data from three complete gait cycles were processed using Visual3D™. Means for total knee excursion, maximal flexion and extension were entered into separate repeated measures ANOVAs to find differences between the four different weights (p < .05), with post hoc t-tests set with a Bonferroni correction (p < .0125). Paired t-tests were used to determine differences between the two 0% conditions.

Results: We found small but significant changes in knee excursion between 10% and 15% of BW. Knee flexion and extension motion decreased most at 15% of BW, possibly as a stabilizing factor. No differences occurred between beginning and ending 0% BW conditions, suggesting kinematic differences during loading were temporary.

Clinical Relevance: During gait the knee ROM varies from baseline when carrying a backpack of 10% BW or higher. This variability appears to be important to maintain one’s walking velocity while successfully carrying a loaded backpack.