PERFORMING ARTS
SPECIAL INTEREST GROUP

ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION

APTA
American Physical Therapy Association
The Science of Healing. The Art of Caring.

PASIG MONTHLY CITATION BLAST: No. 113 **March 2016**

Dear Performing Arts SIG members:

Last month we hope most of your were able to attend CSM 2016 in Anaheim, CA! We had a very successful conference with a great preconference course, our regular PASIG session, and a productive business meeting. We awarded a student scholarship to Susan Kokot and her team for their platform presentation on "Prediction of Injuries at a Dance Medicine Walk-In Clinic During a Summer Dance Intensive."

We look forward to providing more programming at conferences in 2017. Upcoming events for the Orthopaedic Section are the 2016 Annual Conference on May 5-7, in Atlanta, Georgia and CSM 2017 on Feb 15-17 in San Antonio, TX. The 2017 annual conference will be San Diego Hyatt Regency mission bay April 20-22. Programming submissions are open for CSM 2017, Due May 9. Please contact Rosie Canizares, our new Vice-President and Education Chair with your interest.

Please welcome our new PASIG board members! There is room for new committee members, and students are welcome to participate. Please refer to the list below for contact information.

Annette Karim, President	2014-2017	neoluvsonlyme@aol.com
Rosie Canizares, Vice President/Education Chair	2016-2019	Rcc4@duke.edu
Janice Ying, Nominating Committee Chair	2016-2017	JaniceYingDPT@gmail.com
Laura Reising, Research Chair	2016-2018	lbreising@gmail.com
Amanda Blackmon, Dancer Screen Chair	2016-2018	MandyDancePT@gmail.com

Dawn Muci, Public Relations Chair	2016-2018	Dawnd76@hotmail.com
Mariah Nierman, Fellowship Taskforce Chair	2016-2018	Mariah.Nierman@osumc.edu
Anna Saunders, Secretary/Student Scholarship Chair	2015-2017	annarosemary@gmail.com
Andrea N. Lasner, Nominating Committee	2015-2018	alasner1@jhmi.edu
Jessica Fulton, Nominating Committee	2016-2019	jessicafultondpt@gmail.com
Laurel Abbruzzese, Fellowship Chair Asst.	2016-2018	La110@cumc.columbia.edu
Elizabeth Chesarek, Membership Chair	2016-2018	echesarek@gmail.com

Looking for great residency and fellowship opportunities? See below:

The Harkness Center for Dance Injuries Residency Program is accepting applications for the 2016-2017 year! A WONDERFUL opportunity:

The NYU Langone Medical Center (NYULMC) Harkness Center for Dance Injuries is a clinical site for NYU Steinhardt School of Education's Orthopedic Physical Therapy Residency (ORP). The ORP is a 12-month program that provides the Resident with an intensive, individualized experience in orthopedic physical therapy and dance medicine. The goal of the residency program, which follows the guidelines and accreditation standards of the American Physical Therapy Association (APTA), is to enable the Resident to develop the advanced clinical skills necessary to provide a superior level of patient care. Upon completion of the residency program, the Resident will have gained the knowledge and experience to be a competent advanced practitioner, and be qualified to sit for board certification in Orthopedics (OCS). Please note that all applicants must apply to New York University's Orthopedic Physical Therapy residency program and also be interviewed and accepted by the Harkness Center for Dance Injuries. Please visit http://steinhardt.nyu.edu/pt/opt and http://hjd.med.nyu.edu/harkness/healthcare-professionals for more information.

Interested in a Performing Arts Fellowship? The American Board of Physical Therapy Residency and Fellowship Education (ABPTFRE) has approved the PASIG Description of Specialist Practice (DSP) for the Performing arts as an area of study. We are now working with the ABPTFRE to turn the DSP into a Description of Fellowship Practice (DFP). We anticipate the DFP will be available online by June 2016. This means that sites can begin forming fellowships in dance medicine, music medicine, theater medicine, etc. The PASIG will provide the fellowship criteria for accreditation. We may have a meeting on creating a performing arts fellowship at CSM 2017 and/or the 2017 Orthopaedic Section annual meeting. Please contact Rosie Canizares, Mariah Nierman, and Laurel Abbruzzese if interested.

