

# The IADMS Bulletin for Teachers

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Volume 3, Number 2, 2011

## Editors-in-Chief

*Gayanne Grossman, P.T., Ed.M., and Marliese Kimmerle, Ph.D.*

## Associate Editors

*Ruth Solomon and John Solomon*

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Gayanne Grossman, P.T., Ed.M., and Marliese  
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## Departments

### Abstracts from the Current Literature

*edited by Gayanne Grossman, P.T., Ed.M., and  
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### Letter from the Editors

Dear Dance Educators,

We want to thank the many teachers who provide members of the Education Committee with such positive feedback on the *Bulletin*. We hope you will continue to spread the word to your colleagues about the *Bulletin* and the many other resources for teachers available through the IADMS website and the Studio Teachers' Network. The editors, Education Committee, and the IADMS Board of Directors wish to extend our sincere appreciation for the continuous generous support of the *IADMS Bulletin for Teachers* by Ken Endelman of Balanced Body.

We received a request for more articles on psychology and are very pleased to offer articles in this issue on motivational climates and on dance imagery, each with a handout. We are also instigating what we hope will be a continuing series on Functional Anatomy for Dance Training with a first article on the psoas muscle.

Janet Karin, the chair of the Education Committee, reports on the ever expanding outreach activities of the committee. We congratulate Janet on her election to the 2011-13 IADMS Board of Directors as Vice President/President-Elect. The Day for Teachers, October 16, 2011, in Washington D.C. offered a jam-packed program as usual. Details are posted on the IADMS website ([www.iadms.org](http://www.iadms.org)). If you have not explored the website beyond the *Bulletin*, make sure you look for the new posters and recent resource papers.

We encourage dance educators to continue communicating with us to ensure we answer your questions and address topics that help promote our mission of bringing state of the art dance science research into the dance studio and classroom. Please send your letters to: [media@iadms.org](mailto:media@iadms.org).

Editors:

Gayanne Grossman, P.T., Ed.M., and Marliese Kimmerle, Ph.D.

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# Education Committee Activities

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## Greetings from the Chair of the IADMS Education Committee

The IADMS Education Committee has been reaching out to teachers across the world, spreading the news of the many resources and opportunities available through IADMS. From our own experience as dance teachers, we are aware of the importance of new, stimulating information to improve our practice. At the same time, we share the need to speak with others about the challenges and discoveries that are part of all dance teachers' lives. Our initiatives have all arisen from the IADMS Education Committee's recognition of these needs.

Recently, I was re-reading Joan Lawson's books, especially *The Principles of Classical Dance* (1980) and *Teaching Young Dancers: Muscular Co-Ordination in Classical Ballet* (1984). I was reminded of my excitement almost thirty years ago when I discovered that Joan was writing "just for me," illuminating matters of dance science that concerned me daily as a teacher, and in a brilliantly accessible way. I devoured these books and, like *Oliver Twist*, I wrote to her asking for more. Her generous responses over the years were evidence of her urge to share her knowledge. This is the spirit I see today in IADMS.

The Education Committee is making progress in many of its initiatives. We are constantly increasing our list of teachers who receive the *Bulletin*, as this is often the first step towards a closer involvement with IADMS. Thanks to the editors, Gayanne Grossman and Marliese Kimmerle, the *Bulletin* is always packed with inspiring articles that support and challenge our day-to-day teaching experience.

Some of our **resource papers** have been translated into Japanese, French, Dutch and Spanish. Translation to other languages is in progress, reflecting the international nature of IADMS. We have just posted a new resource paper on turn-out and hip anatomy; another on supplementary exercises for turn-out should be online shortly. After this will come an invaluable paper on stretching; this is a much needed resource for teachers and their students. Readers have shown a great interest in psychology for teachers, so

we will focus on this over the next year or so.

Those enrolled in the **Studio Teachers' Network (STN)** are exceptionally pleased with our posters. Comments include "They have proved very popular and are read and discussed and used as lecture content" and "they are simply fantastic and they have been beautifully framed. All three posters are very important to our work and it is wonderful that you have released this information." Series 3 posters, based on the most recent resource papers, were released at the Annual Meeting in October and are now available in the IADMS Online Store: <http://www.iadms.org/storeindex.cfm?findprimarycategory=2306>.

The **Safe and Effective Dance Practice (SEDP)** certification, a partnership between IADMS and Trinity College London, is booming. The qualification is applicable to those working across all sectors of the dance profession and is applicable to all styles of dance, from ballet to ballroom, hip-hop, tap and Bharata Natyam. We are thrilled to report that belly dance and pole dance teachers are now applying for the SEDP certificate. This remarkable growth in numbers and diversity is evidence of the quality of the certification. It also demonstrates that teachers in all genres are increasingly aware of the need for professional development and safe practice.

Surely the most important event of the year for us is the **Day for Teachers**, held the day following the Annual Meeting. This year's program, skillfully devised by Donna Krasnow, focused on conditioning for dancers. Lectures and workshops addressed flexibility, muscular strength, aerobic training, fitness and neuromuscular aspects. Delegates were able to experience various conditioning techniques in movement sessions. The opportunity to hear a range of excellent presenters, to experience techniques first-hand, and to discuss common interests with peers from across the world, made A Day for Teachers an exceptionally refreshing experience.

Janet Karin  
Chair, IADMS Education Committee

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# Motivational Climates: What They Are, and Why They Matter

Michelle Miulli, M.Sc., and Sanna M. Nordin-Bates, Ph.D., Trinity Laban Conservatoire of Music and Dance, London, UK

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## Introduction

For dancers, a motivational climate is the psychological atmosphere in which they are training, rehearsing and performing.<sup>1</sup> While everyone involved in the class contributes to the motivational climate, teachers have the major responsibility in creating a healthy environment. Not only do teachers have a significant influence on climates, but they also impact greatly on dancers' well- and ill-being through the climate they create.<sup>2,3</sup> Note that studies of the motivational climate are typically based on student perceptions, rather than the perspective of some objective outsider. This is valuable because we all respond to what we perceive to be happening, even if our perceptions differ somewhat from those of others.

Research has affirmed two major motivational climates can exist either separately or in combination: these are known as task- and ego-involving climates (see Table 1).<sup>1,4</sup> As illustrated, a climate is task-involving when students perceive an emphasis on self-improvement, learning, cooperation and individual effort. A climate is said to be ego-involving when students perceive an emphasis on objective success and competition, which tends to be accompanied by punishment for mistakes, rivalry, social comparison and favoritism.

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## Motivational Climate Research in Dance

One of the earliest studies investigating dancers' perceptions of the motivational climate showed that students who perceived their environment as emphasizing punishment for mistakes (a characteristic of ego-involving climates) were also more worried about performances, and had a harder time concentrating on their dancing.<sup>5</sup> This could indicate that while some teachers may feel they are helping dancers improve by creating an atmosphere in which mistakes are not accepted, they are actually contributing to fear, worry, and lack of focus. Findings from this study also showed that punishment for mistakes was associated with aspects of perfectionism, such as dwelling on mistakes.<sup>5</sup>

More recently, one study explored motivational climates

**Table 1** Task-Involving and Ego-Involving Climate Characteristics

Task-Involving	Ego-Involving
Encourages self-improvement	Encourages being the best
Supports all students	Supports star students
Mistakes help dancers learn	Mistakes are not acceptable
Dance and learn with peers	Compare and compete with peers
Reward effort	Reward success

and dancers' psychological needs satisfaction.<sup>3</sup> Findings showed that vocational dancers who perceived their environment as being more ego-involving also felt less competent and less accepted in the dance setting. On the other hand, when dancers perceived a task-involving climate they felt more autonomous, and more healthy overall.<sup>3</sup> Likewise, research in sport has found that task-involving climates contribute to healthier athletes and greater overall enjoyment.<sup>4</sup>

The studies reviewed thus far clearly indicate that motivational climates matter, and can play a significant role in dancers' well-being. Four recent studies examining motivational climates in dance are summarized in the next section.

