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.

Contents
Mission .........................................................................................................................................................1
Highlights from 2013 ...................................................................................................................................2
Description of research program ..................................................................................................................2
Growth with new faculty and new facilities! ........................................................................................................3
New grants! ....................................................................................................................................................3
Undergraduate research: .................................................................................................................................4
APPENDIX ...................................................................................................................................................7
Highlights from 2013

The Department of Physical Therapy, Movement, and Rehabilitation Sciences had an excellent year with regard to research in 2013. The department continued to grow with new faculty and research facilities. Researchers were very productive publishing their work and submitting new grants applications to expand our current activities in upcoming years. Highlights from the 2013 calendar year include

- Over 44 peer reviewed journal publications
- Over 89 peer reviewed conference abstracts, papers, and presentations
- Over 460 citations of works by tenure-track faculty with an average H-index of 8.1
- $6.97 million in direct costs for multi-year grants submitted to external agencies
- $1.42 million in direct costs for internally & externally funded research activities in 2013
- One new tenure-track faculty and the newly opened 950 ft² ADAMS Laboratory
- Over 5800 square footage of total research laboratory space

Description of research program

At the heart of the research is the success of the department’s faculty and their resources. The department has ten tenured/tenure-track and seventeen clinical faculty devoted to the department’s research mission. The department has over 5,800 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, 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 Institute, Sweden 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, and computer industries. Our faculty work with Alvin Ailey Dance Troup, Boston Dynamics (Robotic), Local Construction Companies (Gilbane, Suffolk, Shawmut, Skanska, and JMA), Mylan Limited (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).

**Growth with new faculty and new facilities!**

The department’s research expanded with Shaw Bronner PT, PhD, OCS, who joined the department as an Associate Professor in September 2013. Dr. Bronner directs the Analysis of Dance and Movement (ADAM, [http://www.adamcenter.net/](http://www.adamcenter.net/)) research laboratory, which is dedicated to the study of human movement and dance, examining human movement from many perspectives including biomechanics, neuroscience, ergonomics, epidemiology, injury, and prevention and rehabilitation. Dr Bronner’s ADAM laboratory has over 900 square feet on the 4th floor of Richards Hall. The laboratory endeavors to demonstrate the art in science as well as scientific applications in art.

For 2014, searches for three new tenured and tenure-track faculty members are in progress. These searches will expand our research in neurology, movement and rehabilitation sciences, and occupational biomechanics and ergonomics.

**New grants!**

Drs. Christopher Hasson and Sheng-Che Yen in collaboration with Dr. Robert Platt in the College of Computer and Information Science, recently received an Interdisciplinary Tier 1 Seed Grant to fund a project titled “A New Paradigm for Robotic Gait Rehabilitation Based on Reinforcement Learning” The goal of this project is to improve the effectiveness of robotic gait training for patients after stroke – a leading cause of long-term disability. In this project they introduce a new approach based on reinforcement learning principles. The study aims to show that this approach produces superior learning of a new gait pattern compared to the current state-of-the-art approach. After stroke, gait patterns are typically asymmetrical, slow, and inefficient. Recovery of a healthy gait is critical for restoring quality of life. Robotic gait rehabilitation is a potentially cheaper and more effective alternative to therapist-guided rehabilitation.
Dr. Dennerlein was awarded a 4-year $2.1 million R01 project “Randomized Controlled Trial of Whole Body Vibration (WBV) Intervention in Truck Drivers”, funded by the National Institute for Occupational Safety and Health (www.cdc.gov/niosh). Through the use of a new and innovative seat suspension technology, an engineering control that substantially reduces exposure to WBV, this proposal will determine if reducing the intensity of WBV exposures improves the severity of low back pain in US long-haul trucker drivers. Truck drivers suffer from numerous health issues, predominantly musculoskeletal disorders in the low back that have been strongly associated with exposure to whole body vibration (WBV). The new and innovative suspension technology provides a seminal opportunity to use an RCT design to determine whether substantially reducing WBV exposures has an effect on low back pain outcomes. Project collaborators include researchers at the University of Washington and Connecticut as well as industrial partners at Bose and Schneider National.

