



Northeastern University

Bouvé College of Health Sciences



Department of Physical Therapy, Movement and Rehabilitation
Sciences

Annual Research Report 2015
for calendar year 2014

Mission

The Department of Physical Therapy, Movement and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and wellbeing of the local, national, and global community members.

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Highlights from 2014

The Department of Physical Therapy, Movement, and Rehabilitation Sciences had an excellent year with regard to research in 2014. The department continued to grow with new faculty recruiting efforts with three new faculty to be hired in 2015. Researchers were very productive publishing their work and submitting new grants applications to expand our current activities in upcoming years. Highlights from the 2014 calendar year include

- Over 30 peer reviewed journal publications
- Over 95 presentations at local, national, and international conferences
- Over 41 citations of works by tenure-track faculty with an average H-index of 10
- \$2.35 million in direct costs for multi-year grants submitted to external agencies
- \$1.08 million in direct costs for research grant activity in 2014

Description of research program

At the heart of the research is the success of the department's faculty and their resources. The department has over 5,000 square feet of research laboratories mostly located within Robinson and Richards Hall equipped with the state of the art research equipment. Equipment include systems to measure human motion, posture and force, neurophysiology, muscle and tissue physiology, and musculoskeletal structure and include intervention systems such as rehabilitation robots and office ergonomic furniture. Other capabilities include survey and population data base resources and software.

A Department strength is its local and global research partners. Within Northeastern the Department has strong partners with the Health Sciences Department in Bouvé College of Health Science along with research partners in the College of Engineering, College of Science, the College of Arts, Media & Design, and the College of Social Sciences and Humanities. Within Boston the faculty collaborate with centers at neighboring institutions such as Harvard Medical School, Harvard School of Public Health, Dana Farber Cancer Institute, Tufts Medical Center, Boston University, Massachusetts General Hospital, Boston Children's Hospital, Brigham and Women's Hospital, and the Liberty Mutual Research Institute for Safety. In terms of national and global partners, the Department's faculty have strong ties with the University of Massachusetts Amherst, New York University, SUNY Upstate Medical School, University of Washington, Vanderbilt, University of Southern Denmark, Karolinska Institutet, Maastricht University and VU University in Amsterdam.

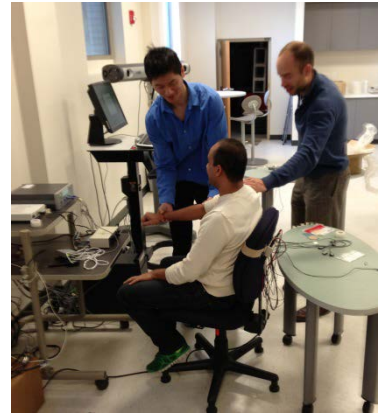
In addition, the department has many partnerships with industry. Our industrial partners span different business sectors such as entertainment, service and retail, transportation, warehousing, health care, pharmaceutical, and computer industries. Our faculty work with Boston Dynamics (Robotic), Local Construction Companies (Gilbane, Suffolk, Shawmut, Skanska, and JMA), Mylan Limited, Pfizer (Pharmaceutical), Cerrejón (Coal mining), the Office Ergonomics Research Committee (www.oerc.org), Bose, Schneider, Partners Health Care, and Partners in Health (health coaching and wellness company).

Description of Laboratories

Occupational Biomechanics and Ergonomics Laboratory (Jack Dennerlein)

001 Robinson Hall 1190 square feet

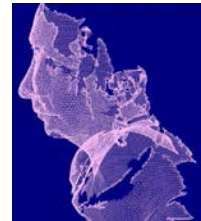
The Occupational Biomechanics and Ergonomics Laboratory research aims to prevent work-related musculoskeletal disorders by understanding injury mechanisms through laboratory and field studies that utilize biomechanics, neuromuscular, exposure-response, and intervention study designs and methods. Located on the ground floor of Robinson Hall, this space contains a state of the art office space for research staff and trainees and a human movement and biomechanics laboratory space, both approximately 600 square feet. The flexible design of biomechanics laboratory space allows for a range of experiments investigating thumb movements while using mobile computing technology to the ergonomics of dynamic office workstation designs. The laboratory contains equipment to measure human motion and posture, surface electromyography, and applied forces. Human motion equipment includes Northern Digital Optotrak system and Ascension Technology Mini-Bird systems. Electromyography equipment include a 12 channel Delsys and an 8 channel wireless Mega systems. Load cells to measure force include custom made force plates for computing to ATI 3-axis force-torque sensors.



Center for Cancer Survivorship Studies (Ann Marie Flores)

406 Robinson Hall 320 square feet

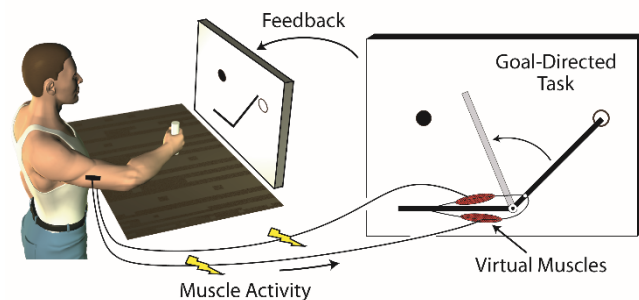
The mission of the center is to describe and evaluate issues of cancer survivorship that affect physical and functional well-being and quality of life after a cancer diagnosis with special emphasis on minorities, the poor and medically underserved. The center is also devoted to the development and testing of physical therapy and technological interventions to improve physical and functional well-being and quality of life after a cancer diagnosis. The center encourages collaborative research that includes the fields of physical therapy, biostatistics, public health, epidemiology, sociology, biomedical & biomechanical engineering, psychology, nursing, oncology (surgical, medical and radiation), pharmacy sciences, cancer, and cell biology.