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## Recent Studies Exploring Motivational Climate

Several recent studies have included motivational climate as one of their variables. These form part of the larger Centre for Advanced Training (CAT) project in the UK, which aims to better understand the development of talented young people in dance. All studies used a dance-specific version of a motivational climate questionnaire.<sup>3</sup> Participants were between 10 and 18 years old, and trained at one of eight CATs around the UK, regional training centers for talented youth. Most CATs focus on contemporary dance, but there are CATs for ballet, urban dance, and South Asian dance, too. In addition to the dance training at a CAT, many dancers participated in classes at a "home" studio



(private dance schools or ongoing dance classes within an academic setting). Throughout the CAT studies, dancers viewed their environments as having significantly more task- than ego-involving characteristics. Participants also perceived more task-involving features within their CAT training than at home dance schools.

*Study 1: Do dancers of varying ages differ in how they perceive the motivational climate?* This was the first study to explore motivational climate in relation to dancers' age.<sup>6</sup> Three age groups were specified for the CAT dancers: early adolescence (10-12 years), mid-adolescence (13-15 years) and late adolescence (16-18 years).

Findings revealed that mid- and late-adolescent groups reported significantly more ego-involving climate features than did younger dancers. This could indicate that as students' training advances, their learning environments put more emphasis on ego-involving characteristics, such as competition, punishment for mistakes, and unequal recognition. However, whereas the older dancers perceived more ego-involving components than the younger dancers, they still viewed their environments as more task- than ego-involving overall. Combined with findings from other research,<sup>7</sup> we suggest that even as students' aim for higher levels of recognition and competition becomes more intense (e.g., for places in schools, companies, or leading roles), a task-involving climate is still ideal for dancers' growth. In other words, an optimal learning environment emphasizes personal improvement, rewards effort, and encourages dancers to learn together, whatever their age.

*Study 2: Is the motivational climate related to dancers' perfectionism?* A second study examined the psychology of motivational climates further, exploring links it may have with perfectionism.<sup>8</sup> Findings showed that the less ego- and more task-involving the dancers perceived their training climate to be, the less likely they were to report perfectionistic tendencies such as concern over mistakes, need for approval, and rumination. Results regarding what are sometimes seen as the more positive aspects of perfectionism (e.g., striving for excellence, planfulness) were less clear, but higher task-involving climate perceptions were associated with striving for excellence to a greater extent. While striving for excellence sounds positive, it can be unhealthy when one feels pressured to be perfect or the very best. Indeed, results showed that dancers who reported striving for excellence in this way also ran an increased risk of experiencing the "other side" of perfectionism: for instance, they were more likely to ruminate and worry excessively about their mistakes. Thus, encouraging excellence rather than perfection, or the notion that whatever one does is never good enough, is likely to be more beneficial for dancers.

*Study 3: Does the motivational climate change over time, and do changes make a difference to dancers?* The third study aimed to look beyond motivational climate at a single point in time, monitoring whether dancers' perceptions of the climate changed over a six- month period, and if so, how.<sup>2</sup> It investigated not only changes in the motivational climate, but also changes in dancers' self-reported anxiety,

and how the two interacted. Questionnaires were administered at two different points in time, six months apart.

Results showed that dancers perceived fewer ego- than task-involving climate features at all times. However, they perceived significantly more ego-involving climate features at the second time point, which was close to the dancers' final performance. This could suggest that teachers' attitudes and methods shift slightly as performances near. Being less tolerant of mistakes, paying more attention to dancers with leading roles, and encouraging students to outperform their peers are all plausible responses to the stress an approaching performance date could cause teachers. Although this may be an understandable reaction, teachers need to be aware that such changes in behavior and tolerance levels are likely to impact how nervous their dancers feel. In fact, results showed that the change in the perceived motivational climate also predicted an increase in dancers' anxiety. If teachers want their dancers to feel calm, in control, and able to focus, this is most likely best achieved by giving equal attention and recognition to all dancers at all times, and avoiding punishment for mistakes, even if it is close to crunch time for a show.

*Study 4: Is the motivational climate related to dancers' creativity?* Continuing to look at dancers of different ages and levels, a fourth study was conducted with a sample of professional dancers.<sup>9</sup> Specifically, this study sought to investigate the relationship that motivational climates might have with dancers' perceived creativity. Findings suggested yet another positive aspect of task-involving climates: when dancers felt that they were dancing in an environment with more task-involving features, they reported feeling more creative. Conversely, the dancers who viewed their environment as more ego-involving felt less creative. This result concurred with previous dance research in indicating the significant impact that the motivational climate may have in nurturing dancers' creativity.<sup>10</sup> This lends further support for the encouragement of task-involving climates in dance in order to help dancers feel creative and, ultimately, perform better.

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## Recommendations for Teachers/Conclusion

Based on these four studies of motivational climates, along with previous research, it seems that the distinct advantages of a task-involving climate continue to be demonstrated. Teachers, choreographers and directors can emphasize individual milestones for their dancers, effort (even if technique is not perfect), and a passion for the entire learning process rather than just the end result. In doing so, they are likely to be nourishing dancers' feelings of creativity and lessening anxiety. These recent findings also offer support and rationale for continuing to create task-involving climates even as dancers become older and more serious about their training, and as performances near. This information may be useful for influencing teaching models in dance. Being patient if someone is slow to learn new choreography, making sure everyone in class has optimal engagement regardless of ability level, or encour-

aging students to reach their own personal best are not always the most traditional ways of teaching dance. These methods could, however, be beneficial for everyone, nurturing artists who are more calm, creative, and self-assured.

As teachers we all have a similar goal: to help our dancers flourish. With accumulating research pointing to the benefits of a task-involving climate, it seems it is our job to do what we can to influence the climate in this way. We suggest trying the recommendations on the handout that follows for a few weeks. Notice if your students fully apply themselves to the material, both technically and creatively. Do they seem to feel better about themselves? Perhaps they are more willing to take risks with their dancing and inspired to try new things? As a result of this new research we believe that students in a task-involving climate will experience these beneficial changes.

