



The Department of Physical Therapy, Movement and Rehabilitation Sciences



Fall 2016 Newsletter

Chair's Message



Greetings to our alumni, current and prospective students, colleagues, and friends. It is my sincere pleasure and honor to continue to serve as Chair during the continued growth in our research enterprise, faculty development and student scholarship and achievement.

This year, our department research funding continued its steady climb with the number of external grants doubling from last year. We also welcomed two new faculty members,

Drs. Steve Clark and Lauren Murphy. Dr. Clark joins our team of orthopedic and sports experts. He will be teaching in the entry level DPT and serving as Associate Director of the Physical Therapy Sports Residency Program. Dr. Murphy joins us as the Director of our Master in Occupational Ergonomics and Health. Sadly, we will be saying goodbye to Dr. Nancy Sharby who will be retiring this December after 23 years of dedicated service to the program.

We continue to recruit high caliber undergraduate and graduate students to our program. I hope you will enjoy reading about some of their achievements in this newsletter. We look forward to seeing you at our off site alumni networking event at APTA CSM in San Antonio, TX in February!

*Maura Iversen PT, DPT, SD, MPH, FNP, FAPTA
Professor and Chair*



- PT Program Accredited since 1930
- Only US Physical Therapy program with Co-operative Education
- International Academic Experiences
- High-Fidelity Simulation and Interprofessional Experiences

Programs:

- DPT— Freshman Assurance
- DPT— Post Baccalaureate
- tDPT— Transitional Doctorate
- MS Occupational Ergonomics & Health
- CAS Orthopedic Physical Therapy
- Graduate Certificate Disability Studies
- Sports Physical Therapy Residency

Research Centers and Labs:

- Neuromotor Systems Lab
- Lab for Locomotion Research
- Cancer Survivorship Center
- The ReGameVR Lab
- Movement Neuroscience Lab
- Rehabilitation and Epidemiology Trainee Program
- Occupational Biomechanics and Ergonomics Lab
- Neurophysiology Lab
- Teaching and Learning Innovation Center
- Musculoskeletal Epidemiology and Biomechanics Lab
- Cadaver Lab
- Neuroscience Wet Lab

Congratulations DPT Class of 2016!



Patricia E. Sullivan, PT, DPT, PhD, a 1968 Boston Bouvé graduate, gave the keynote address. She spoke of her journey as a clinician and professor and the events that lead to the creation of the Rehab Nepal, Inc to care for the victims of Nepal's earthquake. She asked the graduates "What will your journey be?" and "How will you better the world?"



Lisa Giallonardo, PT, MS, OCS from Leonard Morse Hospital was honored with the Clinical Educator of the Year Award for her consistent willingness to be a mentor, a model for what it means to be a professional and for her willingness to share the wealth of clinical experience with the next generation of physical therapists.



Taylor Chasey, BS, DPT ('16) was the elected student speaker. Taylor recounted memorable moments over the past 3.5 years. She encouraged fellow graduates to remember what you learned but also remember why you became a PT. "You will all be great, and most importantly, caring and empathetic physical therapists."



Kathy Shillue, DPT, OCS from Beth Israel Deaconess Medical Center received the Marguerite Sanderson Award in recognition of her dedication to the profession and for her efforts to ensure excellence in clinical practice. She is a former President and Vice President of the APTA of MA and has presented to the MA Board of Allied Health regarding physical therapist student scope of practice.

New Faculty



Lauren A. Murphy, PhD, is an industrial/organizational psychologist and holds positions as Assistant Clinical Professor in the Department of Physical Therapy, Movement and Rehabilitation Sciences at Northeastern University and as Voluntary Assistant Professor in the Department of Public Health Sciences at the University of Miami. She is the Director of the Occupational Ergonomics and Health Master of Science program at Northeastern University. Dr. Murphy previously held a position as an Occupational Health Research Psychologist at the Safety and Health and Research for Prevention (SHARP) program at the Washington State Department of Labor and Industries. She was also a Postdoctoral Research Fellow at Harvard School of Public Health and Liberty Mutual Research Institute for Safety. Dr. Murphy's current research examines the safety climate of organizations within the trucking and construction industries. She also has an interest in work and family issues and how psychosocial factors impact workers' health and safety.