Neuromotor Systems Laboratory (C.J. Hasson)

426 Richards Hall 700 square feet

The goal of the Neuromotor Systems Laboratory is to understand how the nervous system learns, interacts with, and takes advantage of the properties of the musculoskeletal system and the external environment to achieve task goals. They are particularly interested in understanding how age-related changes in the neuromuscular system contribute to decrements in movement performance and stability. The laboratory's larger room will contain an isolated experimental room and a separate office area for research staff and student activities. The experimental room will house an electromyography system (records muscle activity), a high-performance robotic arm, and high-performance computers for modeling, simulation, and data analysis. This equipment will be used to perform human motor control and learning experiments. A separate room will house Dr. Hasson's office and a small workshop that will be



used to fabricate custom apparatuses and maintain experimental equipment.
<http://www.neu.edu/neuromotorsystemslab/>

Teaching and Learning Innovation Program (Lorna Hayward)

Dr. Hayward's research centers on the scholarship of teaching and learning as it relates to student learning, cultural competency, professional role formation and novice to expert transitions. Dr. Hayward designs and examines educational models that involve the use of technology, standardized patient interactions, and experiential education in physical therapist students. Dr. Hayward's research is currently supported by the Kenneth B. Schwartz Center and the Wellesley Village Church.



Rehabilitation and Epidemiology Trainee Program (Maura D. Iversen)

The mission of the Rehabilitation and Clinical Epidemiology Trainee Program is to provide students with exposure to clinical translational research in the area of rehabilitation sciences and the development of patient reported outcome measures (PROs). A central focus of our research is the design, evaluation and implementation of behavioral and rehabilitation interventions to improve health outcomes and promote physical activity in persons with arthritis. Specific areas of expertise include studies of persons with rheumatoid arthritis, systemic lupus erythematosus, spinal stenosis and osteoporosis. Recent PROs include the pedi-IKDC, KOOS-Child, pediatric physical activity scale, a pediatric shoulder survey and outcomes measures to assess therapists confidence in their ability to manage patients in the acute care setting (ACCS). The team also collaborates with the Astrid Lindgren's Hospital Gait Laboratory for the evaluation of gait dynamics in children and adults with arthritis. Dr. Iversen's work is /has been funded by the National Institutes of Health, the Research & Education Foundation, Foundation for Physical Therapy, Pzifer, the Arthritis Foundation and Farnsworth Foundation.

Neurophysiology Laboratory (Robert Sikes)

Mugar Hall 300 Square Feet

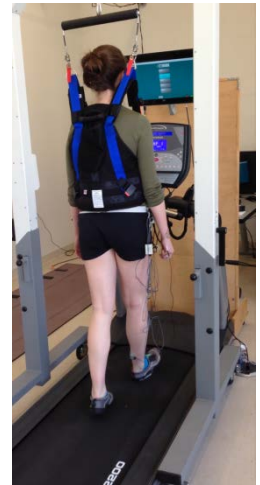
The Neurophysiology Laboratory of the Department of Physical Therapy explores the role of limbic system brain structures in pain and stress. The lab conducts pre-clinical electrophysiological experiments using animal models of cutaneous and visceral pain. This facility is one of very few that records simultaneous neuron activity at multiple levels of the pain transmission network and is part of a multidiscipline collaboration with labs at Northeastern and Boston University Medical School which conduct the brain imaging and behavior testing of these animals. The lab is located in 319 Mugar Building which provides close proximity to the animal facilities and brain imaging center. With 300 sq-ft the lab has adequate space for neurophysiological recording in small animals, surgical procedures, histological processing, light microscopy and preliminary data analysis. The lab is equipped with state of art neurophysiological recording, stereotaxic micropositioning, stimulus control and physiological monitoring systems. For histology there is a Nikon Optiphot microscope and a microtome for tissue preparation. There are multiple computer systems including a server that provides access for remote data analysis. Additional equipment includes a fume-hood, flammable storage cabinet, refrigerator and drying oven.



Laboratory for Locomotion Research (Sheng-Che Yan)

460 Richards Hall, 750 Square Feet

The goals of Laboratory for Locomotion Research are to: (a) understand how the central nervous system achieves sensorimotor control during gait; (b) develop and test gait rehabilitation programs for patients with sensorimotor control problems. The lab is located in the 4th floor of the university's Richards Hall and has a total space of 600 ft². A separate office (150 ft²) is adjacent to the lab that will be served as an examination room for healthy and patient subjects. The lab will be equipped with state of the art equipment and software for gait analysis.



Peer reviewed journal articles in 2014

1. Bruno Garza JL, Eijkelhof BH, Huysmans MA, Johnson PW, van Dieen JH, Catalano PJ, Katz JN, van der Beek AJ, Dennerlein JT. Prediction of trapezius muscle activity and shoulder, head, neck, and torso postures during computer use: results of a field study. *BMC Musculoskelet Disord* 2014;15:292.
2. Caban-Martinez AJ, Lowe KA, Herrick R, Kenwood C, Gagne JJ, Becker JF, Schneider S, Dennerlein JT and Sorensen G. Construction workers working in musculoskeletal pain and engaging in leisure-time physical activity: Findings from a mixed-methods pilot study. *Am J Ind Med* 2014;57(7):819-25.
3. Cardoso JR, Pereira LM, Iversen MD, Ramos AL. What is Gold Standard and What is Ground Truth? *J Orthod* 2014;19(5):27-30.
4. Corkery MB, O' Rourke B, Viola S, Yen SC, Rigby J, Singer K, Thomas AC. An exploratory examination of the association between altered lumbar motor control, joint mobility and low back pain in athletes. *Asian J Sports Med* 2014; 5(4): e24283.
5. Dennerlein JT. Anaphylaxis treatment: ergonomics of epinephrine autoinjector design. *Am J Med* 2014;127(1 Suppl):S12-6.
6. Dias, J. M., O. Menacho Mde, B. F. Mazuquin, K. Obara, F. Q. Mostagi, T. B. Lima, F. A. Moura, T. Abrao, M. D. Iversen and J. R. Cardoso (2014). "Comparison of the electromyographic activity of the anterior trunk during the execution of two Pilates exercises - teaser and longspine - for healthy people." *J Electromyogr Kinesiol* 24(5): 689-697.
7. Eden M, Flores AM, Galantino ML, Spinelli B. Recommendations for patient-reported outcome measures for head and neck cancer-related shoulder dysfunction: a systematic review. *Rehabilitation Oncology*. 2014;32(3):9-19.
8. Eijkelhof BH, Huysmans MA, Blatter BM, Leider PC, Johnson PW, van Dieen JH, Dennerlein JT, van der Beek AJ. Office workers' computer use patterns are associated with workplace stressors. *Appl Ergon* 2014;45(6):1660-7.
9. Esbjornsson AC, Rozumalski A, Iversen MD, Schwartz MH, Wretenberg P, Brostrom EW. Quantifying gait deviations in individuals with rheumatoid arthritis using the Gait Deviation Index. *Scand J Rheumatol* 2014;43(2):124-31.
10. Flores AM, Dwyer K. Shoulder impairment before breast cancer surgery. *J Womens Health Phys Ther* 38(3):1-7, 2014.
11. Greenwood K, Nicoloro D, Iversen MD. Reliability and Validity of the Acute Care Confidence Survey: An Objective Measure to Assess Student's Self-Confidence and Predict Student Performance for Inpatient Clinical Experiences. *J Acute Care Phys Ther* 2014;5(1):1-10.
12. Hasson CJ, Sternad D. Safety margins in older adults increase with improved control of a dynamic object. *Front Aging Neurosci* 2014;6:158.
13. Hasson CJ, van Emmerik RE, Caldwell GE. Balance decrements are associated with age-related muscle property changes. *J Appl Biomech* 2014;30(4):555-6
14. Hasson CJ. Neural representation of muscle dynamics in voluntary movement control. *Exp Brain Res* 2014;232(7):2105-19.
15. Iversen MD, Conors M, Samson A, Tessitore E. Technology Applications to Improve Health Outcomes and Self-Management in Patients with Arthritis. *Int J Clinical Rheumatol* 2014;9(5):487-504.
16. Iversen MD, Frits M, Cui J, Shadick N, Scanlon L, Sharby N. Perceptions of Physical Activity Engagement among Adults with Rheumatoid Arthritis and Rheumatologists: A Qualitative Study. *Int J Clin Rheumatol* 2014 10(2): 67-77; doi: 10.2217/ijr.15.3
17. Iversen MD, Rekedal L, Solomon D. Development and Results of a Motivational Interviewing Program for Health Education to Facilitate Osteoporosis Self-Management. *J Osteopor Phys Act* 2014; 2:2. <http://dx.doi.org/10.4172/2329-9509.1000116>.