Current PASIG members, please remember to update your membership: https://www.orthopt.org/login.php?forward_url=/surveys/membership_directory.php

Keep up with us on Facebook by contacting Dawn Doran. It is a closed group, so you need to contact Dawn first. Keep up with us and post on Twitter: We are **PT4Performers.** https://twitter.com/PT4Performers

Call for case reports: If you have a brief, clinically-focused case report on a performing arts PT patient, or a clinical commentary, please contact Annette Karim to submit your writing for the next Orthopaedic Physical Therapy Practice Magazine: neoluvsonlyme@aol.com

WE NEED MORE CONTRIBUTORS TO OUR MONTHLY CITATION BLASTS!!!!
Past Monthly citation blasts are available, with citations and EndNote file, listed on the website:
http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

TOPICS THAT HAVE BEEN COVERED RECENTLY INCLUDE:
Factors in Optimal Turnout (Current Issue)
Achilles tendinopathy
Biomechanics and Posture in Musicians
Pilates
ACL Injuries in Dancers
Patellofemoral Pain and Dance
Neural Entrapments Found Among Musicians
Stress fractures of the foot and ankle
Dry needling
Dynamic Warm Up and Stretching
Platelet Rich Plasma Injections
Back Pain in Dancers

If you are interested in contributing by writing a citation blast, contact our new research chair, Laura Reising lbreising@gmail.com.

I have enjoyed serving as research chair the past 2 years and hope these blasts have been useful and interesting for our members. Welcome Laura as new chair!!!

Sincerely,

Brooke
Brooke Winder, PT, DPT, OCS
Outgoing Chair, PASIG Research Committee
Womanology by Hoag Hospital, Newport Beach, CA

PASIG Research Committee members:

Shaw Bronner PT, PhD, OCS, sbronner@liu.edu
Jeff Stenback PT, OCS, jsptocs2@hotmail.com
Sheyi Ojofeitimi PT, DPT, OCS,sojofeit@gmail.com
Susan D. Fain PT, DMA, sfain@ptcentral.org

PERFORMING ARTS CONTINUING EDUCATION, CONFERENCES, AND RESOURCES

Musician Health Series, Janice Ying, PT, DPT, OCS
Glendale Adventist Therapy and Wellness Center, Los Angeles area (Eagle Rock), CA
http://www.musicianshealthcorner.com/
Healthy Musician Series - Overuse

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist*.
Monographs are available for:
- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal), and
- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section-American Physical Therapy Association,
Performing Arts SIG
http://www.orthopt.org/content/special_interest_groups/performing_arts
Performing Arts Citations and Endnotes
http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

ADAM Center
http://www.adamcenter.net/
Publications:
http://www.adamcenter.net/#!vstc0=publications
Conference abstracts:
http://www.adamcenter.net/#!vstc0=conferences

Dance USA
http://www.danceusa.org/
Research resources:
http://www.danceusa.org/researchresources
Professional Dancer Annual Post-Hire Health Screen:
http://www.danceusa.org/dancerhealth

Dancer Wellness Project
http://www.dancerwellnessproject.com/
Becoming an affiliate:
http://www.dancerwellnessproject.com/Information/BecomeAffiliate.aspx

Harkness Center for Dance Injuries, Hospital for Joint Diseases
http://hjd.med.nyu.edu/harkness/
Continuing education:
http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/continuing-education-courses-cme-and-ceu
Resource papers:
http://hjd.med.nyu.edu/harkness/dance-medicine-resources/resource-papers-and-forms
Links:
http://hjd.med.nyu.edu/harkness/dance-medicine-resources/links
Informative list of common dance injuries:
http://hjd.med.nyu.edu/harkness/patients/common-dance-injuries
Research publications:
http://hjd.med.nyu.edu/harkness/research/research-publications

International Association for Dance Medicine and Science (IADMS)
http://www.iadms.org/
Resource papers:
http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=186
Links:
http://www.iadms.org/displaycommon.cfm?an=5
Medicine, arts medicine, and arts education organization links:
http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=5
Publications:
http://www.iadms.org/displaycommon.cfm?an=3

Performing Arts Medicine Association (PAMA)
http://www.artsmed.org/
http://www.artsmed.org/symposium.html
Interactive bibliography site:
http://www.artsmed.org/bibliography.html
Related links:
http://www.artsmed.org/relatedlinks.html
Member publications:
http://artsmed.org/publications.html

(Educators, researchers, and clinicians, please continue to email your conference and continuing education information to include in future blasts)

Optimizing Turnout in Dancers

Turnout is an important requirement of ballet and is utilized in many other dance forms as well. Clinically, it is believed that improper use of functional turnout can lead to increased injury risk to the low back, hip, knee and foot/ankle complex. A helpful blast that linked turnout to injury patterns was published by PASIG in 2013 and can be viewed on our website. This current blast focuses on contributing factors to proper turnout, improving functional turnout, and factors involved in measuring turnout in dancers. I hope this blast can improve understanding of how to improve a dancer's turnout safely and how we as clinicians can measure turnout and turnout capacity appropriately.