Steve Clark, PT, DPT, MS, ATC, CSCS joined the department as an Assistant Clinical Professor in July and will be teaching in the sports medicine and orthopedic areas, in addition to helping with the Sports Residency Program. He is a 2012 Northeastern alum and spent 8 years working for the NU Sports Performance Department as an Athletic Trainer, primarily for the men's ice hockey program. In addition to his DPT, he holds a MS in Exercise Science from the University of Toledo, a BS in Sports Medicine/Athletic Training from the University of Charleston. Dr. Clark continues to practice with Sports and Physical Therapy Associates/ATI Physical Therapy at their Northeastern location and serves as Rehabilitation Coordinator for NU Sports Performance. Clinical interests include managing the injured athlete from initial injury through return to play, interdisciplinary care of student-athletes, management of athletic hip injuries, and concussion care.

New Sports Residents



Isabella DiRado, PT, DPT received her DPT from Northeastern in 2016. Isabella completed a clinical rotation with Princeton University Division I athletics, where she worked with various teams including men's ice hockey, men and women's rugby, men and women's volleyball, and women's crew.



Lauren Lou, PT, DPT, CSCS received her DPT from New York Medical College in 2014. Lauren spent the last year living in Beijing, China providing a western perspective as part of the sports medicine team for the Chinese National Wrestling & Judo athletes training for the Rio Olympics.

Sports Residency Program Graduation

September 1, 2016 Massachusetts General Hospital and Northeastern University graduated two Sports PT Residents, **Kathryn Calpino, PT, DPT, CSCS** and **Elijah Harris, PT, DPT**. The ceremony was held at *The Paul S. Russel, MD Museum of Medical History and Innovation*.

Pictured left to right: Scott Waugh, PT (Clinical Director MGH Sports PT), Maura Iversen, PT, DPT, SD, MPH, FNP, FAPTA Kathryn Calpino, PT, DPT, CSCS Elijah Harris, PT, DPT David Nolan, PT, DPT, MS, OCS, SCS, CSCS and Steve Clark, PT, DPT, MS, ATC, CSCS



Words from an Alumni



The New Wave of Concussion Treatment

By Lauren Ziaks, PT, DPT ('12), ATC ('09)

Wasatch Physical Therapy and Sports Medicine's Concussion Management Clinic in Park City, UT was born out of frustration and disappointment in the local "concussion specialists" after suffering from my 9th and worst concussion in January 2014. After countless specialist visits and hours of rehabilitation that proved ineffective, the crucial piece in my recovery was a local TBI specialist for the VA. This OT was able to identify my own binocular vision disorder. Upon starting treatment, I realized that oculomotor deficits are the "missing link" in post concussion management.

It is atypical for a Physical Therapist to work as a Vision Therapist; typically treatment is provided by an OT under the direction of an Optometrist (OD). For any colleagues hoping to venture down this path, ensure you take the time to master this new field as improper therapy for binocular vision disorders (convergence insufficiency) can cause more harm to your patients than good. It is crucial for the success of your patients that

you create a good working relationship with a local OD experienced in the "Behavioral" or Neuro-Optometric exam. I was lucky enough to be trained by my OT colleague who shared my mission to bring quality care to our community. We have been lucky to align ourselves with a FCOVD; Board Certification in Vision Development and Vision Therapy for Optometrists.

Typically, PTs provide Vestibular Rehabilitation Therapy (VRT) for post concussion patients. These patients often "fail out" of VRT programs due to intolerance and lack of progress. We are now finding these "failures" are often due to underlying oculomotor deficits. If a patient is not tolerating VRT well, have someone qualified look deeper for an oculomotor dysfunction. The Convergence Insufficiency Symptom Survey (CISS and soon to be ATBI Vision Questionnaire) is an excellent subjective screening tool to determine which patients may benefit from a visual exam. Once the neuromuscular control of smooth pursuits and saccades begins to improve, these patients will be able to tolerate an integration of VRT.