### References

1. Ames C. Motivational climate and achievement related patterns. *In: Roberts G (ed): Motivation in Sport and Exercise.* Champaign, IL: Human Kinetics, 1992, pp. 161-76.
2. Nordin-Bates SM, Quested E, Walker IJ, Redding E. Climate change in the dance studio: findings from the UK Centres for Advanced Training. *Sport, Exercise, & Performance Psychology.* In press.
3. Quested E, Duda JL. Exploring the social-environmental determinants of well- and ill-being in dancers: A test of basic needs theory. *J Sport Exerc Psychol.* 2010;32(1):39-60.
4. Carr S, Wyon M. The impact of motivational climate on dance students' achievement goals, trait anxiety, and perfectionism. *J Dance Med Sci.* 2003;7(4):105-14.
5. Harwood C, Spray CM, Keegan R. Achievement goal theories in sport. *In: Horn TS (ed): Advances in Sport Psychology 3<sup>rd</sup> ed.* Champaign, IL: Human Kinetics, 2008, pp. 157-85.
6. Walker IJ, Nordin-Bates SM, Redding E. Characteristics of talented dancers and age group differences: findings from the UK Centres for Advanced Training. *High Ability Studies.* 2011; 22(1):43-60.
7. Pensgaard AM, Roberts GC. Elite athletes' experiences of the motivational climate: the coach matters. *Scand J Med Sci Sports.* 2002;12(1):54-9.
8. Nordin SM, Walker IJ, Redding E, Quested E, Duda JL. Motivational climate and perfectionism among young dancers: findings from the UK Centres for Advanced Training. Presented at the International Society for Sport Psychology (ISSP), Marrakesh, Morocco.
9. Miulli MK. *Creativity, Perceived Motivational Climate, and Self-esteem in Professional Dancers.* Unpublished master's thesis, Trinity Laban Conservatoire of Music and Dance, London, 2010.
10. Watson DE. *Creativity: An Exploration into the Views and Experiences of Young Dancers in a Pre-vocational Training Programme.* Unpublished master's thesis, Trinity Laban Conservatoire of Music and Dance, London, 2009.



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# IADMS Education Committee

## The IADMS Bulletin for Teachers Handout 3(2)A 2011

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### Helping Dancers Thrive and Feel Motivated:

*Creating a task-involving atmosphere in the studio*

- **Focus on self-improvement** – emphasize the learning process more than a specific outcome. Make goals focused on self-improvement and not dependent on the behavior of others.
- **Mistakes are OK** – they are part of learning! Help dancers be tolerant of their own mistakes so that they feel eager to try new things, and understand that it's ok not to be perfect.
- **Give dancers choices** – ask for input on combinations, choosing partners, how many times to repeat an exercise, or other areas. Small choices can make a big difference in helping dancers feel involved!
- **Emphasize collaboration** – have dancers work together, mix up groups so they are not always with the same people, and give them the opportunity to cooperate and learn together.
- **Provide positive feedback** – hearing that you're on the right track can go a long way. Remember to point out areas that dancers are doing well in, focusing on positive and constructive feedback ahead of negative comments.
- **Everyone counts** – whether it's in the classroom or on stage. Let each dancer know they matter to the success of the class, school or performance.
- **Give dancers equal attention** – pay attention to everyone in class. If you have students demonstrate in front of each other, mix up whom you call on and make sure they all get a turn. Everyone has something to contribute and everyone can learn from others.



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# The History and Research of Dance Imagery: Implications for Teachers

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If we listen carefully to a dance teacher leading a class, we might hear many uses and examples of imagery. The teacher may encourage the dancers to lengthen the spine by imagining a string attached to their heads, gently lifting and elongating. Or she may focus on the roundness of the arms by having them imagine holding a round ball with energy streaking through it. Imagery is one of the tools teachers use to promote goal attainment in dance classes. Depending on the level and style of dance, imagery can be used to enhance technique, choreography, creativity, and expression. Research in motor imagery in general, and dance imagery specifically, provides some insight into how imagery works, and in what contexts, for dance education. This paper begins with a brief history of dance imagery research and practice. Next, it describes characteristics of mental imagery, typical uses of dance imagery, and concludes with examples of past and recent research.

Based on over 20 years of observation and exploration of imagery in various dance and non-dance related contexts, and for the purposes of this discussion, the following definition of dance imagery is proposed: *Dance imagery is the deliberate use of the senses to rehearse or envision a particular outcome mentally, in the absence of, or in combination with, overt physical movement. The images may be constructed of real or metaphorical movements, objects, events, or processes.*

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## Dance Imagery – The Foundation

The use of dance imagery has a long history, dating back to the early 1900s and the work of Mabel Ellsworth Todd in New York City. Her seminal book, *The Thinking Body: A Study of the Balancing Forces of Dynamic Man*,<sup>1</sup> was the culmination of her work in the area of movement and posture. The book promoted an understanding of the biomechanical forces behind human movement and body alignment, and included images based on body engineering. Barbara Clark and Dr. Lulu Sweigard were two of Todd's students who began teaching dancers in New York in the 1940s. Although not dancers themselves, the applicability of their teaching methods to dance, incorporating imagery

(among other tools), was noted and appreciated, especially by the new generation of modern dancers working in NYC. Dr. Sweigard, a scientist who conducted research studies based on Todd's work and her own evolution of those ideas, joined the dance faculty of The Juilliard School in 1956. Her courses included Anatomy for Dance, and she also established the Posture Laboratory, where students came for evaluation and individual instruction in neuromuscular reeducation. Sweigard's book, *Human Movement Potential: Its Ideokinetic Facilitation*,<sup>2</sup> is still studied as one of the primary texts on the use of imagery. It also gave the field of imagery an official name, "Ideokinesis," from the Greek "ideo," meaning idea, and "kinesis," meaning movement. The movement images are used to gain subcortical control over spinal musculature. Ideokinesis enhances and improves the execution of dance skills. It works because of the relevance of the images (ideokinetic facilitators) to anatomical structure and function.

Sweigard's presence for many years at Juilliard was instrumental in the widespread dissemination of the use of imagery in the dance world. Many of the students she influenced became educators and leaders themselves in dance education and performance, both in the United States and internationally. Betty Jones and Irene Dowd were especially important in widening exposure to the dance world. Jones, one of the master Limon teachers worldwide, was Sweigard's assistant for twelve years, and early in her career started integrating anatomy and imagery into her own classroom teaching. Irene Dowd, who was Sweigard's assistant during the last six years of her life, evolved her own unique brand of ideokinetic work which enjoys widespread use in the dance world, for example at The National Ballet School of Canada. Dowd continues to teach privately in New York, and like her mentor, Lulu Sweigard, also teaches anatomy at The Juilliard School.

The Ideokinesis exercises were designed to focus on alignment of the dancer. Numerous other dance educators have developed varying systems for using imagery in their work, both in dance and in other environments. For example,

dance educators have used imagery to enhance kinesthetic perception<sup>3</sup> and to encourage creative movement exploration.<sup>4</sup> The Franklin Method, developed by Swiss-born dancer and educator Eric Franklin,<sup>5</sup> is a contemporary example of imagery application. Franklin studied imagery with Andre Bernard at New York University, and incorporates recent scientific research from the field of neuroplasticity into his work. Other examples of the current generation of imagery educators include Australian Ballet educator Janet Karin, and the “Conditioning with Imagery” movement system of York University’s Donna Krasnow, in Canada.<sup>6</sup>

Imagery, as used by dancers and dance educators, has applications similar to those in the sports and exercise science disciplines; however, because of the aesthetic and theatrical dimensions of dance, there are applications that are unique to dance.