Brooke Winder, PT, DPT, OCS
Womanology at Hoag Hospital
Newport Beach, CA

Champion, Lowry M., and Steven J. Chatfield. "Measurement of Turnout in Dance Research–A Critical Review." ***Journal of Dance Medicine & Science*** **12.4 (2008): 121-135.**
Turnout measurement procedures, results, and reporting formats vary in dance medicine and science research, making comparisons difficult. It is agreed that turnout results from summative contributions of the hip, knee, lower-leg, and the foot-ankle complex. However, the most frequently reported measurement is hip external rotation, and even this is measured in incompatible ways. No normative data exist for component and summative measures or for different categories of dancers, making screening, clinical assessment, and research problematic. Thus, there is a need to standardize component measurements, develop an inclusive measurement procedure for total turnout, and establish normative data for each measurement and for different categories of dancers. This review evaluates the 24 published articles that have reported original data for turnout assessment in dancers. Results are summarized and displayed for each article. In conclusion, recommendations are made for: use of selected hip external range of motion and tibial version measurements as the most important components of turnout; a procedure for assessing total turnout; adoption of conventions for reporting data in compatible forms; and the development of normative data sets for different categories of dancers.

Filipa, Alyson R., et al. "Performance on the star excursion balance test predicts functional turnout angle in pre-pubescent female dancers." ***Journal of Dance Medicine & Science*** **17.4 (2013): 165-169.**

The purpose of this study was to determine if there was a predictive relationship between performance on the Star Excursion Balance Test (SEBT) and functional turnout angle (FTA) in prepubescent female dancers. Ten dance students, ages 5 to 9 years (mean: 7.3 years), were recruited for this study. The SEBT required the subject to reach in the anterior, posterior-medial, and posteriorlateral directions with her free-limb foot while standing on the reference limb. A composite reach score was determined by calculating the sum of distance reached in the three directions and normalizing to leg length. The FTA was assessed in first position by measuring the angle of bisection between the second and third metatarsals and the midpoint of the calcaneus. Linear regression was used to determine if there was a predictive relationship between performance on the SEBT and FTA in this cohort. The subjects demonstrated a mean FTA of 90.3° ± 17.7°. Composite reach on the dominant limb normalized to leg length (81.4 ± 11.1%) during the SEBT was a significant predictor of FTA ($r2 = 0.49$, $p = 0.02$), while performance on the non-dominant limb (81.9 ± 10.8%) indicated a trend toward a predictive association ($r2 = 0.35$, $p = 0.07$). A decreased composite reach score was predictive of decreased FTA. These measurements may serve as an important screening tool for identifying dancers at risk for lower extremity injury.

Grossman, Gayanne, et al. "Reliability and Validity of Goniometric Turnout Measurements Compared with MRI and Retro–Reflective Markers." ***Journal of Dance Medicine & Science 12.4 (2008): 142-152.***

There is no consensus on a valid and reliable method of measuring turnout. However, there is a building awareness that such measures need to exist. Total turnout is the sum of hip rotation, tibial torsion, and contributions from the foot. To our knowledge, there has been no research that directly measures and then sums each individual component of turnout to verify a total turnout value. Furthermore, the tibial torsion component has not previously been confirmed by an imaging study. The purpose of this study was to test the validity and reliability of a single total passive turnout (TPT) test taken with a goniometer by comparing it with the sum of the individual components. Fourteen female dancers were recruited as participants. Measurements of the subjects' right and left legs were gathered for the components of turnout. Tibial torsion was measured using Magnetic Resonance Imaging (MRI). Retro-reflective marker assisted measurements were used to calculate the static components of TPT. Hip external rotation, TPT, and total active turnout (TAT) were measured by goniometer. Additional standing turnout values were collected on rotational disks. Tibial torsion and hip rotation were summed and compared with three whole-leg turnout values using Two-Tailed T-Tests and Pearson product-moment correlation coefficients. Tibial torsion measurements in dancers were found to demonstrate substantial variation between subjects and between legs in the same subject. The range on the right leg was 16° to 60°, and the range on the left leg was 16° to 52°. Retro-reflective markers and biomechanical theory demonstrated that when the knee is extended

and locked, "screwed home," it will not factor into a whole-leg turnout value. TAT and turnout on the disks were not statistically significant when compared with the summed total. Statistical significance was achieved in four of the eight measurement series comparing TPT with the summed value of tibial torsion and hip rotation. The advantages of a standard, valid, and reliable method of measuring turnout are many, and the risks are few. Some advantages include improved training techniques, mastery of the use of turnout at an earlier age, better dancer and teacher compliance with suggested turnout rates, understanding the use of parallel position, understanding the etiology of many dance-related injuries, and possible development of preventative measures.