In our program, patients are expected to complete 20-30 minutes per day of a home exercise program. In addition, they complete weekly sessions for 4-6 weeks decreasing to bimonthly sessions for 1-3 months and finally are discharged with a 4-8 week home program. This differs greatly from traditional vision therapy which consists of 16-24 weekly visits. Our program still requires a 3-6 month commitment, but significantly lowers the burden of health care costs. I believe creating independence and ownership over recovery is imperative in the recovery from concussion. Successful treatment of moderate-severe concussions or mTBI relies on the PT's ability to understand and treat the whole patient. With comorbidities of depression, anxiety, and ADD/ADHD, these patients often feel out of control, or "like a failure" or "now stupid". Sensitivity to individual patient needs along with instilling confidence and self-reliance in these patients is crucial to a full recovery.

My injury and rehabilitation has afforded me the opportunity to help others in similar situations. I believe, and hope to prove, it is the combination of visual first and vestibular therapy second, that produces the excellent results we have come to expect.

Lauren Ziaks, PT, DPT, ATC completed her BS in Athletic Training at Northeastern University in 2009 and her DPT degree in 2012. She is currently working in Park City, UT as the Director of the Concussion management program at Wasatch Physical Therapy and Sports Medicine. She specializes in concussion rehabilitation.

Faculty Accolades



Ann Marie Flores, PT, PhD, CLT was the first physical therapist to receive the distinguished Research Merit Award from the American Cancer Society, National Cancer Institute, CDC, and LIVEStrong at the Biennial Cancer Survivorship Research Conference in Washington D.C. June 2016. Dr. Flores presented her original research entitled *'Moving On' after head and neck cancer - Development of patient-centered education materials for physical and functional recovery.*



Kristin Greenwood, PT, DPT, MS, GCS and colleagues' research was recorded for an online education module through APTA Learning center. Earn 0.2 CEUs by listening to LMS-768: *Acute Care in the 21st Century: What's Entry Level Practice?*



Jack Dennerlein, PhD was named a fellow of the Human Factors and Ergonomics Society at their Annual Meeting held September 19-23 in Washington, D.C.

New Master's Program

The new **Masters of Science in Occupational Ergonomics and Health** program focuses on workplace prevention approaches for work-related musculoskeletal disorders (MSDs) and injuries and worker health promotion. This is the only degree program that combines ergonomics and health programs. This unique program emphasizes physical ergonomic factors, such as the design of tools and equipment, and the importance of organizational ergonomic factors (eg. policies, communication, and teamwork). Recognizing the large burden of work-related MSDs and the increase of chronic health conditions in working populations, this program integrates a multidisciplinary set of skills, the interaction of the work environment, including the physical and organizational factors.

For more information contact:

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New Graduate Online Courses Spring 2017

Ergonomics and the Work Environment

PT 5600: teaches students how to optimize overall human-systems performance and improve the physical ergonomic factors in a workplace using a public health approach suited for healthcare settings.

Workplace Wellness and Health Promotion

PT 5610: teaches students to use organizational ergonomic principles (optimization of sociotechnical systems) to evaluate workplace factors that are strongly associated with the health and health behaviors of workers.

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Dr. Yen's Laboratory of Locomotion Research at NU



