Washington University in St. Louis
School of Medicine

# 80 Years of the Program in Physical Therapy

ANNUAL REPORT 2022

# Contents



# Program in Physical Therapy

## 2022 by the Numbers

**Ranked #1**

**PT Program by U.S. News & World Report**

**90**

incoming DPT students for the class of 2025

**100%**

employment of WUPT21 graduates

**30**

active grants

**4**

clinical practice sites

**50,000+**

patient visits from Jan. – Dec. 31, 2022

# Welcome

**Gammon Earhart, PT, PhD, FAPTA,**
Associate Dean for Physical Therapy

The WashU Program in Physical Therapy, founded in 1942, is 80 years young this year! We've stayed young because we are continually learning from patients, research participants, trainees and colleagues. Check out the "Then and Now" facts throughout this report to see how far we've come in 80 years, and delve deeper to learn more about where we're headed next.

> "Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young."
>
> Henry Ford

## New Faculty Spotlight!

**Dale Thuet, PT, DPT, OCS,** joined our faculty in July. Dale, a PT09 alum, previously worked as a Clinic Associate at our O'Fallon clinical practice. In his faculty role, Dale is developing a new **orthopedic residency program** and will continue to work with patients, transitioning his patient care to our new @4240 location.

**Rebekah Lawrence, PT, PhD, OCS,** joined our Research Division faculty in August. Her research is in **Shoulder Biomechanics and Rehabilitation** and focuses on improving the quality of life for individuals with shoulder pain and those who have undergone rotator cuff repair surgery.

Program in Physical Therapy

## Then & Now

1942
**Department of Preventive Medicine Program in Physical Therapy**

2022
**Washington University in St. Louis Program in Physical Therapy**

**Wonhee Lee, Leonard Kim** and **Jason Lee,** all of PT25, at the 2022 White Coat Ceremony.


**Dr. Jessica Pittman** leads Equity Champion training for members of Washington University School of Medicine . Dr. Earhart was the first executive faculty member to go through the Equity Champion training.

# Diversity, Equity, Inclusion and Belonging

We aim to create an environment conducive for all Program members, not just to survive but to thrive academically, personally, and professionally.

In the year since Dr. Julian Magee joined the Washington University Program in Physical Therapy as Assistant Director of Diversity, Equity and Inclusion, a lot has happened. "We're definitely moving in the right direction," says Dr. Gammon Earhart, Associate Dean. "The class that entered last year was our most diverse ever, and this year's class continues that trend. Julian is doing great work and helping us continue to prioritize DEI efforts."

In fact, Magee helped the program gain national recognition by applying for and receiving the American Physical Therapy Association's Minority Initiatives Award. The award "recognizes programs accredited by the Commission on Accreditation in Physical Therapy Education that have successfully demonstrated ongoing initiatives to assist minority students for at least three consecutive years."

"We still have plenty of room for continued improvement, but through our application Julian told the story of how we've worked to scale up our diversity and equity efforts. Now we have some momentum, and this is a nice recognition of that," Earhart says. The $2,500 award will help fund the program's affinity groups, which offer learners who identify as Black, Indigenous and people of color (BIPOC), LGBTQIA+, and international students – and their allies – a supportive space to gather and discuss common issues.

Magee himself is modestly reserved about the Minority Initiatives Award. "This really isn't a point of celebration quite yet because there are still significant groups that are underrepresented throughout the profession," he says. "We're doing better, though, and I'm proud of the progress and investments the Program is making. I hope that other programs will want to see what we're doing and model their own efforts after ours. That kind of accountability helps keep us focused."

Among the program's recent efforts, Magee and Earhart became "Equity Champions." A program offered by the Washington University School of Medicine, Equity Champions come from all medical departments and divisions and are committed to understanding and dismantling systemic racism. As Equity Champions, Magee and Earhart participated in a weeklong training to implement the Understanding Systemic Racism (USR) curriculum in the Program in Physical Therapy. Their work culminated in a full-day USR retreat involving all faculty and staff throughout the program.