18. Kim SS, Okechukwu CA, Dennerlein JT, Boden LI, Hopcia K, Hashimoto DM, Sorensen G. Association between perceived inadequate staffing and musculoskeletal pain among hospital patient care workers. *Int Arch Occup Environ Health* 2014;87(3):323-30.
19. Nasseroleslami B, Hasson CJ, Sternad D. Rhythmic manipulation of objects with complex dynamics: predictability over chaos. *PLoS Comput Biol* 2014;10(10):e1003900.
20. Onyebeke LC, Young JG, Trudeau MB, Dennerlein JT. Effects of forearm and palm supports on the upper extremity during computer mouse use. *Appl Ergon* 2014;45(3):564-70.
21. Ortvist M, Iversen MD, Janarv PM, Brostrom EW, Roos EM. Psychometric properties of the Knee injury and Osteoarthritis Outcome Score for Children (KOOS-Child) in children with knee disorders. *Br J Sports Med* 2014;48(19):1437-46.
22. Qin J, Trudeau M, Buchholz B, Katz JN, Xu X, Dennerlein JT. Joint contribution to fingertip movement during a number entry task: an application of Jacobian matrix. *J Appl Biomech* 2014;30(2):338-42.
23. Reme SE, Shaw WS, Boden LI, Tveito TH, O'Day ET, Dennerlein JT, Hashimoto D, Sorensen G. Worker assessments of organizational practices and psychosocial work environment are associated with musculoskeletal injuries in hospital patient care workers. *Am J Ind Med* 2014;57(7):810-8.
24. Sparks JA, Iversen MD, Miller Kroouze R, Mahmoud TG, Triedman NA, Kalia SS, et al. Personalized Risk Estimator for Rheumatoid Arthritis (PRE-RA) Family Study: rationale and design for a randomized controlled trial evaluating rheumatoid arthritis risk education to first-degree relatives. *Contemp Clin Trials* 2014;39(1):145-57.
25. Spinelli B, Galantino ML, Eden M, Flores AM. Recommendations for patient-reported outcome measures for head and neck cancer-related neck dysfunction: A systematic review. *Rehabilitation Oncology*, 2014;32(3):20-31.
26. Trudeau MB, Sunderland EM, Jindrich DL, Dennerlein JT. A data-driven design evaluation tool for handheld device soft keyboards. *PLoS One* 2014;9(9):e107070.
27. Tveito TH, Sembajwe G, Boden LI, Dennerlein JT, Wagner GR, Kenwood C, Stoddard AM, Reme SE, Hopcia K, Hashimoto D, Shaw WS, Sorensen G. Impact of organizational policies and practices on workplace injuries in a hospital setting. *J Occup Environ Med* 2014;56(8):802-8.
28. von Heideken J, Iversen MD, Ekblom A, Mats P. Femur Shaft Fracture at a Young Age and the Risk of Subsequent Severe Injuries During Childhood. *BMC Pediatrics* 2014;14(1):62. PMID: 24589362.
29. Wang CC, Iversen MD, McAlindon T, Harvey WF, Wong JB, Fielding RA, et al. Assessing the comparative effectiveness of Tai Chi versus physical therapy for knee osteoarthritis: design and rationale for a randomized trial. *BMC Complement Altern Med* 2014;14:333.
30. Wang YC, Hart DL, Deutscher D, Yen SC, & Mioduski, J. The Self-Report Fecal Incontinence and Constipation Questionnaire (FICQ) in Patients with Pelvic Floor Dysfunction Seeking Outpatient Rehabilitation. *Physical Therapy* 2014; 94(2): 273-288.
31. Wu M, Landry J, Kim J, Schmit B, Hornby G, Yen SC, Macdonald J. Robotic resistance/assistance training improves locomotor function in individuals poststroke: a randomized controlled study. *Archives of Physical Medicine and Rehabilitation* 2014; 95(5): 799-806.
32. Yen SC, Landry J, Wu, M. Multisensory feedback enhances retention of locomotor adaptation in human SCI. *Human Movement Science* 2014; 35: 80-93.
33. Greenwood K, Nicoloso D, Iversen M. "Reliability and Validity of the Acute Care Confidence Survey: An Objective Measure to Assess Students' Self-confidence and Predict Student Performance for Inpatient Clinical Experiences". *Journal of Acute Care PT*. 2014; 5(1):1-10.