Undergraduate research:
The Department has been extremely active engaging undergraduate students in research ensuring that we integrate our research and education missions. For the 2013-2014 academic year, 6 Provost’s Undergraduate Research Grants were awarded to student projects in the department. Here are some highlights from this year’s projects:

Winner of the 2014 RISE Health Science Undergraduate Award

Early PT education for pre-surgical breast cancer survivors: A pilot study
Marin Little Emily Nasson Gallagher Lucy Burrage, PI Ann Marie Flores Working with Rebecca Stephenson in the Rehabilitation Services and Mehran Golshain of the Breast Surgical Services at Brigham and Women’s Hospital and Dana Faber Cancer Institute, this pilot project evaluated the effects of early physical therapy on functional outcomes for cancer among pre-surgical breast cancer survivors. The project was funded by a small grant from the America Physical Therapy Association Section on Women’s Health. Other winners of RISE awards can be found online through the RISE website here at http://www.northeastern.edu/rise/what-is-rise/awards/

An examination of the association between altered lumbar motor control, joint hypermobility and low back pain in an athletic population
Brittany O’Rourke, Joseph Rigby, Kevin Singer, and Samantha Viola PI Marie Corkery and Adam Thomas
The goal of this research is to investigate whether an association exists between low back pain in an athletic population and alterations in lumbar motor control and joint hypermobility. They team hypothesizes that athletes who have signs of joint hypermobility and decreased motor
control will be more likely to experience low back pain. Through their extensive research, they have found that joint hypermobility may lead to increased risk for injury in the lower extremities in athletes; however, there is a gap in research regarding its relationship to low back pain in athletes.

Cultural Influences & Exercise Parameters for Community Dwelling Aging Adults

_Cara Bartolomeo, Veronica Lopes, and Lauren Tarsi_ PI Diane Fitzpatrick and Ann Golub-Victor

The burgeoning of a vastly diverse older adult population, with the fastest growing segment being age 85 and older, challenges our society to utilize our health care resources in the most effective manner to foster optimal aging. To achieve the best quality of life in the physical, psychological and social domains in the most cost efficient manner presents a challenge to all involved in health care. The purpose of this research is to design a culturally appropriate, evidence-based exercise program for older adults living in a local, urban affordable housing community and to investigate the impact of culturally appropriate exercise programs on participation and outcomes. The researchers will be using convenience sampling to recruit participants for this project.

An Integrated Educational Model: Evaluation, Enhancement, and Best Practices to Sustain an International Service Learning Partnership

_Shah Nirali and Marisa Brawerman, PI: Lorna Hayward_

The research design relies on a mixed method approach, collecting both qualitative and quantitative data to address the major research questions. To capture data on DPT student development of cultural competence a survey is administered pre/post travel to Ecuador. The title of the survey is Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals-Student Version©. Additional data will be collected via focus groups with the students to understand the professional and personal development experienced through their international study abroad. To understand the community partner perspective on the global relationship with the NU DPT student team, they will conduct 6 one-on-one interviews with key staff and then survey the remaining staff (25 people) working at both locations in Ecuador. The purpose of the data collection is to capture student learning and stakeholder perceptions of benefits and drawback of global international study abroad programming.

Impairments in scapular muscle thickness during submaximal contraction support motor control deficits in individuals with scapular dyskinesis

_Caralyn J. Baxter PI Ameek L. Seitz_

Shoulder disorders are the third most common musculoskeletal disorder in the United States and cost the healthcare system billions of dollars each year. Results of this project will lead to improvements in rehabilitation to restore health related quality of life and maximize functional independence. This study aims to determine whether scapular muscle strength and changes in
muscle morphology are related to dyskinesis. The team hypothesizes that individuals with scapular dyskinesis will demonstrate decreased lower trapezius and serratus anterior muscle strength and decreased change in thickness with contraction as compared to healthy counterparts. Additionally, they anticipate a strong relationship between change in muscle thickness and isometric strength. The results of this study will provide evidence regarding the specific mechanisms of abnormal shoulder motion and assist in directing optimal treatment and injury prevention programs.