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### **Mental Practice to Motor Imagery**

Mental imagery as an area of research has a long and distinguished history in psychology and, more specifically to dance, the sub-discipline of sports psychology. Sport psychologists have found that mental imagery is effective in learning and performing motor skills.<sup>7</sup> Such research has followed the mental practice paradigm, essentially comparing performance change under three experimental conditions (i.e., physical practice, mental practice, and the combination of mental and physical practice) to a control group. This classic meta-analysis demonstrated that physical practice provides the greatest performance gains, followed by mental practice and then no practice.<sup>7</sup> Recent reviews of mental practice of motor imagery (MI), a term coined to describe the mental practice of physical actions, have continued to demonstrate the positive effects of MI when used in conjunction with physical practice.<sup>8</sup> Therefore, when practice time is limited or injury affects dancers, motor imagery can be an effective rehearsal tool.

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### **Dance Imagery Research**

Since the 1980s a small but growing number of scholars have conducted research on various aspects of dance imagery. One basic way researchers have captured the elements of dance imagery for investigation is by modality and perspective. The chief sensory modalities characteristic of mental imagery usually include visual (seeing), kinesthetic (feeling), or auditory (hearing) imagery. Perspective refers to whether the viewer imagines the action as happening externally or internally. An external image involves imaging from the perspective of outside the body, as if observing oneself on video. An internal image involves imaging from the perspective of inside the body, as if observing through one’s own eyes.<sup>9</sup>

Dance teachers and researchers recognize several additional forms of MI, including metaphorical imagery, contextual imagery, and character images. Metaphorical imagery involves imaging objects or ideas that have a relationship to a skill or task; for example, while jumping, imagining feeling one’s pelvis as a bouncing ball.<sup>5,9</sup> Context

images depict places and people, both real and imaginary, whereas characters and roles depict a character’s appearance, behaviors and emotions.<sup>10</sup>

A distinction between the ways imagery is used in dance versus sports is that dance images are given both while moving and still, whereas in sports motor imagery is provided while still. While Ideokinesis employs the use of metaphorical images while the individual is still, lying in a constructive rest position, metaphorical images are often used while moving. An example of a metaphorical image provided while students are moving is one used by Katherine Dunham, who instructed dancers to focus on a “magnetic circle” as they performed various isolations: “Feel the presence of a magnetic circle; move toward the circle.” This example was from a class observed at the 2003 Annual Conference of the International Association of Blacks in Dance at Howard University in Washington, D.C.

Psychologist Allan Paivio posits that imagery serves two functions, one cognitive, the other motivational.<sup>11</sup> This functional distinction is reflected in differences in image content. The Sport Imagery Questionnaire (SIQ) was designed to reflect Paivio’s model of five categories of imagery. Two of these categories relate to the cognitive function, while three relate to the motivational function. These categories are: Cognitive general (CG) imagery, related to choreography and improvisation; Cognitive Specific (CS) imagery, representing specific dance skills (plié or relevé, for example); Motivational General-Mastery (MG-M) imagery, associated with mental toughness, control and confidence; Motivational General-arousal (MG-A), i.e., arousal and relaxation in a performance/competition context, and finally; Motivation Specific (MS) imaging, i.e., performing with skill and expression. In a recent study, forty-two professional ballet dancers were surveyed on their use of the five functions of imagery using a modified SIQ.<sup>12</sup> The researchers found that professional dancers use imagery for cognitive and motivational functions. They reported using imagery to rehearse dance sequences (CG imagery), rehearse specific dance skills (CS imagery), to stay positive and confident (MG-M), to regulate arousal and anxiety (MG-A), and to a lesser extent for goal setting (MS).<sup>12</sup>

Researchers have attempted to answer the question of what types of imagery dancers and teachers find most useful for motor skill development and performance. Recent findings support the assertion that dancers and teachers tend to use both motor imagery and metaphorical imagery, but the type varies over time in relation to the level of advancement of the dancer.<sup>13</sup> In a study of the developmental aspects of imagery use, 250 dancers from various dance types perceived their images to have improved both in quality and quantity across their years in dance.<sup>13</sup> In this study, higher-level dancers reported having been encouraged to image more frequently and were given metaphorical images more often than lower-level dancers.

Dance teachers might also concern themselves with the affective components of the dance, for example, the level of anxiety accompanying professional training. Audition

anxiety and the role of imagery in the anxiety-performance relationship were studied in 131 female dancers.<sup>14</sup> These participants were assessed for competitive anxiety and confidence (CSAI2), cognitive and motivational functions of imagery (SIQ), and movement imagery (MIQ-R). Successful dancers experienced less cognitive anxiety and more somatic anxiety. Kinesthetic imagery was found to be a significant predictor of confidence. In other words, those dancers who used a high level of kinesthetic imagery were more confident and successful in gaining a role by way of the audition.

### Dance Imagery Research: Intervention Studies

Intervention research provides us with strategies for the successful application of imagery in studios, auditions, and preparation for performances. Swiegard/Dowd Ideokinesis, the Franklin Method, and metaphorical images have been explored as interventions in dance imagery research. Ideokinesis is a form of imagery based on the location, direction, and forces required to perform a movement efficiently. Hanrahan and colleagues have studied the use of lines of imagery (images relating to a particular direction of movement) and global images (images that describe a more holistic or general image).<sup>15</sup> In a research study they found the use of imagery enhanced the performance of a developpé in the global imagery condition. The image was “Imagine your whole body is thin and luminous” (p. 19).<sup>15</sup>

Teresa Heiland conducted intervention research<sup>16</sup> using images created by Eric Franklin.<sup>5</sup> This study used a repeated-measures design to assess the effects of four mental images on the height of sequential jumps by dancers who were struggling with jumping height and/or dynamic alignment. Thirteen university dance majors served as participants, and performed first position jumps for vertical height analysis while applying four imagery interventions: “whole body is a spring,” “central axis is a rocket booster,” “feet stretching into the sand,” and “spinal curves lengthening and deepening.” The “rocket” and “spring” interventions both significantly increased jump height above baseline measurements. There were also noteworthy increases following the “spine” and “sand” interventions.

Finally, in a study utilizing 60 children by Sawada et al.,<sup>17</sup> the researchers found that the children who received metaphoric instructions performed a dance sequence more accurately than those who received verbal instructions or no instructions (model only). The sequence included a squat, stand, jump, kneel and fall. The metaphor was “A flower is in bud. Soon it will open. A butterfly is fluttering. It has an afternoon nap on the flower, but it falls from there.” The results indicated that the metaphorical instructions were more effective than specific movement-related verbal instruction.

In sum, the existing research provides evidence that dance imagery is useful as a tool for motor skill learning in both teaching and performance settings. Kinesthetic (feeling) imagery appears to play an important role in skill development and performance. Metaphors, a common

component of dance classes, appear to facilitate skill learning and performance. Intervention research demonstrates the positive impact specific applications of dance imagery have on expected outcomes.

A review of the history and research of dance imagery provides practitioners with evidence that dance images can positively impact motor learning and performance in beginning, intermediate and advanced dancers. When we use dance imagery with our students we will contribute to their well-being as dancers and as individuals.