34. Hayward LM , Li Li. Promoting and Assessing Cultural Competence, Professional Identity, and Advocacy in Doctor of Physical Therapist Students within a Global Community of Practice. *Journal of Physical Therapy Education*. 2014; 28(1):23-32.
35. Corkery M, Edgar K, Smith C. A Survey of Physical Therapists' Clinical Practice Patterns and Adherence to Clinical Guidelines in the Management of Patients with Whiplash Associated Disorders (WAD). *J Man Manip Ther*. 2014; 22(2), 75-89.
36. Beltrani CM, Corkery MB. Hip Resurfacing Arthroplasty in an Older Athlete. *The Rheumatologist* December 2014

Book Chapters:

1. Corkery M, Iversen MD. Rheumatoid Arthritis and Osteoarthritis. In: O'Sullivan SB, Schmitz TJ, eds. *Physical Rehabilitation* 6th ed. F.A. Davis, 2014.
2. Iversen MD, Sharby N. Arthritis patient education and team approaches to management. In: Hochberg M, Silman A, Smolen J, Weinblatt M, Weisman MM, editors. *Rheumatology*, 6th Edition, Elsevier. 2014

Conference Abstracts and Presentations

National and International conference presentation

1. Adolf G, Bolton M, Bonia T, Daly S, Maurice O, Murphy P, Yen SC, Mavroidis C. Development of a robotic device to improve chronic ankle instability through controlled perturbation. *Proceedings IEEE Northeast Bioengineering Conference 2014*; 1-2.
2. Adolf,G, Bolton, M, Bonia T, Daly, S, Maurice O, Murphy P, Mavroidis C, Yen SC. Development of a robotic device to improve chronic ankle instability through controlled perturbation. 40th IEEE Northeast Bioengineering Conference. Boston, MA, April 25-27, 2014.
3. Asakawa D, Dennerlein, JT, World Congress of Biomechanics, Finger Joint Angles, and the Pressure Applied by the Fingers for 7 Common Gestures on a Touchscreen Computing Device, Boston MA. (July 8, 2014).
4. Barbir, A, Dennerlein, JT, World Congress of Biomechanics, Upper Extremity Motor Variability during Computer Mouse Use Changes across Individuals and Workstation Configurations, Boston MA. (July 8, 2014).
5. Bassin, J-P, Iversen, M, Fitzpatrick, D. Enhancing Cultural Awareness Through an Academic Exchange with Physical Therapy Students, Swiss Congress for Health Professions Bern, Switzerland, March 2014.
6. Caffrey K, Graff J, Moore K, Tashjian L , Golub-Victor A. Research, Innovation and Scholarship Expo, Creation of a fitness curriculum for middle school students, Northeastern University, Boston, MA. (March 2014).
7. Caldwell, G. E., Hasson, C. J., Miller, R. H. Age-related changes in muscle mechanical propertie. 7th World Congress of Biomechanics. 2014
8. Cesario C, Wilmarth MA. The Relationship Between Academic Factors and Clinical Education Outcomes. Poster presented at Education & Leadership Conference; Kansas City, MO. 10/11/14.

9. Day, L., Reimer, E. , Mattingly, G. , APTA Combined Section Meeting, Is Cadaver Dissection Diminishing in PT Schools?, American Physical Therapy Association, Las Vegas, NV. (February 2014).
10. Dennerlein, J. T. , 1st International Symposium to Advance Total Worker Health, A Framework for Developing and Implementing Total Worker Health™ Interventions in Construction, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014).
11. Dennerlein, J. T. , 1st International Symposium to Advance Total Worker Health, "Patterns of Site-Employment of Commercial Construction Report Generated on Workers and the Relationship with Musculoskeletal Pain, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014). Murphy, L. A. ,
12. Dennerlein, J. T. , 1st International Symposium to Advance Total Worker Health, Safety Climate and the Organizational Complexity of Commercial Construction Worksites, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014).
13. Dennerlein, J. T. , 1st International Symposium to Advance Total Worker Health, Simulating the Effects of Interventions on a Mobile Work Force, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014).
14. Dennerlein, J. T. (Author, Symposium Organizer Chair), 1st International Symposium to Advance Total Worker Health, Integrated Approaches for Mobile and Contingent Work Forces, Using Construction as an Exemplar, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014). Sparer, E. ,
15. Dennerlein, J. T., (Invited Presenter) World Congress of Biomechanics, Biomechanical Exposure Assessment for Office Workers: Identifying Injury Pathways, Boston, MA. (July 8, 2014).
16. Dennerlein, J. T., Chevron Global Wellness Network Meeting, Occupational physical activity in health care and construction: work's contribution to workers' weekly recommended levels of physical activity, Chevron, International Webinar. (May 20, 2014).
17. Dennerlein, J. T., Featured Speaker Applied Ergonomics Conference, How mobile technology is changing the paradigm of office ergonomics. Institute for Industrial Engineers, Orlando, FL. (March 26, 2014).
18. Dennerlein, J. T., Keynote Speaker HFES Inter-University Workshop, Physical Ergonomics Biomechanics and Ergonomics of the Modern Office: Identifying Injury Pathways, HFES, Buffalo NY. (November 15, 2014).
19. Dennerlein, J. T., Lin, M. Y., 2014 International Annual Meeting of the Human Factors and Ergonomics Society, A Comparison of Upper Body Kinematics and Muscle Activation Between Sit and Stand Computer Workstation Configuration, HFES, Chicago IL. (October 31, 2014).
20. Esbjörnsson AC, André M, Iversen MD, Hagelberg S, Schwartz M, Broström EW. Effect of Intra Articular Foot Joint Injections on Generating Muscle Power During Walking in Children with Juvenile Idiopathic Arthritis. ESMAC Conference, Rome, Italy. Sept 2014.
21. Faber G, Dennerlein JT. World Congress of Biomechanics, "Estimating 3D ground reaction forces and L5/S1 moments during asymmetric trunk bending using an inertial/magnetic sensor suit," Boston MA. (July 8, 2014).
22. Fitzpatrick, D. F. , L. S. , Golub-Victor, A. , Douglas, B. M. , APTA NEXT Conference and Exposition, Should my patient use a mechanical lift at home? An algorithm for home