"I was very proud to participate as an Equity Champion with the Director of my program," Magee says. "Having Dr. Earhart walking beside me shows her commitment as a leader, and she was the first executive faculty member (department or program head) to go through the Equity Champions program. Also, the Program in Physical Therapy was the first under the School of Medicine umbrella to implement the curriculum, and it says so much that we have the top program leadership involved."

Earhart remembers the program's USR retreat as "a really inspiring day" that allowed plenty of opportunity for faculty and staff to ask questions and share thoughts and experiences. "It was a great day of learning and moving our awareness and efforts forward," she says.

Magee aims to help program faculty, staff and students become "anti-racist" and to be upstanders in the active sense of the term, as engaged individuals working to help promote underrepresented groups through policy change, educational opportunities and professional commitment. To that end, the program is identifying individuals in the areas of education, clinical practice and research to work with him in correcting systemic issues.

"Sustained, significant change takes time," Magee says. "We can be proud of what we've achieved so far, and we can be proud of the investment we're making through scholarships, support for underrepresented students and eliminating entry barriers to the profession. Our Program is about more than advancing the science of physical therapy – we're making our profession more equitable for physical therapists and the people we serve."

WUPT faculty, staff, students and family joined the School of Medicine and OUTmed at the June St. Louis PrideFest parade to celebrate, support and advocate for the LGBTQIA+ community.

# Education

The mission of the Education Division is to prepare exceptional practitioners and researchers who contribute to the practice of physical therapy and to the research of movement science.

The Washington University Program in Physical Therapy no longer has "students." Instead, it has "learners." And not just any learners – according to the Program's new curriculum, now in its second year, the goal is to "become master adaptive learners."

To do so, the Program overhauled its curriculum and last year introduced the incoming class to a whole new paradigm in which traditional classes and exams are out and experiential, interprofessional learning is in. This means that the learners are hands-on from the start, under the guidance of integrated teams of faculty who demonstrate the various aspects of physical therapist practice and the science of movement in a coordinated fashion.

During the three-year educational program, learners move through four distinct phases: learning as a professional, promoting health through movement, optimizing movement, and practicing as a professional. Instead of only high-stakes, summative exams along the way, the learners participate in formative assessment that identify strengths and weaknesses to guide their learning. Learners then drive the work with faculty and peer mentors to master and demonstrate their learning, and ultimately their competence in the art and science of physical therapy.

**Lorenzo Nave**, PT25, with his clinical instructor, **Chris Peterson** and WUPT Faculty **Nancy Bloom** during a patient visit at the 4240 Clinical Practice location.

Putting the new curriculum in place has been a heavy lift for faculty, especially during the pandemic. However, Steven Ambler, Associate Professor and Division Director of Education, says that as each Phase of the curriculum is implemented it takes some of the load off as we shift from the initial build work to our continuous quality improvement cycle.

"One of the best aspects of the new curriculum is the integrated content," Ambler says. "With faculty delivering content collaboratively within modules, we've integrated content delivery around our outcomes focused on optimizing movement. The greatest challenge has been challenging our beliefs about learning and assessment. This type of change is not just moving content around. It requires all of us to embrace new ways of teaching and learning. If we did not have a group of faculty and learners that are committed to each other and ultimately to their patients I don't know how we would be doing it."

Ambler also notes that last year's learners, the first class to use the new curriculum, were critical to helping faculty hone the process through their feedback. "When you start something new like this, the first class to experience it has fewer peers to turn to for advice, but we've seen the learners who are now in the second year of the curriculum really take the first-year learners under their wings and build community together. It's been wonderful to see."