Jenkins, Jo Baker, Matthew Wyon, and Alan Nevill. "Can turnout measurements be used to predict physiotherapist-reported injury rates in dancers?." *Medical problems of performing artists* 28.4 (2013): 230.
BACKGROUND: Research has suggested that dancers may be more at risk of injury when they excessively utilise non-hip components of turnout to compensate for deficits in hip external rotation when trying to achieve maximal total turnout. However, recently different measures of turnout have been cited in the literature as well as suggestions for derived variables to account for shortfalls in particular components of turnout. This study aimed to assess whether measurements of turnout can predict the number of injuries (0 or 1 injury, or 2+ injuries) over a 10-month period. METHODS: At the beginning of the academic year, 47 female, full-time, contemporary dance students (mean age 19.9 ± 2.51 yrs; height 1.65 ± 0.05 cm; weight 56.23 ± 6.51 kg) were screened as part of a biannual screening process. Measurements, summed of both legs, were obtained for passive hip external rotation (pER), total passive turnout (TPT), and total active turnout (TAT). From these, three further variables were derived: compensated turnout, muscular turnout, and active ER lag. At the end of 10 months, the dancers¿ physiotherapist-reported and self-reported injuries were obtained. RESULTS: Binary regression analyses for the six turnout variables identified compensated and muscular values as having significant positive effects. For every 1% increase in compensated and muscular values, there was a corresponding 9% or 8.4% increase in the odds that the dancer would sustain 2 or more injuries compared to 0 or 1 injury. CONCLUSION: Screening compensated and muscular values may be useful to address shortfalls to prevent injuries in the future.

Khoo-Summers, Lynnette C., et al. "Predictors of first position turnout in collegiate dancers: the role of tibiofemoral external rotation and hip external rotation." *American Journal of Physical Medicine & Rehabilitation* 92.2 (2013): 136-142.
Objective: Turnout is a dance position with known contributions from the hip, knee, and foot. A standardized method measuring total turnout has not been established.

This study assessed the relationships between first position turnout (FPT) and measures of hip and tibiofemoral external rotation.
Design: This is a retrospective chart review of screening physical examination data of the knee and hip in collegiate female dancers. Measurements included FPT, active hip external rotation in sitting (HERS), active hip external rotation in prone, and passive tibiofemoral external rotation (TFR). Measurement comparisons were made using paired-samples *t* tests, Pearson product moment correlation coefficients, and hierarchical multiple regression analyses.
Results: Twenty-three female dancers (aged 18–21 yrs) participated. Correlations ranged from 0.01 (left HERS and left TFR) to 0.54 (left TFR to left FPT). Hip rotation in sitting explained a significant amount of variance in FPT (17% explained variance on the right and 19% variance on the left). Left TFR explained an additional 30% of the variance in left FPT beyond the variance explained by HERS. Right TFR did not explain a significant amount of the variance in right FPT beyond the variance explained by HERS.
Conclusions: These findings suggest that active HERS and TFR are important contributors to FPT and that the relative contribution of these motions differ between sides.

Pata, Danielle, et al. "Improving turnout in university dancers." *Journal of Dance Medicine & Science 18.4 (2014): 169-177.*
A high degree of turnout is desired by many dancers. Turnout enables the efficient transfer of weight, allows for greater extension and control, and reduces injury risk when used correctly. The purpose of this study was to determine whether participation in a targeted training program beyond technique classes would improve university dancers' ability to use a greater proportion of the turnout their bodies could accommodate without compensation. Six dancers' ability to produce turnout without distorting their alignment was assessed daily, and a multiple baseline experimental design was used to measure the effects of turnout training. Results showed an average increase of 14° in Total Active Turnout (TAT) for all six dancers. In addition, a dance teacher with special experience in the dance sciences rated all of the dancers as showing better control of turnout while performing an adagio phrase following training than before training. These findings suggest that targeted training may offer a useful approach to helping dancers improve skills that enhance performance and promote good health.