- healthcare workers, American Physical Therapy Association, Charlotte, North Carolina. (June 2014).
23. Golub-Victor, A. , Fitzpatrick, D. , Lowe, S. , Douglas, B. , Fourth International Conference on Health, Wellness and Society, Should my patient use a mechanical lift athome? An algorithm for home healthcare workers, Health , Wellness and Society, Vancouver, BC (Canada). (March 2014).
 24. Fitzpatrick, D., Golub-Victor, A., Lowe, S., Douglas, B., Should My Patient Use a Mechanical Lift? : An Algorithm for Home healthcare workers APTA NEXT National Virtual Conference and Webinar. June-August 2014.
 25. Fitzpatrick, D., Golub-Victor, A., Lowe, S., Douglas, B., Should My Patient Use a Mechanical Lift? An Algorithm for Home healthcare workers. APTA National Conference, Charlotte, No Carolina, June 2014.
 26. Iversen, M., Bassin, J-P., Fitzpatrick, D. Enhancing Cultural Awareness Through an Academic Exchange: Development and Outcomes of US-Swiss PT Students Program, , APTA CSM Education Section, Las Vegas, NV 2014
 27. Flores, A. M. , Nelson, J. , Tucker, K. , Poster, Physical & Functional Side Effects and Physical Therapy After Cancer Among Men And Women Of Puerto Rican Descent, 7th Biennial Cancer Survivorship Meeting, National Cancer Institute/NIH, American Cancer Society, LIVEStrong, CDC, Atlanta, GA,.
 28. Flores, A. M. , Stephenson, R. , Golshan, M. , Weinandy, M. , Marques, A. , Taber, M. , Lovitz, N. , Poster, Early PT education for pre-surgical breast cancer survivors A preliminary pilot study, Combined Sections Meeting, Feb. 2014, APTA, Las Vegas, NV,).
 29. Fostyni, H. , Golub-Victor, A. , Bibi, K. , Wilmarth, M. A. , Region 1 Conference of PATH International, Exercise and symptoms of Attention Deficit Hyperactivity Disorder: a systematic review., Professional Association of Therapeutic Horsemanship International, Nashua, NH. (April 2014).
 30. Greenwood, K. C., Nicoloro, D., Iversen, M., Podium Presentation, The Acute Care Confidence Survey Predicts Students' Clinical Performance: Phase 2 of the Pilot study. Journal of Acute Care Physical Therapy, APTA CSM 2014, Las Vegas, Conference, Academic,
 31. Greenwood, K. C., Nippins, M. P., Poster, The Use of Observation and Online Reflection to Promote Students' Interpretation of the Patient Examination Using the Guide Framework., APTA Combined Sections, American Physical Therapy Association, Las Vegas.
 32. Hasson CJ, Manczurowsky J, and Rogazzo M (2014). Effect of vibrotactile kinematic feedback on learning to control a myoelectrically controlled virtual arm. Society for Neuroscience 44th Annual Meeting, Washington D.C., November 15-19.
 33. Hasson, C.J., Wang, S., Hoyt, C., Yen, S.C. (faculty advisor) A Reinforcement Approach for Gait Rehabilitation. Neuroscience 2014, Washington DC, November 15-19, 2014.
 34. Hasson, C.J., Wang, S., Hoyt, C., Yen, S.C. (faculty advisor) Effectiveness of a reinforcement learning approach for gait training. World Congress of Biomechanics, Boston MA, July 6-11, 2014.
 35. Hayward, L. M. , Canali, A. , Oral Presentation, Doctor of Physical Therapy Student Recognition and Understanding of Clinical Reasoning in the Inpatient Environment: A Qualitative Study, Global Internship Conference, Global Internship, Toronto, Canada.

36. Hayward, L. M. , Dwyer, A. M. , Oral Presentation, An Educational Approach for Facilitating a Compassionate, Culturally Sensitive and Interprofessional Environment within a Rehabilitative Setting, Combined Sections Meeting, APTA, Las Vegas, NM.
37. Hayward, L. M. , Venere, K. , Pallais, A. , Oral Presentation, An Integrated Educational Model: Evaluation, Enhancement, and Sustainment of an International Service Learning Partnership., Combined Sections Meeting, APTA, Las Vegas, NM,.
38. Hayward, L. M., Gardinier, L. M. , Paper, International Faculty-Led Programs: Benefits, Perceptions, and Challenges in Global Community Engagement., International Association for Research on Service-learning and Community Engagement (IARSLCE) Annual Meeting, International Association for Research on Service-learning and Community Engagement (IARSLCE), Chicago, Illinois (2011).
39. Hickey, M. J. , Poster, Gastrointestinal Disease Manifesting as Shoulder Dysfunction: A Medical Triage View, Combined Sections Meeting, American Physical Therapy Association.
40. Iversen MD. Google Minefield: Empowering Patients to Evaluate Online Resources. ACR/ARHP Annual Scientific Meeting, Boston, MA, November 16, 2014
41. Iversen MD. State of the Science II– Mobile Applications to Promote Physical Activity. ACR/ARHP Annual Scientific Meeting, Boston, MA, November 16, 2014
42. Iversen MD, Sylvester, K, Grader, A, et al. Clinical Exam Features in Patients with Knee Osteoarthritis (KOA) and Correlations with Self-Report and Performance Outcomes. APTA Combined Sections Meeting. Las Vegas, NV. February 5, 2014.
43. Kiami, S., New England Faculty Development Consortium Spring Conference 2014, "Use of Digital Case Studies to Promote Critical Thinking Abilities," NEFDC, Roger Williams University Bristol, RI. (June 6, 2014).
44. Lin, M. Y. , Dennerlein, J. T. , World Congress of Biomechanics, Sit/Stand Workstation Configuration affects Upper Extremity Posture, Muscle Load and Variability during Computer Mouse Use, Boston, MA. (July 8, 2014).
45. Markowski, A. M. , Rodgers, R. F. , Watkins, M. , Combined Sections Meeting, Effectiveness of a comprehensive workplace wellness and exercise program on self-reported quality of life measures and health, APTA, LasVegas NV. (January 2014).
46. Markowski, A. M. , Watkins, M. , Rodgers, R. F. , Poster, The Effects of an Employee-Based Health and Wellness Program on Change in General Health Behaviors., Combined Sections Meeting, APTA, Conference, Academic, National, peer-reviewed/refereed, published in proceedings, Accepted. (January 2014).
47. Murphy P, Adolf G, Daly S, Bolton M, Maurice O, Bonia T, Mavroidis C, Yen SC. Test of a customized compliant ankle rehabilitation device in unpowered Mode. *Conference Proceedings IEEE Medicine and Biology Society 2014*; 3057-3060.
48. Naili JE, Iversen MD, Esbjörnsson AC, Schwartz MH, Häger C, Broström EW. Quantifying Function before and after Total Joint Replacement Surgery in Patients with Hip Osteoarthritis. ESMAC Conference, Rome, Italy. Sept 2014.
49. Nippins, M. P., Lecture, The Nuts and Bolts of Physical Therapy in Cystic Fibrosis, 2014 North American Cystic Fibrosis Conference, Cystic Fibrosis Foundation, Atlanta, GA, Seminar, Academic, International, peer-reviewed/refereed, Invited. (October 2014).
50. Nippins, M. P., Lecture, The Pediatric Cardiopulmonary Review, Advanced Clinical Practice in Pediatrics Course, American Physical Therapy Association, Boston, MA, Seminar, Non-Academic, National, peer-reviewed/refereed, published in proceedings, Invited. (September 2014).