By Sheng-Che Yen, PT, PhD

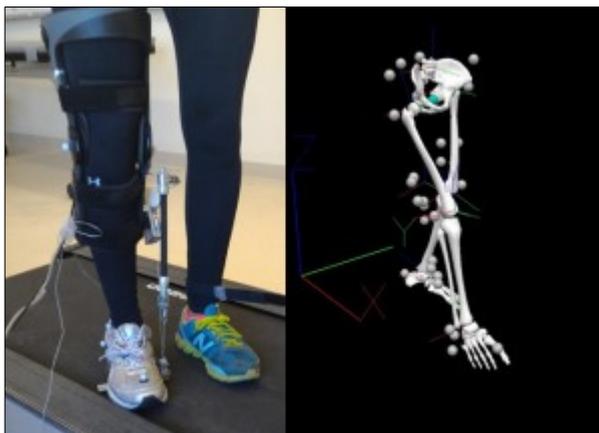
The goals of **Dr. Steve Yen's** Laboratory of Locomotion Research (L²R) are to understand sensorimotor control during gait and to enhance the effectiveness of gait rehabilitation. Our lab is equipped with a 3D optical motion capture system and electromyography (EMG) for studying joint kinematics and muscle activities during gait. Our research projects are very interdisciplinary as we are particularly interested in using robotic approaches to study gait and rehabilitation. For example, we have developed a wearable ankle robot called Pneumatic Actuator for Ankle Rehabilitation (PAAR), a joint research project with robotics researchers in the College of Computer and Information Science at Northeastern University. The PAAR is actuated by lightweight "air muscles" that can provide assistance and resistance to ankle motion during gait. Our lab also works with Northeastern University's Center for Research Innovation and TAVANA, LLC to perform human testing on an innovative platform ankle robotic device called Virtually Interfaced Robotic Ankle and Balance Trainer (vi-RABT). This

device was originally developed in Biomedical Mechatronics Laboratory at Northeastern University. Our goal is to enhance the robot function and usability so that physical therapists can easily use this device in the clinic to help patients improve ankle control and balance during gait. We recently received external funding from Massachusetts Technology Transfer Center (MTTC) for this research. We also received internal funding to study how brain activity is used to control these robotic devices to maximize the effectiveness of robotic gait rehabilitation.

Bench to clinical practice

When applying robotic technology to physical therapy, most people would think to use a robot to provide assistance and help patients reduce movement errors. In our lab, however, we use the robot to "amplify" rather than reduce movement error. What is the rationale for us to do so? In previous research, we tried to help patients with incomplete spinal cord injury to improve their gait performance by increasing their step length. We used a robot to provide leg swing assistance (the error reduction approach) and leg swing resistance (the error amplification approach) then observed how patients changed their gait, and we found something interesting. When leg swing assistance was provided, we saw an immediate increase in step length, but patients' leg muscle activity was reduced, as indicated by EMG. After we removed the assistance, patients actually walked with a reduced step length compared to the original one. This suggested that patients became dependent to the robot-generated assistance and reduced their effort in walking. On the other hand, although the leg swing resistance reduced patients' step length in the beginning, they were able to gradually correct the amplified error and return the step

length to the origin. After we removed the resistance, patients actually walked with an increased step length. This suggests that the resistance initiated patients' error correction process and increased active effort to change gait. This error augmented robotic approach could be used as a new paradigm to help patients improve their gait. Currently, we are testing if we can use this approach to improve the ankle function during gait in patients with chronic ankle instability.



Dr. Yen and Dr. Erdogmus received a tier 1 award for their research project titled "EEG-guided Robotic Mirror Therapy for Neurorehabilitation."

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Technology Integration within Clinical Practice



By Danielle Levac, PT, MSc, PhD.

A major challenge for children and adults with developmental or acquired brain injuries such as cerebral palsy or stroke is staying engaged in long-term physical therapy treatment. Physical therapists help children and adults learn and recover lost motor skills by encouraging abundant practice of meaningful, goal-oriented tasks. Virtual reality systems and active video games are increasingly popular physical therapy options that may offer engaging, meaningful practice of functional motor skills. These systems use different hardware and software options to display virtual environments on screens or in head-mounted displays, allowing patients to use full body movements to

interact with virtual objects. Virtual reality and active video games appeal to physical therapy because they provide real-time feedback and opportunities for repetitive practice of meaningful tasks in engaging virtual environments. Patients might also be motivated and engaged by the gaming and simulation aspects of these interventions. VR is also attractive to therapists because it allows them to tailor the difficulty levels of practice to each patient and measure patients' movement performance and progress in real time.