Improving Control of a Virtual Arm with Vibrotactile Feedback

*Meredith Rogazzo PI Christopher J. Hasson*

While virtual limbs have been used previously, these have simulated a very limited range of “force-control” tasks that involve little or no movement, and provide limited sensory feedback. The purpose of our research project is to determine whether human control of a virtual limb can be improved with vibrotactile feedback. Our central hypothesis is that using vibrotactile feedback to signal virtual arm motion will improve virtual limb control, but only when the vibration is frequency modulated rather than amplitude modulated. The rationale is that proprioceptors in the body transmit their information by modulating the frequency of action potentials, and therefore stimulating these sensors with frequency modulated vibration should be most compatible with the body’s natural mode of information transmission. This study will have broader impacts on the fields of motor learning, motor control, and rehabilitation. At the study’s completion we will know if vibrotactile feedback can improve the control of virtual limbs. The practical application of this research is to improve neuromotor training techniques for users of prosthetics or patients with neuromuscular injuries.

Learning from Exploration: A Reinforcement Approach to Gait Rehabilitation

*Christine Hoyt and Stephanie Wang PI: Sheng-Che Yen and Christopher Hasson*

The purpose of this study is to compare the effects of reinforcement learning and supervised learning on the outcomes of gait training. The team hypothesizes that reinforcement learning will result in a longer retention and better transfer of gait training outcomes. There is currently an urgent need to implement an effective clinical strategy to improve gait outcomes in patients with stroke. Reinforcement learning is an approach that facilitates active learning through exploration by rewards or punishments. Specifically, reinforcement learning does not inform patients of the goal, so the patients need to explore movements to determine the goal.
APPENDIX

Contents
Appendix .................................................................................................................................................. 8
   Description of Laboratories .................................................................................................................... 8
   Analysis of Dance and Movement (ADAM) Laboratory (Shaw Bronner) ........................................... 8
   Occupational Biomechanics and Ergonomics Laboratory (Jack Dennerlein) .................................... 8
   Center for Cancer Survivorship Studies (Ann Marie Flores) ............................................................... 8
   Neuromotor Systems Laboratory (C.J. Hasson) .................................................................................... 9
   Teaching and Learning Innovation Program (Lorna Hayward) ......................................................... 9
   Neurorehabilitation Laboratory (Maureen Holden) .............................................................................. 9
   Rehabilitation and Epidemiology Trainee Program (Maura D. Iversen) ...........................................(10
   Biomotion Research Laboratory (Amee Seitz) ...................................................................................... 10
   Neurophysiology Laboratory (Robert Sikes) ......................................................................................... 10
   Laboratory for Locomotion Research (Sheng-Che Yan) .................................................................... 11
       Peer reviewed journal articles in 2013 ............................................................................................... 12
       Peer Reviewed Conference Abstracts, Presentations and Papers ................................................. 16
       Grants Submitted ($6.97 million) .................................................................................................. 25
       Funded Grants ($1,365,224 in direct costs in 2013) ................................................................. 28
Description of Laboratories

Analysis of Dance and Movement (ADAM) Laboratory (Shaw Bronner)
455 Richards Hall  750 square feet
The ADAM Laboratory is a research and teaching laboratory dedicated to examining human movement and dance through biomechanics, neuroscience, ergonomics, epidemiology, prevention and treatment of musculoskeletal injury, and enhancement of function. The ADAM Center believes interdisciplinary communication results in enhanced research inquiries and superior educational experiences for all students. We endeavor to demonstrate the art in science as well as scientific applications in art. Working with collaborators at the Alvin Ailey Dance Company the ADAM Center has developed occupational rehabilitation programs and practices for dance companies across the nation [http://www.adamcenter.net/](http://www.adamcenter.net/).

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/](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.