### References

1. Todd ME. *The Thinking Body*. New York & London: Paul B. Hoeber, Inc., 1937.
2. Sweigard L. *Human Movement Potential: Its Ideokinetic Facilitation*. New York: Dodd Mead, 1978.
3. Hawkins AM. *Creating Through Dance*. Englewood Cliffs, New Jersey: Prentice Hall, 1964.
4. Ellfeldt J. *A Primer for Choreography*. Palo Alto, California: National Press Book, 1971.
5. Franklin E. *Dance Imagery for Technique and Performance*. Champaign, Illinois: Human Kinetics, 1996.
6. Krasnow D, Deveau, J. *Conditioning with Imagery for Dancers*. Toronto, Ontario: Thompson Educational Publishing, Inc., 2010.
7. Feltz D, Landers DM. The effects of mental practice on motor skill learning and performance: a meta-analysis. *J Sport Psychol*. 1983;5:25-57.
8. Schuster C, Hilfiker R, Oliver A, Scheidhauer A, Andrews B, Butler J, Kischka U, Ettlin T. Best practice for motor imagery: a systematic literature review on motor imagery training elements in five different disciplines. *BMC Med*. 2011;9:75. Available at: [www.biomedcentral.com/1741-7015/9/75](http://www.biomedcentral.com/1741-7015/9/75).
9. Overby LY, Hall C, Haslem I. A comparison of imagery used by dance teachers, figure skating coaches, and soccer coaches. *Imagin Cogn Pers*. 1998;17(4):323-37.
10. Nordin S, Cumming J. Professional dancers describe their imagery: Where, what, why and how. *Sport Psychologist*. 2005;19:395-416.
11. Paivio A. Cognitive and motivational functions of imagery in human performance. *Can J Appl Sport Sci*. 1985;10:22-8.
12. Fish L, Hall C, Cumming J. Investigating the use of imagery by elite ballet dancers. *J Dance Med Sci*. 2004;10(3):26-39.
13. Nordin S, Cumming J. The development of imagery in dance: Part II: Quantitative findings from a mixed sample of dancers. *J Dance Med Sci*. 2006;10(1&2):28-34.
14. Monsma EV, Overby L. The relationship between imagery and competitive anxiety in ballet Auditions. *J Dance Med Sci*. 2004;8 (1):11-18.
15. Hanrahan C, Salmela, J. Dance images – do they work or are we just imagining things? *Journal of Physical Education Recreation & Dance*. 1990;61(2):18- 21.
16. Heiland, T, Rovetti, R. Which images and image categories best support jump height? In: Solomon R, Solomon J (eds): *Abstracts of the 20th Annual Meeting of the International Association for Dance Medicine & Science 2010*. Birmingham, UK: IADMS, 2010, pp. 74-75.
17. Sawada, M, Mori, S, Ishii M. Effect of metaphorical verbal instruction on modeling of sequential dance skills by young children. *Percept Mot Skills*. 2002;95:1097-1105.



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# IADMS Education Committee

## The IADMS Bulletin for Teachers Handout 3(2)B 2011

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### Dance Imagery

#### Dance Imagery can be useful in teaching dance skills

- Consider the experience level of the learner. Beginners may need more physical practice prior to the use of motor imagery or metaphorical images.
- Consider the environment – a quiet environment may facilitate the use of imagery.
- Consider the task. Complex tasks may require more physical practice before images are appropriate.
- Motor imagery can be useful in teaching skills. By imploring a learner to “see” and “feel” herself performing a skill in the correct manner, dance skills can improve.
- Metaphorical imagery practice can be useful in teaching skills and improving the quality of movements. However, in order for metaphorical images to be effective, dancers need to have experience with the object, experience or process – ask young dancers to provide you with examples in nature that relate to a specific quality of movement i.e. “Imagine walking across the room in a field of feathers.”

#### Dance Imagery can reduce anxiety and improve performance

- Performance anxiety can be controlled through imagery use. In preparation for a performance, provide students with a guided imagery session that can lead to relaxation and improved focus.
- Have students imagine dancing before an audience or in a competition. By imagining the most stressful situations, they will begin to feel more in control of themselves. “Imagine you are on stage in a filled to capacity theatre. You feel relaxed and in control, as you perform your dance.”

#### Dance Imagery can enhance motivation

- Self-confidence can be boosted through dance imagery. Providing dancers with positive images of the outcomes of their performances. For example, “Imagine seeing and feeling yourself perform every movement with perfection.”

#### Dance Imagery may heal

- Since imagery works for healthy dancers, it can be very important to the retention and recovery of injured dancers. Have injured dancers practice both mental practice and metaphorical imagery of choreography and technique. As the dancers listen to the sound/music of their dances, they can do the following: “Imagine seeing and feeling yourself perform your dance to the music. Repeat 8 – 10 times. Each time make your performance more expressive.” If injured, the dancer can spend a few minutes each day, imagining healing taking place in the affected body part.





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# Functional Anatomy in Dance Training: An Efficient Warm Up Emphasizing the Role of the Psoas

Ruth Solomon, Professor Emerita, University of California Santa Cruz, and John Solomon, Ph.D., Santa Cruz, California, USA

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## An Efficient Warm Up Emphasizing the Role of the Psoas

When we see movement performed in a way that evokes our admiration one of the things we frequently say about it is that it was “effortless.” More accurately, what we mean is that it *appeared* effortless because the dancer was able to find the means within his/her body to generate it efficiently. It is the search for the source of this efficiency of movement that has shaped my approach to teaching.

Early in my career, at the point where teaching assumed equal status with performing and choreographing, I was so fortunate as to be exposed to the work of Mabel Ellsworth Todd,<sup>1</sup> Lulu Sweigard,<sup>2</sup> and my then dear colleague Andre Bernard.<sup>3</sup> What these people had in common was a focus on exactly the questions I was asking, and a mutual conviction that the answers we sought lay in an understanding of human anatomy. I readily perceived that the study of anatomy had the potential not only to explain to me how efficient movement is produced, but also that it provided a very precise and universally accepted language with which to pass that knowledge on to my students.

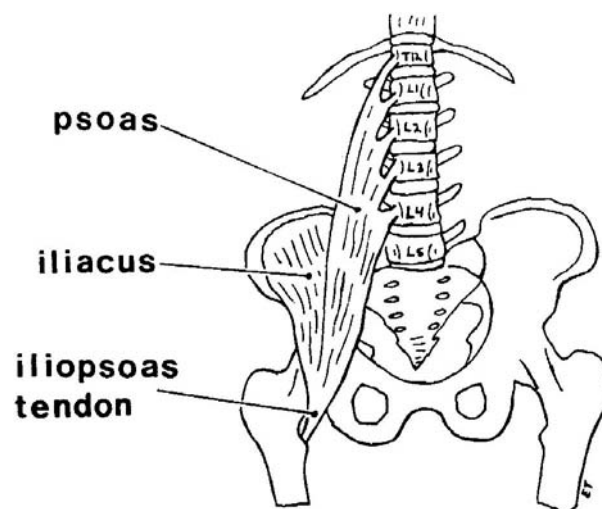
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## The Roles of the Psoas

The most important thing I learned from the study of anatomy, one of the basic tenets on which my approach to teaching technique rests, is that efficient movement originates in muscles that are located deep in the body, most notably the psoas system. The significance of the roles played by the psoas (we call it that for the sake of convenience, although “iliopsoas” is the more accurate term, as the muscle complex is composed of two parts) can be easily visualized by glancing at Figure 1, a drawing by Dr. Elly Trepman. As Dr. Trepman points out, the psoas is one of the longest and most powerful muscles in the body, and it “is the only muscle that attaches to the spine, pelvis and femur. The two components of the iliopsoas are the iliacus, which originates from the inside of the iliac crest [and fossa], and the psoas, which takes its origin from the vertebrae between the twelfth thoracic (T12) and fifth lumbar (L5)

vertebrae. The iliacus and psoas are joined in the common iliopsoas tendon, which inserts on the lesser trochanter of the femur.” Clearly a potentially powerful source of energy of that sort, located right in the center of the body and attached to three of the anatomical units that are most crucial to dance movement—the lower spine, pelvis, and hip joint—has to be respected. (By now this observation seems somewhat commonplace, as many people speak to the need of dancers to move “from the center,” although there remains a good deal of ambiguity as to exactly what they mean by that).