51. Nippins, M. P., Symposiums, Musculoskeletal Issues in Cystic Fibrosis, 2014 North American Cystic Fibrosis Conference, Cystic Fibrosis Foundation, Atlanta, GA, Workshop, Academic, International, peer-reviewed/refereed, published in proceedings, Invited. (October 2014).
52. Nolan, D. C. (Presenter), Davis, I. (Presenter), Lecture, Running Assessment, New England Sports and Orthopedic Rehabilitation Summit 2014: Advances in Rehabilitation of the Lower Extremity, Brown University; University Orthopedics, Providence, RI.
53. Nolan, D. C. (Presenter), Lecture, Female Athlete: Core & Gluteus Medius: The Epicenter of Injury Prevention, Sports Medicine 2014: Imaging and Managing Athletic Injuries, MGH, Boston, MA,.
54. Nolan, D. C. (Presenter), Lecture, Hamstring Injuries: Rehabilitation, Sports Medicine 2014: Imaging and Managing Athletic Injuries, MGH, Boston, MA, Conference, Non-Academic,.
55. Nolan, D. C. (Presenter), Lecture, Management of Common Non-Operative Shoulder Conditions, Primary Care Orthopaedics, MGH Department of Orthopaedic Surgery, Boston, MA).
56. Nolan, D. C. (Presenter), Lecture, Management of the Foot & Ankle Complex, PhysicalTherapy.Com, Online, Seminar, Non-Academic, National, Invited. (May 2014).
57. Nolan, D. C. (Presenter), Lecture, New Treatments for Tendinopathy: Manual Therapy, Sports Medicine 2014: Imaging and Managing Athletic Injuries, MGH, Boston, MA.
58. Nolan, D. C. (Presenter), Lecture, Rehabilitation Considerations Following Anterior Cruciate Ligament Reconstruction, PhysicalTherapy.Com, Online, Seminar, (April 28, 2014).
59. Nolan, D. C. (Presenter), Symposiums, Management of the Foot & Ankle Complex, Northeast Seminars, Robert Wood Johnson University Hospital; Somerville, NJ, Conferenc).
60. Nolan, D. C. (Presenter), Vopat, B. (Presenter), Fleming, K. (Presenter), Lecture, Elbow OCD Lesions, MGH Department of Orthopaedic Surgery Sports Medicine Conference, Sports Medicine Service, Boston, MA.
61. Okechukwu, C. , Dennerlein, J. T. , 1st International Symposium to Advance Total Worker Health, Using Creative and Strategic Partnership for TWHTM Interventions in Complex Organizational Structures, National Institute for Occupational Safety and Health, Bethesda, MD. (October 8, 2014).
62. Park, S., Hasson, C. J., Caldwell, G. E. (2014). Adaptation of muscle synergies while learning to direct pedal forces.. Boston, MA: 7th World Congress of Biomechanics.
63. Cesario C, Clark C, Howard M, Nelson L, Reddington D. Research, Innovation and Scholarship Expo (RISE), "The Effects of a 4 week Strengthening Program on Reducing ACL Risk Factors in Female High School Soccer Players". Northeastern University, Boston, MA. (April 2014).
64. Sparer, E. , Dennerlein, J. T. , 24th International Epidemiology in Occupational Health (EPICOH), Qualitative findings from a safety communication and recognition program on safety awareness and teambuilding in construction, Chicago IL. (June 24, 2014).
65. Sparer, E. , Manjourides, J. , Dennerlein, J. T. , 24th International Epidemiology in Occupational Health (EPICOH), Patterns of site-employment of construction workers on and off commercial construction sites in new England and the relationship to musculoskeletal pain, Chicago IL. (June 24, 2014).

66. Sparks, J, Iversen, MD, Kroouze, R, et al. Personalized Risk education for Rheumatoid Arthritis Improves Self-Perceived Risk Accuracy and Risk Factor Knowledge in First-Degree Relatives. American College of Rheumatology Annual Meeting. Boston, MA. November 18, 2014.
67. Van Eerd, D. , Munhall, C. , Irvin, E. , Rempel, D. , Brewer, S. , Dennerlein, J. T. , van der Beek, A. , Tullar, J. , Amick, B. , Skivington, K. , Pinion, C. , 45th Annual Conference, "Effectiveness of OHS workplace interventions in the prevention of upper extremity MSDs: an update of the evidence," Association of Canadian Ergonomists, Montreal. (October 7, 2014).
68. Wu M, Landry J, Yen SC, Schmit B, Hornby G, Rafferty M. A novel cable-driven robotic training improves locomotor function in individuals post-stroke. *Conference Proceedings IEEE Medicine and Biology Society 2011*; 8342-8359.
69. Yen, S.C., Schmit, B., Wu, M. Using robotic assistance and resistance to improve gait symmetry in patients post stroke. Neuroscience 2014, Washington DC, November 15-19, 2014. Academic.
70. Corkery MB, Price A, Rosenberg L. Right Cerebellar Tumor in a Patient Referred to Physical Therapy with Neck Pain. *Journal of Manual & Manipulative Therapy*. 2014; Electronic Publication <http://www.aaompt.org/education/conference14/presentations/> Presented at the AAOMPT Conference, San Antonio TX, October 2014
71. Corkery MB, Baxter C, Seitz A. Clinical Reasoning Utilizing Magnetic Resonance Imaging in a Patient with Shoulder Pain. *Journal of Manual & Manipulative Therapy*. 2014; Electronic Publication <http://www.aaompt.org/education/conference14/presentations/> Presented at the AAOMPT Conference, San Antonio TX, October 2014
72. Bohannon BD, Corkery MB. Resection of Anomalous First Ribs in a Competitive Swimmer with Thoracic Outlet Syndrome: A Case Report. *J Orthop Sports Phys Ther*. 2014;44(1):A73-A74. Presented at APTA, Combined Sections Meeting, Las Vegas, NV February 2014.
73. Flores AM, Tucker KL, Nelson J. Physical and functional side effects and physical therapy after cancer among men and women of Puerto Rican descent. June 2014. 7th Biennial Cancer Survivorship Research Conference, Atlanta, GA.
74. Flores AM, Stephenson R, Golshan M, Marques A*, Taber M*, Weinandy M*. Early PT education for pre-surgical breast cancer survivors: A preliminary pilot study. February 2014. APTA Combined Sections Meeting, Las Vegas, NV.