Sherman, Astrid J., Erika Mayall, and Susan L. Tasker. "Can a prescribed turnout conditioning program reduce the differential between passive and active turnout in pre-professional dancers?." *Journal of Dance Medicine & Science 18.4 (2014): 159-168.*
Preliminary and speculative findings are reported on the benefits of a prescribed turnout conditioning program (TCP) designed to facilitate pre-professional dancers' active use of natural turnout potential. While of some debate, it is reported in the

literature that many dancers use less turnout than what is available to them when measured passively. Key muscles required to achieve full turnout were the focus of the TCP, and exercises were introduced in a manner that, theoretically, should stimulate
appropriate activation patterns for proper turnout biomechanics. A group of female pre-professional dancers (13 to 17 years old, training 20 to 25 hours a week, N = 16) were measured before and after the 7-week program for total passive turnout, total active turnout, passive hip external rotation, and tibial torsion. Statistically and functionally significant improvements were found in both static total active turnout (standing in first position on a large piece of paper) and dynamic total active turnout (standing in first position on rotational Balanced Body discs). These results indicate that the TCP was effective in improving active turnout, thereby reducing the differential between passive and active turnout in pre-professional ballet dancers. Implications are discussed for dancer-specific turnout conditioning programs, the role of cognitive imagery cueing, and emphasis on the importance of quantity with quality in the conditioning and teaching of active turnout.

Sutton-Traina, Kristen, et al. "Exploring Active and Passive Contributors to Turnout in Dancers and Non-Dancers." Med Probl Perform Art 30.2 (2015): 78-83.

OBJECTIVE: Lower-extremity external rotation, or turnout, is a fundamental skill in dance. Active standing turnout has previously been measured using low-friction turnout disks. Turnout is influenced by passive range of motion (ROM) and strength, with passive ROM a function of bony morphology and ligamentous/capsular restraints. PURPOSE: Our study explored the relationship between standing active turnout and femoral bony morphology, hip passive ROM, and strength among dancers and non-dancers. METHODS: Cross-sectional cohort study. Twenty-three female dancers and 13 female non-dancers aged 18 to 30 yrs were recruited. Standing active turnout on reduced-friction disks, ultrasound images of femoral version, supine passive turnout, and hip abductor and external rotator strength were collected. RESULTS: Dancers demonstrated greater standing turnout (107º±18º) than non-dancers (92º±28º), but the difference was not statistically significant (p=0.054). A significant difference was found for femoral version (p<0.001), 4.7º (±2.8º) for dancers vs 12.1º (±4.6º) for non-dancers. Dancers demonstrated greater supine turnout, 102.7º±18.8º, compared to non-dancers, 84.3º±30.4º (p=0.031). Dancers were able to achieve greater peak force in turnout compared to non-dancers: 2.44±0.44 N/kg and 1.72±0.59 N/kg, respectively (p<0.0001). Supine total turnout was the best predictor of active turnout, contributing 48% of the variance (r=0.696, p<0.001). CONCLUSION: Our findings suggest supine turnout is the largest predictor for standing turnout. Investigating dancers and non-dancers independently, our finding were similar to previous studies suggesting the femoro-acetabular complex may be influenced by dance training, contributing to differences in bony morphology between dancers and non-dancers. Although strength did not significantly contribute to active

standing turnout, dancers demonstrated greater peak force compared to non-dancers.

van Merkensteijn, Gry Galta, and Edel Quin. "Assessment of compensated turnout characteristics and their relationship to injuries in university level modern dancers." ***Journal of Dance Medicine & Science 19.2 (2015): 57-62.***
Dancers may compensate alignment at the spine, hip, knees, ankles, and feet to achieve a greater turnout than is available at the hip alone. Such compensations are believed to lead to many of the musculoskeletal injuries experienced by dancers, especially overuse injuries. The aim of this study was to explore the relationship between compensated turnout and injury of the lower extremities and low back. Twenty-two university level modern dancers age 19 to 23 participated. Measurements were taken of active hip external rotation (AHER) prone and functional turnout (FTO) in first position. The difference between FTO and AHER was designated as compensated turnout (CTO). A questionnaire was conducted to gather information about dancers' injuries within the past 2 years. A total of 17 participants (77%) reported experiencing at least one injury in the 24 month period. All dancers compensated turnout. Results revealed a large variability in CTO among participants, ranging from 3° to 72°. Statistical analysis showed a significant relationship ($r = 0.45$, $N = 22$, $p = 0.04$) between CTO and the number of injuries experienced, especially as related to low back pain ($r = 0.50$, $N = 22$, $p = 0.02$). Students with no injury had a CTO mean of 26°, while those with two or more injuries had a CTO mean of 43°. Results contribute to previous studies that have examined the effects of CTO in ballet dancers and further indicate that compensatory patterns of turnout may increase the risk of experiencing more than one injury in university level modern dancers.