Elisha Li is one of those second-year learners. She was impressed by an informational session about the program that Ambler presented at the University of Illinois Urbana-Champaign where she earned her bachelor's degree. "Instead of just telling us what prerequisites we needed and what classes we'd take at Washington University, Dr. Ambler spent the time explaining the philosophy and teaching style we could expect,"

she says. "He mentioned the revamped curriculum, and it sounded like it would really fit my learning style. It's practical and realistic for learning how physical therapy works as a profession."

Despite her enthusiasm, Li notes that shifting from a more traditional structure of classes and written exams to the Program's curriculum model was an adjustment. "It's just so different from what the undergraduate experience was like," she says. "But even in the first few weeks, I realized I'm retaining more information and blending concepts together like you have to do in the real world."

Another adjustment involved letting go of the stress surrounding traditional exams. "School is always somewhat stressful, but now a single class can't knock you out of the game," Li says. "We get multiple chances to show our learning, and if you need to try again you can. That's big! But the challenge is in piecing everything together and learning that it's okay to tell the faculty you feel ready to be assessed again."

That collaborative environment between learners and faculty is a key component of the new curriculum. Dr. Carey Holleran, Assistant Director of Student Assessment and Program Evaluation, refers to it as a "co-constructed learning environment." Communication is a two-way street with learners telling faculty what they need in order to be more successful. "Learners provide feedback to faculty on how teaching and content organization can be improved to support them learning in a new structure," she says.

Holleran received a $5,000 internal grant for work that will help collect, analyze and share data on a novel workplace based assessment aiming to support ongoing learning and improvement in the clinical environment. "The most important element of our curriculum is that it is learner-centered," Holleran says. "It's about providing mechanisms that mirror the ones they will use in clinical practice to continue to advance health. We want to create flexibility and opportunity for learners to develop into 'master adaptive learners' who have the ability to learn and innovate within their clinical practice."

## Class Size
Then & Now

1942

**10**

Students

2022

**88**

DPT

**10**

Movement Science PhD

**2**

Residents

**Dr. Carey Holleran** received an internal grant for work that will help collect, analyze and share data on a novel workplace based assessment aiming to support ongoing learning and improvement in the clinical environment.

**Elisha Li** of PT24 studying before an assessment.

Members of the Lang lab- PhD student **Dr. Jeff Konrad, Dr. Carey Holleran** and **Dr. Catherine Lang**, review sensor data.

# Research

The mission of the Research Division is to understand how the movement system is affected by disease, injury, lifestyle, development and aging, and how movement can be used to promote health by enhancing physical function, activity and participation across the lifespan.

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Dr. Catherine Lang, Washington University Program in Physical Therapy Professor and Associate Director of the Movement Science Program, expected to confirm her hypothesis 10 years ago. Instead, her study on the effects of varying amounts of physical therapy for people recovering from stroke uncovered a different and surprising result that informed her research going forward. In seeing the opportunity and revising her research question based on that initial study, which some might have considered a failure, Lang propelled her work forward in an important new direction.

"She's really an excellent example to our learners and other researchers of how to glean the importance of research findings, regardless of the outcome, and move on to the next important set of questions," says Dr. Linda Van Dillen, "Catherine and her group carefully examine their data and, based on the findings, determine what the next important questions are for improving patient care."

In this case, instead of confirming that upper limb capabilities in persons with stroke improved overall with greater doses of rehabilitation, Lang and her group found that "although people changed on their capacity for upper limb activity in the clinic, no one changed their performance of activity in everyday life, as measured with wearable sensors." The disparity between what someone can do in the clinic and real-world activity was stunning, and Lang set out to understand it and find ways to help physical therapists return patients to better function at home, not just in the clinic.

Lang's work on the topic was recognized with a 2022 MERIT Award from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, part of the National Institutes of Health. The $2.7 million award will support her ongoing work using wearable motion sensors in stroke rehabilitation. The award's objective is "to provide long-term grant support to investigators whose research competence and

productivity are distinctly superior and who are highly likely to continue to perform in an outstanding manner."