Local conferences and presentations.

1. Bartolomeo, C. , Lopes, V. , Tarsi, L. , Fitzpatrick, D. , Golub-Victor, A. , Research, Innovation and Scholarship Expo, Cultural influences and exercise parameters for community dwelling aging adults: A literature review, Northeastern University, Boston, MA. (March 2014).
2. Cicconi, J. , Courtade, C. , Ward, E. , Thomas, A. C. , Poster, The Relationship Between Balance and Concussion in a Dual-Task Paradigm, Research, Innovation and Scholarship Expo, Northeastern University, Boston, MA, Conference, Academic, Local, (April 10, 2014).
3. Corkery, M. , O'Rourke, B. , Viola, S. , Yen, S.-C. , Rigby, J. , Singer, K. , Thomas, A. C. , Poster, An examination of the association between altered lumbar motor control,

- joint hypermobility and low back pain in athletes, Research, Innovation and Scholarship Expo, Northeastern University, Boston, MA, Conference, Academic, Local, (April 10, 2014).
4. Day, L. , Kelly, D. , Kelly, P. , Kinnard, K. , Lepke, B. , Peabody, K. , Procholio, A. , Walker, G. , Wingate, K. , Research, Innovation and Scholarship Expo (RISE), Flipped Classroom Learning in a Gross Anatomy Lab, Northeastern University, Boston, MA. (April 2014).
 5. Dennerlein, J. T., Featured Speaker Harvard Club and the Massachusetts Chapter of the Fulbright Association., Ergonomics of the modern office: mobile technology to dynamic workstations, Fullbright Associations, Boston MA. (November 18, 2014).
 6. Dennerlein, J. T., Occupational Health Surveillance Seminar, Occupational physical activity in health care and construction: work's contribution to workers' weekly recommended levels of physical activity, Massachusetts Department of Public Health, Boston MA. (March 20, 2014).
 7. Fratto, T. , Tuttrup, K. , Thomas, A. C. , Poster, Are Neck Strength and Proprioception Risk Factors in Athletes Sustaining a Concussion?, Research, Innovation and Scholarship Expo, Northeastern University, Boston, MA, Conference, Academic, Local, Accepted. (April 10, 2014).
 8. Greenwood, K. C., Thakerbury, J., Lecture, Clinical Specialization, The Recognition You Deserve, NH APTA Evening Lecture Series, NH APTA, Manchester NH, Session, NonAcademic, peer-reviewed/refereed. (October 16, 2014).
 9. Hasson, C. J. (2014). Influence of actuator properties on learning to control a virtual limb.. Boston, MA: 40th Annual Northeast Bioengineering Conference.
 10. Hayward, L. M. , Donat, M. , Poster, Global Education: Preparation for Study Abroad and the Provision of Physical Therapy Services to Ecuadorian Orphans, RISE, NU, Boston, MA, Conference, Academic, Local, peer-reviewed/refereed, published in proceedings, published elsewhere, Accepted. (April 2014).
 11. Kiami, S., 8th Annual Falls Prevention Awareness Day, Interprofessional Falls Prevention Program in a Long Term Care Setting, Massachusetts Falls Prevention Coalition, Massachusetts State House. (September 23, 2014).
 12. Kiami, S., Amorin, O., Dunn, K., Iby, B., Vangel, L., NU RISE 2104, Development and Efficacy of Clinical Decision Making Skills with Digital Neurologic Case Studies, Northeastern
 13. Markowski, A. M., Poster, Exploring the Need for a Wellness Program Screening Tool., Fall Conference and Exposition, MA APTA, MA, Conference, Academic, State, peer-reviewed/refereed, Accepted. (November 2014).
 14. Nolan, D. C. (Presenter), Demonstration, Management of Plantar Heel Pain, APTA of MA Manual Therapy SIG, APTA of MA, Northeastern University; Boston, MA, Conference, NonAcademic, State, Invited. (July 16, 2014).
 15. Nolan, D. C. (Presenter), Lecture, 117th Boston Marathon Medical Coverage: April 15th, 2013, MGH Department of Orthopaedic Surgery Sports Medicine Conference, Sports Medicine Service, Boston, MA, Conference, Non-Academic, Local, Invited. (April 2014).
 16. Nolan, D. C. (Presenter), Lecture, Distal Lower Extremity Mechanics Influence on Running Injuries and Rehabilitation Implications, New England Sports and Orthopedic Rehabilitation Summit 2014: Advances in Rehabilitation of the Lower

- Extremity, Brown University / University Orthopedics, Providence, RI, Conference, Non-Academic, Regional, Invited. (April 5, 2014).
17. Nolan, D. C. (Presenter), Lecture, Exercise Trends in Sports Medicine: Optimizing Athletic Performance: Lower Extremity Injury Patterns & Prevention, Sports Medicine 2014: Imaging & Managing Athletic Injuries, MGH, Boston, MA, Conference, Non-Academic, National, Invited. (June 2014).
 18. Nolan, D. C. (Presenter), Lecture, Posterolateral Corner Injury of the Knee, MGH Sports Physical Therapy Grand Rounds, Sports Physical Therapy Service, Boston, MA, Conference, Non-Academic, Local, Invited. (September 12, 2014).
 19. Nolan, D. C. (Presenter), Oh, L. (Presenter), Lecture, Management of the Overhead Athlete, APTA of MA Shoulder SIG, APTA of MA, MGH / Brigham & Women's; Foxborough, MA, Conference, Non-Academic, State, Invited. (August 20, 2014).
 20. Nolan, D. C. (Presenter), Oh, L. (Presenter), Weisbach, C. (Presenter), Symposia, NonOperative & Post-Operative Management of Shoulder Instability: Integrating a Manual Therapy Approach, APTA of Massachusetts 2014 Annual Conference, APTA of Massachusetts, Norwood, MA, Session, Non-Academic, State, peer-reviewed/refereed, Accepted. (November 8, 2014).
 21. Nolan, D. C. (Presenter), Wong, J. (Presenter), Stevens, K. (Presenter), Lecture, Ankle Instability, MGH Department of Orthopaedic Surgery Sports Medicine Conference, MGH Sports Medicine Service, Boston, MA, Seminar, Non-Academic, Local, Invited. (November 2014).
 22. Watkins, M. , Markowski, A. M. , Poster, Can the Functional Movement Screen Identify Risk for Injury in the Recreational Dance Population? A Systematic Review., RISE Research Expo, Northeastern University, Boston MA, Other, Academic, Accepted. (April 2014).
 23. Watkins, M. , Markowski, A. M. , RISE Research Expo, Can the Functional Movement Screen Identify Risk for Injury in the Recreational Dance Population? A Systematic Review., Northeastern University, Boston MA. (April 2014).
 24. Watkins, M. K. , Markowski, A. M. , APTA of Massachusetts Annual Conference, Exploring the Need for a Wellness Program Screening Tool, APTA of Massachusetts, Norwood, MA. (November 8, 2014).
 25. Corkery M, Rigby R, Singer K, O'Rourke B, Viola S, Yen SC, Thomas A. An examination of the association between joint hypermobility and altered motor control in athletes. Northeastern University Research and Scholarship Exposition. Boston, MA. April, 2014.