Neurorehabilitation Laboratory (Maureen Holden)
402 Robinson Hall 500 Square Feet
The Neurorehabilitation Laboratory’s mission is to develop new and more effective methods to rehabilitate patients with motor control deficits. In particular, we are interested in patients who have suffered neurological impairments following stroke or traumatic brain injury. We are involved in the study of sensorimotor contributions to motor control and learning, and in the development and application of newer technologies to assist neurorehabilitation. Projects include the study of motor learning and generalization using virtual environments, studies of hand motor control through the use of an instrumented glove in patients with stroke and healthy subjects, development of two novel rehabilitation devices (Smart Glove and NU Virtual Ankle and Balance Trainer) in collaboration with Prof. Constantinos Mavroidis, NU Engineering, and studies of motor retraining for patients with stroke in a rehabilitation setting in Japan, with Prof. Toshiaki Tanaka, University of Tokyo.
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. A central focus of our research is the design, evaluation and implementation of behavioral and rehabilitation interventions to improve health outcomes in persons with arthritis. Specific areas of expertise include studies of persons with rheumatoid arthritis, systemic lupus erythematosus, spinal stenosis and osteoporosis. Dr. Iversen’s work is funded by the National Institutes of Health, the Research & Education Foundation, Foundation for Physical Therapy, the Arthritis Foundation and Farnsworth Foundation.

Biomotion Research Laboratory (Amee Seitz)
404 Robinson 400 Square Feet
The mission of the Biomotion Research Laboratory is to investigate neuromuscular and biomechanical mechanisms, the efficacy of rehabilitation, and associated clinical outcomes of upper extremity musculoskeletal disorders related to aging and repetitive overuse during work or sport. The 400 sq. ft. dedicated research lab space, located within 404 Robinson Hall at Northeastern University, has state of the art equipment and dedicated space for motion analysis, ultrasound imaging, electroymyography, patient examination, and computer workstations for processing and analysis. The lab pursues collaborative research in the fields of biomedical engineering, orthopedics, rehabilitation medicine, motor control and human movement science to optimize patient outcomes, participation, and health related quality of life.

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 2013


Peer Reviewed Conference Abstracts, Presentations and Papers


9. Corkery, M. (Author & Presenter), Cesario, C. (Author), Annual Conference, "Corkery Marie - Factors associated with student PT clinical decision making and utilization of
thrust joint manipulation during clinical education," AAOMPT, Cincinatti, OH. (October 19, 2013).


40. Iversen M.D., Strength, Aerobic Conditioning Biomechanical Evaluation and Considerations in Adults with Knee OA. ACR/ARHP Annual Sections Meeting San


43. Larrieux, S. (Author & Presenter), Boston Scholar Recognition Dinner, Northeastern University Admissions & African American Institute, Northeastern University. (April 23, 2013).


50. Markowski, A. M., Bay State PT Rehab Symposium, "Integrating rehabilitative ultrasound imaging into spinal stabilization.," Bay State Physical Therapy Inc., Boston, MA. (May 2013).

51. Markowski, A. M., Watkins, M., Bogins, A. (Author & Presenter), Morris, L. (Author & Presenter), Perkins, L. (Author & Presenter), Rodgers, R. F., Northeastern University RISE Research Expo, "Effectiveness of a Comprehensive Workplace Wellness and
Exercise Program on Self-Reported Quality of Life Measures and Health Indicators," Northeastern University, Bosotan, MA. (March 2013).


76. Seitz, A. L. (Panelist), American Congress of Rehabilitation Medicine 2013 Annual Conference, "Starting and managing your own research laboratory," American College of Rehabilitation Medicine, Orlando, FL. Invited


86. Wang, Y.-C., Hart, D. L., Deutscher, D., Yen, S.-C., Mioduski, J. E., ISPRM 2013 7th World Congress of International Society of Physical and Rehabilitation Medicine, "Psychometric properties and practicability of the self-report Urinary Incontinence Questionnaire," International Society of Physical and Rehabilitation Medicine, Beijing, China.

87. Watkins, M. Markowski, A. M., Bogins, A. (Author & Presenter), Morris, L. (Author & Presenter), Perkins, L. (Author & Presenter), Rodgers, R. F., Northeastern University RISE Research Expo, "Effectiveness of a Comprehensive Workplace Wellness and Exercise Program on Self-Reported Quality of Life Measures and Health Indicators," Northeastern University, Boston, MA. (March 2013).