Research evidence is growing about how PTs can use a wide variety of rehabilitation-specific VR and off-the-shelf video gaming systems to help patients recover motor skills. However, a lot remains to be understood about how these interventions compare to conventional therapy for motor skill learning and about what the key 'active ingredients' of VR might be that enhance motivation and engagement. Since VR and active video games also have practical and logistical challenges to implementation in clinical settings, and given the wide variety of system and game options, therapists require educational resources to support evidence-based clinical decision-making about VR use.

Dr. Danielle Levac, a physical therapist who joined the faculty in 2015, explores these and other issues through her [Rehabilitation Games and Virtual Reality Laboratory](#). In collaboration with colleagues and students in the College of Engineering, Dr. Levac develops VR applications that make game-based rehabilitation accessible to children with motor impairments. The **ReGame-VR lab** focuses on promoting the sustainable, evidence-based integration of VR and active video gaming systems into rehabilitation. Research efforts are directed towards exploring how VR-based therapy can improve motor learning, balance, functional mobility and participation in children and adults with neuromotor impairments. Dr. Levac is also focused on partnering with clinical sites to evaluate the use of VR systems and to create user-friendly knowledge translation resources that facilitate the integration of VR and active video gaming into clinical practice.

Ultimately, Dr. Levac's research aims to inform the evidence-based use of VR and active video games in rehabilitation by understanding how and why they might be most effective for different patient populations. Research efforts also strive to support therapists in technology integration and to enhance the quality of physical therapy treatment to help children and adults with neurological impairments develop better motor skills and participate more in functional activities.



For more information:

- Watch this [short video](#) about lab activities
- Email: regamevrlab@northeastern.edu
- www.northeastern.edu/regamevrlab
- Facebook: www.facebook.com/regamevrlab
- Twitter: [@regamevr](https://twitter.com/regamevr)

Community Service



Heroes in Transition

Associate Clinical Professor, **Alycia Markowski, DPT, MPhyS(manip), FAAOMPT, OCS**, joined men and women within or connected to all branches of the military for Ruck4HIT2016 which is a 2-day, 275 mile ruck run from New York's Ground Zero to Cape Cod, Massachusetts. Fundraising efforts were to assist *Heroes in Transition*, a nonprofit organization that provides service dogs to returning heroes in need. Participants carried a 30 pound ruck sack as a symbol of the hardships endured during active duty. Dr. Markowski joined the group as medical support / Physical Therapist / support runner which kept her very busy along the course. The event took place May 13th –14th with all runners successfully crossing the finish line!

FUNFitness

On Saturday, June 4th DPT students from Northeastern, Boston University and MGHIHP joined Physical Therapists in the FUNFitness Screen event at Special Olympics Massachusetts (SOMA) Summer Games held at Harvard University. Originally developed by the American Physical Therapy Association, FUNFitness provides fitness screening and education services. Athlete flexibility, functional strength, balance and aerobic condition are assessed by physical therapy professionals who advise on injury prevention and sport performance. Ed Kostek, PT, DPT, OCS and **Ann Golub-Victor, PT, DPT, MPH** Associate Clinical Professor, are Clinic Directors for SOMA FUNFitness.



Pan Mass Challenge

On August 6th, Northeastern Physical Therapy volunteered for the 7th consecutive year at the Pan Mass Challenge. More than 6,300 riders and 4,000 volunteers raised more than \$33 million for the Dana Farber Cancer Institute. NU PT had an impressive showing with a record 50 DPT students, PT alumni and faculty donating eight hours of massages to riders completing the first leg of their bike ride from Sturbridge to Bourne, MA. Faculty members **Maureen Watkins, PT, DPT, OCS, MBA, LMT** and **Alycia Markowski DPT, MPhyS(manip), FAAOMPT, OCS** have been organizing this effort since its inception. **Chris Cesario, PT, DPT, MBA** recently joined the faculty-led volunteer opportunity that encourages students to join them for a chance to improve their therapeutic massage techniques and receive additional faculty-led training while learning first-hand the benefits of donating their time and their skills for a great cause.