In order to appreciate the roles played by the psoas in dance movement it is important to understand what might be called the “paradox of the psoas.” The psoas is capable of stabilization and activation simultaneously. The importance of the stabilization aspect of the psoas cannot be overem-



**Figure 1** The iliopsoas consists of the iliacus and psoas muscles. The iliopsoas tendon inserts on the lesser trochanter of the femur. (Reprinted with permission from: Trepman E: Spinal problems in dancers. In: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 84.)



**Figure 2** Développé à la seconde. **A**, Incorrect execution with the hip lifted; **B**, more correct position, with the greater trochanter of the femur coming closer to the ischial tuberosity. (Reprinted with permission from: Clippinger K: Biomechanical considerations in turnout. In: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 145. Maurya Kerr, model.)

**Figure 3** Incorrect “extension” in second position; the gluteus maximus is engaged, causing internal rotation of the extended leg. (Reprinted with permission from: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 114.)

phasized. If a dancer can stabilize the dorsal aspect of the muscle (the portion attached to T12-L2) while activating the contraction of the proximal portion (e.g., to bring the thigh up toward the torso) the body will remain in good alignment and produce an efficient movement. On the other hand, movement is *inefficient* specifically when it is initiated by the peripheral muscles that lie near the surface of the body, as can be seen all too commonly in students at all levels and in all genres of dance.

Of the many available examples of this principle let us consider just one. Think of the student who is having trouble achieving full leg extension in second position (“extension,” as used here, is how dancers refer to what is actually *flexion* of the femur, drawing it up and toward the body, either to the front or side). The leg comes up to 90° easily enough, but beyond that whatever extension can be managed is accompanied by obvious tension. Further, if this problem has persisted long enough there may be popping sounds at the front of the hip socket and snapping or grinding sensations that can become painful enough in themselves to inhibit the student’s ability (or willingness) to raise the leg.

This can easily be identified as a positioning problem: the extended or “gesturing” leg is not moving in the proper vertical plane relative to the position of the pelvis. Normally this problem can be addressed by simply taking hold of the leg and gently searching out the place where it can be raised

without constriction. This is fine as far as it goes; a high, graceful, stress-free extension requires proper positioning, and in this respect all the teacher can do is try to help the student experience where that is (I would only add the caveat that as the bony construction of the hip socket and the angle of femoral insertion in the acetabulum differ for every individual, the “proper” position for extension will vary, however minutely, from one dancer to another). Ultimately the dancer must *feel* right when performing the extension rather than satisfying some externally imposed image of what *is* right.

However, there is another whole aspect of this problem that tends to get short shrift, if it is considered at all. When the gesturing leg of the student who is experiencing an inability to achieve full range of motion in extension is viewed closely it will often be seen that as the leg passes 90° the quadriceps muscles along the top of the thigh are strongly contracted (see Figure 2). In effect, what the student is trying to do is lift the leg by using the muscles of the leg itself. Unfortunately, this effort not only contracts the quadriceps but also tightens the tendons that surround the hip socket, such as the rectus femoris and sartorius (these tendons are not visible, but they can be palpated). Far from promoting the desired elevation of the leg, this tightening of the tendons seems to restrict the ability to raise the leg higher, and actually pulls the leg *down*. It may also be observed that the gluteus maximus is engaged, causing internal rotation of



**Figure 4.** Teacher helping student to experience release of the tendons around the hip socket in seated second position. (Reprinted with permission from: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 114. Maurya Kerr, model.)

the extended leg (see Figure 3). These are classic examples of how the body can work against itself when inappropriate anatomical means are utilized to accomplish a task.

The quadriceps are, of course, engaged in extension, but their role is secondary to that of the “hip flexor,” a lay term for the psoas. Through its proximal attachments to the spine and distal attachment to the lesser trochanter at the posteromedial neck of the femur, the psoas provides the primary impetus for raising the leg. The muscles of the leg itself simply respond to this impulse from deeper in the body—as is commonly said, “from the pelvis.” Therefore, another correction that should help the student who is having problems with inhibited extension achieve better results (in addition to placing the leg in the proper position) is to encourage him/her to *release* the tendons of the hip socket

and the quadriceps muscles, especially at initiation of the movement (see Figure 4).

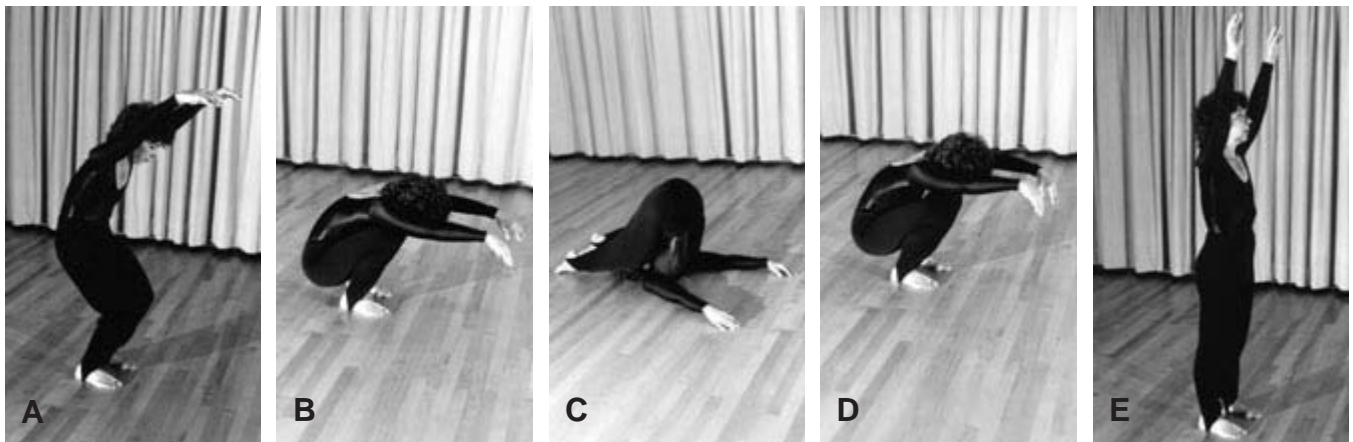
### Some Exercises for the Psoas

So, granted that our students need to learn to use the psoas—to move “from the center”—how do we provide them with the means to both get in touch with and strengthen that muscle complex? I have devised a sequence of exercises that is intended to do just that. Approximately 30 minutes in length when each exercise is repeated 4-6 times, it constitutes the warm up with which my technique class normally begins. This is essentially floor work, that is, work done while sitting or lying on the floor, which I prefer because the support we derive from the floor helps to “unload” the bones and joints we want to articulate and to reduce tension in the muscles that support them. Further, work of this sort tends to minimize most students’ concern with balance—and perhaps with the external shape of the movement generally—thus freeing them to concentrate on what is happening anatomically.