Grants Submitted (\$2.35 million)**2014 External Funding: \$2,350,815 total direct costs requested with faculty as PI**

Agency	Title	Direct Costs	Faculty
NIH	Pieces Project 2 as requested by Dr. Vogt	\$5,815	Sikes
NIH	Virtual Aging of Muscle Dynamics and Motor Function (R01)	\$1,300,000	Hasson (PI)
NIH	A New Reinforcement Learning-Based Approach to Robotic Gait R. R21	\$275,000	Hasson (PI) Yen (Co-I)
NIH/NCI	The Moving On pilot study for acceptability and feasibility of pre surgical recruitment for an early enhanced education intervention for breast cancer survivors (R21 NIH/NCI)	\$285,000	Flores (PI)
Lupus Research Institute	Promoting Physical Activity (PA) and Exposure Assessment in Patients with Systemic Lupus Erythematosus (PULSE): A pilot study of a novel multimodal mobile intervention	\$299,000	Iversen (PI)
Doug Flute Foundation	Enabling Young Athletes with Disabilities to Become Valued and Successful Members of the US Youth Soccer Family	\$12,000	Hayward (PI)
NIH/NIAMS	Improving Recurrent Ankle Sprains through Error Driven Gait Rehabilitation (NIAMS R03)	\$119,000	Yen (PI)
NASA	Assessment of High Performance EVA Glove (HPEG) injuries using finite element analysis	\$55,000	Dennerlein (PI)
NIH/SBIR	iDART: interactive Daily Activity Robotic Therapist	\$32,000	Hasson – Yen (PIs)
Denta Quest Foundation	Interprofessional CurbSide Consults	\$2,000	Greenwood
2014 Society for Simulation in Healthcare	Development of an innovative educational process to educate debriefers on common outcomes and consistent communication during interprofessional team simulation experiences	\$5,000	Greenwood (PI)
Boston Children's Hospital, Orthopedics Research	Development and Testing of a Pediatric Shoulder Dysfunction Measure	\$8,000	Iversen (PI)

Funded Grants

2014 External Funding: Approximate Total direct costs for 2014 \$1,08

Agency	Title	2014 Direct Costs	Faculty
National Institute for Occupational Safety and Health	Randomized Controlled Trial of Whole Body Vibration Intervention in Truck Drivers	\$450,000	Dennerlein (PI)
Alpha Foundation	Whole body vibration exposure and injury prevention of heavy equipment operators in coal mines	\$300,000	Dennerlein (PI)
National Institute for Occupational Safety and Health	HSPH Center for Work Health and Wellbeing. Project B	\$140,000	Dennerlein (PI)
National Institute for Occupational Safety and Health	Center for Construction Research and Training: Development and Evaluation of Contractor Safety Pre-Qualification Tool.	\$160,000	Dennerlein (PI)
National Institute for Occupational Safety and Health	HSPH Center for Work Health and Wellbeing. Project Administration Core	\$11,000	Dennerlein (PI)
National Institute for Occupational Safety and Health	Center for Construction Research and Training: Enhancing Safety Climate through Leadership.	\$15,000	Dennerlein (PI)
Denta Quest Foundation	Creation and Implementation of an Educational Module in Doctor of Physical Therapy Curriculum to Promote Oral Health Screening and Collaborative Interprofessional Patient Care	\$2000	Greenwood Markowski
Wellesley Congregational Church	A Place Called Home: Security for Abandoned Ecuadorian Children with Severe Disabilities	\$2,500	Hayward
Eastern Bank Charitable Foundation	Support for Professional Development of an Ecuadorian Physical Therapist to come to Boston	\$1,000	Hayward

2014 Internal Funding: Approximate

Program	Title	\$	Faculty
TIER 1 Seed Grant/Proof of Concept	A New Paradigm for Robotic Gait Rehabilitation Based on Reinforcement Learning	\$50,000	Hasson Yen (PIs)
Northeastern University Provost Grant	Interprofessional Competence in Co-operative education (IPE-COOP): A Pilot Study	\$14,672	Nippins (PI) Greenwood (Co-PI) Iversen
Advancing Undergraduate Teaching and Learning at Northeastern	From the Slices to the Loaf: Using 3-D printing to enhance learning and clinical application of cross-sectional neuroanatomy and diagnostic imaging	\$10,000	Markowski - Sikes
Undergraduate Research and Creative Endeavors Award	An examination of the association between neuromuscular control of the core during functional movements, and knee pathologies in athletes	\$1000	Corkery
Undergraduate Research and Creative Endeavors Award	Cultural Influences and Exercise Parameters for Community Dwelling Adults: A Literature Review and Community	\$1000	Fitzpatrick Golub- Victor
Undergraduate Research and Creative Endeavors Award	Early PT education for pre-surgical breast cancer survivors A preliminary pilot stud	\$1000	Flores
Northeastern University Provost Undergraduate Research Program	The Voice of the Global Partner: Integration of Stakeholder Feedback in the International Service Learning Process	\$925	Hayward
Northeastern University CATLR Faculty Scholars Program		\$1500	Hayward