## Grants Submitted ($6.97 million)

### 2013 External Funding:
- **$6,965,533** total direct costs requested
- **$5,450,756** with faculty as PI or Co-PI
- **$2,438,041** funded

<table>
<thead>
<tr>
<th>Agency</th>
<th>Title</th>
<th>Direct Costs</th>
<th>Faculty</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institute for Occupational Safety and Health</td>
<td>Randomized Controlled Trial of Whole Body Vibration Intervention in Truck Drivers</td>
<td>$1,694,028</td>
<td>Dennerlein (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td>NIH</td>
<td>Virtual Aging: An Original Approach to Understanding How Altered Muscle Dynamics Affects Movement Control in Older Adults</td>
<td>$900,000</td>
<td>Hasson (PI)</td>
<td>Impact Score 44 (38%)</td>
</tr>
<tr>
<td>Center for Construction Research and Training (NIOSH)</td>
<td>Development and Evaluation of Contractor Safety Pre-Qualification Tool</td>
<td>$811,180</td>
<td>Dennerlein (PI)</td>
<td>Pending</td>
</tr>
<tr>
<td>Patient Centered Outcomes Research Institute (PCORI)</td>
<td>Triggering Options for Urban Communities with Hypertension (The TOUCH Project)</td>
<td>$685,000</td>
<td>Hayward (Co-PI 15%)</td>
<td>Not Funded</td>
</tr>
<tr>
<td>Alpha Foundation</td>
<td>Whole body vibration exposure and injury prevention of heavy equipment operators in coal mines</td>
<td>$603,535</td>
<td>Dennerlein (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td>NIH</td>
<td>Evidence-Based Rehabilitation of Rotator Cuff Tears: Neuromuscular Mechanisms</td>
<td>$589,993</td>
<td>Seitz</td>
<td>Impact Score 34</td>
</tr>
<tr>
<td>NSF</td>
<td>Robotic Reinforcement: A New Approach for Robotic Gait Rehabilitation After Stroke</td>
<td>$300,000</td>
<td>Hasson (PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td>Center for Construction Research and Training (NIOSH)</td>
<td>Enhancing Safety Climate through Leadership</td>
<td>$150,639</td>
<td>Dennerlein (Sub-PI)</td>
<td>Pending</td>
</tr>
<tr>
<td>NIH (NIAMS)</td>
<td>Improving ankle Improving recurrent ankle instability through error driven gait rehabilitation</td>
<td>$121,307</td>
<td>Yen (PI)</td>
<td>Impact Score 34. Pending</td>
</tr>
<tr>
<td>Canadian Institutes of Health Research</td>
<td>Predicting The Outcome Of Rehabilitation In Individuals With Rotator Cuff Tendinopathy</td>
<td>$102,636</td>
<td>Seitz</td>
<td>Not funded</td>
</tr>
<tr>
<td>Mylan Specialty L.P.</td>
<td>Evaluating the physical form of autoinjectors on the effectiveness of transmitting force and maintaining position and orientation of the injector</td>
<td>$91,962</td>
<td>Dennerlein (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td>HSPH Center for Work, Health and</td>
<td>Stand Up Against Sedentary Behavior: A Pilot Study In Office Workers</td>
<td>$17,149</td>
<td>Dennerlein (PI), John</td>
<td>Funded</td>
</tr>
<tr>
<td>Project Title</td>
<td>Description</td>
<td>Amount</td>
<td>Principal Investigator(s)</td>
<td>Funding Status</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
<td>--------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Wellbeing Pilot</strong></td>
<td>Simulation modeling of construction workers to estimate and mitigate the effects of individual mobility patterns on worksite-level interventions</td>
<td>$14,282</td>
<td>Dennerlein (PI), Manjourides (Co-PI)</td>
<td>Funded</td>
</tr>
<tr>
<td><strong>Association of Ecuadorians in New England</strong></td>
<td>A Place Called Home: Security for Abandoned Ecuadorian Children with Severe Disabilities</td>
<td>$14,085</td>
<td>Hayward (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td><strong>CIMIT</strong></td>
<td>Development of an innovative educational process to educate debriefers on common outcomes and consistent communication during interprofessional team simulation experiences</td>
<td>$10,000</td>
<td>Greenwood (PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td><strong>CIMIT</strong></td>
<td>Improving Patient Safety: Simulated Patient Approach to Facilitate Interprofessional Communication Among Future and Current Healthcare Providers</td>
<td>$10,000</td>
<td>Greenwood (PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td><strong>APTA Orthopedic Section Foundation</strong></td>
<td>Effectiveness Of A Rehabilitation Program Emphasizing Motor Control For Patients With Rotator Cuff Tendinopathy; A Randomized Clinical Trial</td>
<td>$8,182</td>
<td>Seitz (PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td><strong>Society for Simulation in Health care</strong></td>
<td>Development of an innovative educational process to educate debriefers on common outcomes and consistent communication during interprofessional team simulation experiences.</td>
<td>$5,000</td>
<td>Greenwood (PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td><strong>NIH (Boston University)</strong></td>
<td>Psychological Pain and Stress Mechanisms in an Adolescent Model of Physical Abuse</td>
<td>$3,778</td>
<td>Sikes (Sub-PI)</td>
<td>Not-funded</td>
</tr>
<tr>
<td><strong>The Village Church Outreach grants program</strong></td>
<td>Connection of People, Place and Profession</td>
<td>$2,000</td>
<td>Hayward (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td><strong>Eastern Bank Charitable Foundation</strong></td>
<td>Support for Professional Development of an Ecuadorian Physical Therapist to come to Boston</td>
<td>$1,000</td>
<td>Hayward (PI)</td>
<td>Funded</td>
</tr>
<tr>
<td><strong>NIH</strong></td>
<td>Providing Computer Accessibility and Tele-Rehabilitation for Physically Disabled</td>
<td>$500,000</td>
<td>Li (PI), Iversen (Co-I)</td>
<td>Pending</td>
</tr>
<tr>
<td><strong>NIOSH</strong></td>
<td>Modifying the Workplace to Decrease Sedentary Behaviour and Improve Health</td>
<td>$250,000</td>
<td>John (PI), Dennerlein (Co-I)</td>
<td>Pending</td>
</tr>
<tr>
<td><strong>NIH</strong></td>
<td>An Over-Ground Lower Body Robotic Exoskeleton for Gait Retraining After Stroke</td>
<td>$79,777</td>
<td>Mavorides (PI), Yen (Co-I)</td>
<td>Pending</td>
</tr>
</tbody>
</table>
### Internal Funding: $157,296 Total Requested
### $57,296 Funded