Actually, the warm up starts with an exercise that begins in standing, rolls down onto the floor, and returns to standing (see Figures 5a-e). This first exercise is useful for energizing the body, activating the psoas, and preventing the students from thinking that the floor work to follow is only meditative, rather than preparation for dancing.

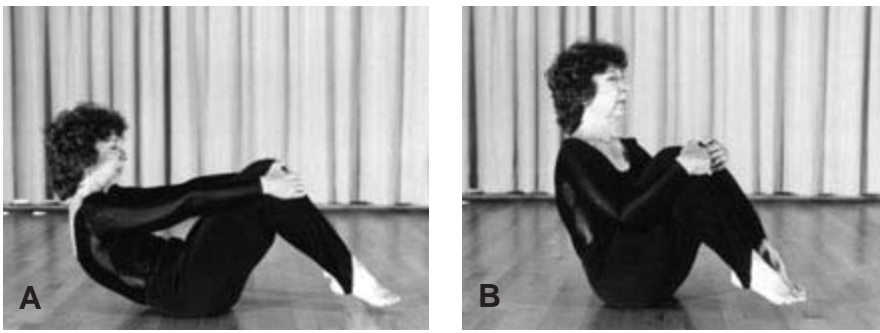
Although this warm up does not entail movement through space (locomotion) it is performed in a vigorous fashion, thus fulfilling the need to raise the heart rate, increase blood flow throughout the muscles, and lubricate the joints. An efficient warm up should raise the body temperature about 1.5 or 2 degrees above normal. This has the effect of increasing elasticity in the muscles and decreasing friction in the joints. Further, it facilitates the transmission of nerve impulses into the muscle fibers; thus, the reflexes also improve.

Due to space limitations I will describe just one sequence of exercises from later in the warm up, selected because it can easily be equated with the problem of restricted extension discussed above. I should note first, however,



**Figure 5** (Reprinted with permission from: In: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 117. Bruce Berryhill, photographer.)





**Figure 6** (Reprinted with permission from: *In: Solomn R, Solomon J, Minton SC (eds): Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005 p. 121. Bruce Berryhill, photographer.)



**Figure 7** (Reprinted with permission from: *In: Solomn R, Solomon J, Minton SC (eds): Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005. pp. 124, 125. Bruce Berryhill, photographer.)



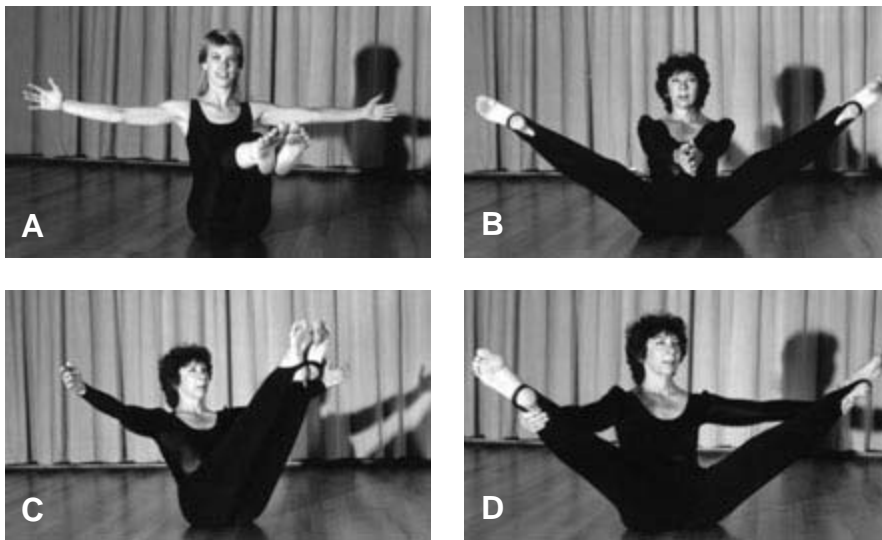
**Figure 8** (Reprinted with permission from: *In: Solomn R, Solomon J, Minton SC (eds): Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 125. Bruce Berryhill, photographer.)

**Figure 9** (Reprinted with permission from: *In: Solomn R, Solomon J, Minton SC (eds): Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 126. Bruce Berryhill, photographer.)

that the exercises preceding those I am about to show you are based on the concept of the lever, which I happily acknowledge having borrowed from Sweigard.<sup>2</sup> Levers are designed to produce movement in a desired direction by applying pressure in the opposite direction. Thus, in a movement sequence like that illustrated in Figures 6a & b, we bring the body up onto its “balance point” by pressing “down” through the “base of support,” which in this case is the distal vertebral attachments of the psoas. We then return slowly to the starting position and repeat this lever action numerous times. Exercises of this sort are designed to promote the experience of initiating work in the psoas, and to strengthen the muscle through both concentric and eccentric activity.

The exercises related to extension are all performed on the balance point, which is located slightly behind the

coccyx. The exact placement differs from one individual to another. While we are on the balance point the lumbar and dorsal spine must remain in an easy curve; one must not straighten the spine or come up into a V position, as that causes undue strain on the low back and contraction of the tendons of the hip socket, which in turn restricts the ability to extend the legs. While in this position the psoas, which is already engaged in sustaining the body on the balance point, works even harder as we do a variety of movements with the knees bent (see Figures 7 a-c). The same effect is heightened in the next exercise, where we add the extension of the legs to the work the psoas is doing, extending them while keeping the femurs as close to the chest as possible (see Figure 8). We then articulate the tibias to line up with the femurs. Then we alternately fold at the knees (see Figures 9a & b) and straighten the legs



**Figure 10** (Reprinted with permission from: In: Solomon R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 126. Bruce Berryhill, photographer.)

(this also starts to lubricate the knee and hip joints).

The final exercise in this series works on lubricating and warming up the hip joints and, of course, strengthening the psoas. From the starting position on the balance point, knees together in parallel and arms extended outside the legs (see Figure 10a), we open the knees to the side, bringing the arms inside the legs (see Figure 10b). Then we reverse the process—knees in, arms out (see Figure 10c). After each set of four repetitions we catch the ankles and allow the weight of the legs to rest in the palms of the hands, releasing the hip sockets (see Figure 10d). The strength and facility developed throughout these balance-point exercises is exactly what we will use when, in standing position, we work on extension.

As these few exercises used to illustrate this work are performed on the floor they may automatically be associated with modern dance. It is important to understand, however, that the principles they embody can be adapted to and utilized in any other dance genre. Beyond such distinctions, I believe it is our primary responsibility as technique teachers to help our students find the most efficient way possible to use their bodies. I emphasize the roles of the psoas, the pelvis, and the spine because the study of anatomy has led me to believe that they are the prime motivators of movement. If the dancer is able to initiate action by the use of

these components, all else should follow and the movement produced will be relatively stress free and efficient.

\* \* \* \* \*

This brief introduction draws heavily on material that is dealt with far more extensively in “An Efficient Warm Up Based on Anatomical Principles,” in *Preventing Dance Injuries*, 2<sup>nd</sup> edition, Human Kinetics, 2005,<sup>4</sup> and the video/DVD “*Anatomy as a Master Image in Training Dancers*.”<sup>5</sup>

## References

1. Todd ME. *The Thinking Body*. New York, NY: Dance Horizons, Inc., 1968.
2. Sweigard L. *Human Movement Potential: Its Ideokinetic Facilitation*. New York: Dodd Meade, 1974.
3. Bernard A. An introduction to Ideokinesis. *Contact Quarterly*. 1997 Summer/Fall;22(2):23-5.
4. Solomon R. An efficient warm up based on anatomical principles. In: Solomon R, Solomon J, Minton SC. *Preventing Dance Injuries*, 2<sup>nd</sup> edition, Champaign, IL: Human Kinetics, 2005.
5. Solomon R. *Anatomy as a Master Image in Training Dancers* (video recording). Santa Cruz, CA: 59 minutes, color, 1/2 inch, available in VHS/Beta/DVD formats, 1988.