<table>
<thead>
<tr>
<th>Agency</th>
<th>Title</th>
<th>Direct Costs</th>
<th>Faculty</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeastern University Tier 1 Seed Grant</td>
<td>Development of an Adaptive Clinician-Friendly Virtual Rehabilitation System for Post-Operative Shoulder Therapy</td>
<td>$50,000</td>
<td>Seitz</td>
<td>Funded</td>
</tr>
<tr>
<td>Northeastern University Tier 1 Seed Grant</td>
<td>Boston Puerto Rican Cancer Survivorship Study</td>
<td>$50,000</td>
<td>Flores</td>
<td>Funded</td>
</tr>
<tr>
<td>Northeastern University Tier 1 Seed Grant</td>
<td>Robotic Reinforcement: A New Approach for Robotic Gait Rehabilitation after Stroke</td>
<td>$50,000</td>
<td>Yen &amp; Hasson</td>
<td>Not-funded</td>
</tr>
<tr>
<td>Northeastern University Tier 1 Seed Grant</td>
<td>Improving recurrent ankle instability through errordriven gait rehabilitation</td>
<td>$50,000</td>
<td>Yen</td>
<td>Not-funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>An examination of the association between altered lumbar motor control, joint hypermobility and low back pain in an athletic population</td>
<td>$847</td>
<td>Corkery Thomas</td>
<td>Funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>Impairments in scapular muscle thickness during submaximal contraction support motor control deficits in individuals with scapular dyskinesis</td>
<td>$998</td>
<td>Seitz</td>
<td>Funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>An Integrated Educational Model: Evaluation, Enhancement, and Best Practices to Sustain an International Service Learning Partnership</td>
<td>$1089</td>
<td>Hayward</td>
<td>Funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>Improving Control of a Virtual Arm with Vibrotactile Feedback</td>
<td>$1362</td>
<td>Hasson</td>
<td>Funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>Learning from Exploration: A Reinforcement Approach to Gait Rehabilitation</td>
<td>$2000</td>
<td>Yen &amp; Hasson</td>
<td>Funded</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>Cultural Influences and Exercise Parameters for Community Dwelling Aging Adults</td>
<td>$1000</td>
<td>Fitzpatrick and Golub-Victor</td>
<td>Funded</td>
</tr>
</tbody>
</table>
## Funded Grants ($1,365,224 in direct costs in 2013)