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# Abstracts from the Current Literature

Gayanne Grossman, P.T., Ed.M., and Marliese Kimmerle, Ph.D.

**Burckhardt P, Wynn E, Krieg MA, Bagutti C, Faouzi M. The effects of nutrition, puberty and dancing on bone density in adolescent ballet dancers. J Dance Med Sci. 2011;15(2):51-60.**

On average, ballet dancers have a low bone mineral content, elevated fracture-risk, low body mass index, low energy intake and delayed puberty. This study of 127, 15-17 year old Caucasian and Asian pre-professional dancers examined dance exposure, pubertal delay and the influence of nutrition on bone mineral density. Many studies have demonstrated that teenage dancers limit their calorie intake, particularly with deficient proteins, minerals and vitamins, which contributes to health problems such as pubertal delay, low estrogen and bone loss. This study used the EAT-40 questionnaire and a three-day dietary record and found that food intake was below the recommendations for a normally active population, with the exception of non-dairy proteins such as meat, fish and eggs, which were twice the recommended amount. Dairy products, the major source of calcium, were below average. The imbalance between these two categories is a concern in terms of bone development. For this dancer population, the average Body Mass Index was below or near the lower normal limit for age and sex; they danced an average of 22 hours a week and menarche was delayed by 17 months. While the hours of dancing may be seen as having a positive effect on bone density, the very high energy expenditure must be met by a sufficient nutritional intake. Recommendations include the maintenance of appropriate weight gain during growth and a balanced diet avoiding excess intake of non-dairy proteins and increasing dairy, fruit and vegetables.

**Doyle-Lucas AF, Davy BM. Development and evaluation of an educational intervention program for pre-professional adolescent ballet dancers. Nutrition for optimal performance. J Dance Med Sci. 2011;15(2):65-75.**

The dance profession is well aware of the problems associated with severely restricted dietary intake and abnormal

eating behavior, therefore it is important to identify whether it is possible to effectively change this behavior with an educational program. A three-lecture DVD series was developed for use with 231, 13 to 18 year old pre-professional adolescent ballet dancers attending a summer intensive program. The aim of this intervention program was to increase knowledge of basic sports nutrition principles, inform them of the health risks of the Female Athlete Triad and to promote self-efficacy for adopting healthier habits. Students attended the lectures, received handouts and worksheets and were assessed using questionnaires at the beginning, completion and in a 6-week follow-up. Their results were compared with 90 dancers in the control group, and it was found that the intervention program was effective in increasing nutrition knowledge, perceived severity and self-efficacy. Although they declined by a six-week posttest, these measures still remained significantly improved from baseline. Improvements were also seen in self-reported dietary intake, including a decline in fat, candy and fast food intake, and an increase in milk and water consumption. The study demonstrated that an education program administered to dancers enrolled in three different elite professional ballet companies' summer intensives resulted in increased nutritional awareness and some changes in eating behavior. The DVD format allowed ease of program delivery and reproducibility. One of the recommendations is to include artistic directors, ballet instructors and families in long-term educational programs.

**Glasoe M, Yack HJ, Saltzman CL. Anatomy and biomechanics of the first ray: PhysTher. September 1999;79(9):854-859.**

The "first ray" is defined as the bones on the inside (medial side) of the foot, namely the first metatarsal and the first cuneiforms. It is a very important foot segment for dancers because it dissipates weight and is involved in propulsion; in other words, the first ray is vital for push off. This paper describes the anatomy of the first ray in detail and discusses its mechanics. The authors use the analogy of beams and

trusses to discuss foot mechanics. Beams are designed to be able to bend under certain forces. Trusses are triangular frames that have two rigid supports with a base. The first ray is an important part of the truss and beam mechanics of the foot. The authors also discuss the sesamoid bones, problems with a hypermobile and hypomobile first ray and bunions. Sesamoid bones are small bones under the head of the first metatarsal. They elevate the first ray, allow it to accept more weight, and help the intrinsic muscles function better. The joint between the first metatarsal and phalange (bigger bone in the foot and the toe bone) or the entire ray can move too much or too little affecting shock absorption or propulsion. A hypermobile first ray may facilitate a flattened arch. This is known as pronation, or “rolling in” to dancers. The authors discuss how a cause of bunions may be that hypermobility of the first ray (it moves too much) allows it to pronate, forcing the second metatarsal to accept too much of the weight. Pronation also interferes with the first ray becoming rigid during relevé. Dancers need this for stability and so balance will be easier. This article provides interesting anatomical descriptions, is specific and clearly written.

**Couillandre A, Lewton-Brain P, Portero P. Exploring the effects of kinesiological awareness and mental imagery on movement intention in the performance of demi-plié. *J Dance Med Sci.* 2008;12(3):91-98.**

These authors investigated improved dancer performance of demi-plié when kinesiological explanations and mental imagery were used as cues. Dancers from Les Ballets de Monte Carlo volunteered as subjects. The researchers applied surface electrodes to each dancer’s lower leg muscles: vastus lateralis, biceps femoris, tibialis anterior, and soleus muscles. Measurements were recorded for anteroposterior (front and back) and vertical acceleration. They also mea-

sured the angle of the knee joint with an electrogoniometer. The researchers looked at several conditions such as maximum knee flexion during demi-plié and jump. For the study, each dancer performed a first position demi-plié and jump. The researchers intervened by simulating what dancer teachers do in class. They explained to each dancer the kinesiological principles of the movements and then offered some imagery to help the dancer integrate understanding and sensation. For example, one of the images was “an arrow was passing from above the knee cap, down and out through the back of the heel, and continuing down another few meters.” Another image was, “The heels being like the prow of a ship leaving the dock; they slowly initiate the movement, followed by the rest of the foot and the legs.” After data analysis, the authors found no difference knee flexion during demi-plié. Muscle activity of the biceps femoris was greater with kinesiological explanations and imagery while going up from demi-plié. There were no changes noted in jump height, vertical acceleration and time to that height. Again, the biceps femoris was more active with the intervention while going down and up during jumping. The dancers exhibited less anteroposterior sway and less “bucking” while jumping because of the biceps femoris engagement. They engaged the tibialis anterior more and the vastus lateralis less. The authors suggest that the increased anterior tibialis recruitment could maintain the arch in the foot. Decreased vastus lateralis recruitment could be due to reduced strain on the anterior (front) side of the leg. This article compares multiple sources for cueing and feedback. It also provides some useful imagery examples for use in teaching correct demi-plié action and demonstrates that understanding kinesiological principles and using imagery can be effective in improving skill performance. The bibliography is particularly informative for teachers who are looking for related articles to read.

# DANCE MEDICINE & SCIENCE POSTERS FOR SALE!

The posters draw from research and knowledge outlined in the IADMS Resource Papers (available online) and are aimed at teachers, students and health care specialists.

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