### 2013 External Funding: Total direct costs for 2013 $1,365,224

<table>
<thead>
<tr>
<th>Agency</th>
<th>Title</th>
<th>2013 Direct Costs</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institute for Occupational Safety and Health</td>
<td>Randomized Controlled Trial of Whole Body Vibration Intervention in Truck Drivers</td>
<td>$469,743</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>Alpha Foundation</td>
<td>Whole body vibration exposure and injury prevention of heavy equipment operators in coal mines</td>
<td>$301,125</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>National Institute for Occupational Safety and Health</td>
<td>HSPH Center for Work Health and Wellbeing. Project B</td>
<td>$142,332</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>National Institute for Occupational Safety and Health</td>
<td>Center for Construction Research and Training: Effectiveness of employee safety incentive programs in construction</td>
<td>$124,262</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>Mylan Specialty L.P.</td>
<td>Evaluating the physical form of autoinjectors on the effectiveness of transmitting force and maintaining position and orientation of the injector</td>
<td>$91,962</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>NSF</td>
<td>Evaluate the Effect of Multitouch Interaction on the Musculoskeletal System</td>
<td>$69,861</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>NIH (SUNY Upstate)</td>
<td>Anterior Cingulate Visceral Pain, Brainstem Afferents, Network Sensitization</td>
<td>$49,300</td>
<td>Sikes (sub-PI)</td>
</tr>
<tr>
<td>HSPH (NIOSH)</td>
<td>Interactions of Biomechanics and Psychosocial Stressors and MSDS*</td>
<td>$37,478</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>NIH (National Institute of Arthritis and Musculoskeletal and Skin Diseases)</td>
<td>Tai Chi and Knee Osteoarthritis</td>
<td>$18,570</td>
<td>Iversen (PI)</td>
</tr>
<tr>
<td>NIH</td>
<td>Comparison of Physical Activity Levels in Adults with Rheumatoid Arthritis and Gender Age Matched Health Adults.</td>
<td></td>
<td>Iversen (PI)</td>
</tr>
<tr>
<td>Agency</td>
<td>Title</td>
<td>2013 Direct Costs</td>
<td>Faculty</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>HSPH Center for Work, Health and Wellbeing Pilot</td>
<td>Stand Up Against Sedentary Behavior: A Pilot Study In Office Workers</td>
<td>$17,149</td>
<td>Dennerlein (PI), John (Co-PI)</td>
</tr>
<tr>
<td>Association of Ecuadorians in New England</td>
<td>A Place Called Home: Security for Abandoned Ecuadorian Children with Severe Disabilities</td>
<td>$14,085</td>
<td>Hayward (PI)</td>
</tr>
<tr>
<td>National Institute for Occupational Safety and Health</td>
<td>HSPH Center for Work Health and Wellbeing. Project Administration Core</td>
<td>$11,357</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>University of Washington &amp; State of Washington Safety Health Investment Projects</td>
<td>Randomized Controlled Trial of a Whole Body Vibration Intervention in Truck Drivers</td>
<td>$10,000</td>
<td>Dennerlein (PI)</td>
</tr>
<tr>
<td>APTA Section on Women’s Health</td>
<td>“Moving On” Pre-pilot to test acceptability &amp; feasibility of early PT education for breast cancer surgical candidates</td>
<td>$5000</td>
<td>Flores</td>
</tr>
<tr>
<td>The Village Church Outreach grants program</td>
<td>Connection of People, Place and Profession</td>
<td>$2,000</td>
<td>Hayward (PI)</td>
</tr>
<tr>
<td>Eastern Bank Charitable Foundation</td>
<td>Support for Professional Development of an Ecuadorian Physical Therapist to come to Boston</td>
<td>$1,000</td>
<td>Hayward (PI)</td>
</tr>
</tbody>
</table>