"This award shows that Catherine and her group truly pursue research questions with the goal of improving practice and patient outcomes," Van Dillen says. "She has contributed tremendously to our Program and the profession through her passion and excellence, and the award gives her the resources to sustain that work."

Lang used motion sensors outside the clinic in her early research to help quantify exactly what the "dose" of rehabilitation was for patients. Those who exercised at home would have higher doses of rehab than others, which she expected would correlate to recovery. However, the sensor data showed that most patients were not practicing their exercises or moving more at home. "We really found ourselves in a different place," she says. "What does this mean for communication and interventions for these patients?"

The wearable sensors that have become central to Lang's work are convenient, accurate, and economical, allowing clinicians to quantify movement in daily life. The research extends to patients with a variety of neurological deficits. "Our ultimate goal is to create personalized, effective and efficient interventions that will improve daily life. Now we're looking at how we can collect information on patients movement at home and how we can use sensors in everyday clinical practice."

Lang and her colleagues now plan to connect sensor data to individual perceptions of improvement. During a five-year study period, almost 350 patients from across the country will enroll when they begin rehabilitation, and the research team will follow them at specific points over the course of three months of treatment. Patients will self-report barriers to movement, activities and their perceived improvement, allowing Lang to compare perception to quantifiable reality.

At the same time, Lang hopes to develop and test a dashboard that will communicate the wearable sensor information simply and effectively to patients, families, and clinical providers. Having this information in an easily-interpretable format will help clinicians develop better treatment plans and help patients and families follow through with those plans.

Lang says that "on a good day" she thinks her work is beginning to inform practice and optimize outcomes. "We're taught that we administer a test to the patient in the clinic, and if they do well we assume they're doing well at home. But that isn't necessarily the case, and I think this work has raised awareness around that. So now we need to determine creative ways to capture more information and fit that into our clinical work. Most of all, I hope our work continues to push clinicians to think differently about how we can best deliver care."

Wearable motion sensors used by the Lang lab research studies.


## Research

Then & Now

1942

**No formal research.**

2022

**Movement Science Research Center, over $3M annually in grant funding from the NIH, 12 different areas of research focus.**

# Newly Awarded Grants

## Funded in Fiscal Year 2021 – 2022

### Jacob McPherson, PhD

**INTRASPINAL MICROSTIMULATION FOR MULTI-MODAL REHABILITATION**

*Funded by NIH R01*

Spinal cord injury (SCI) often results in motor impairments and neuropathic pain. These conditions are related to changes in neural activity in regions of the spinal cord that control motor output and sensory processing. Generally, there is too little neural transmission in spinal motor pathways below the lesion, whereas there is excessive, inappropriate neural transmission in pain pathways below the lesion. It has previously been shown that delivery of small amounts of electrical current directly to motor regions of the spinal cord can increase neural transmission in motor pathways. The overall hypothesis of this proposal is that intraspinal microstimulation for motor rehabilitation can be designed to simultaneously reduce transmission in spinal pain pathways.

### Laura McPherson, PT, DPT, PhDD

**SUPERCOMPUTER-BASED MODELS OF MOTONEURONSFOR ESTIMTING THEIR SYNAPTIC INPUTS IN HUMANS**

*Funded by NIH R01*

Motor commands to motoneurons have three components, excitation, inhibition and neuromodulation. Our goal is to implement motoneuron models on supercomputers and use the resulting computational power to reverse engineering motor neuron firing patterns to identify these three components in humans. Findings will provide insight into neural control of movement in the intact nervous system and following neurological injury.

**CRCNS: US-FRENCH RESEARCH PROPOSAL: IMPROVED SELECTIVITY FOR BIOELECTRONIC THERAPIES WITH INTRAFASCICULAR STIMULATION**

*Funded by NIH Subaward*

Electrical stimulation technology for activating small groupsof peripheral nerve fibers can form the foundation of bioelectronic systems to influence metabolic processes, enhance immune system function, regulate gastrointestinal activity, or treat a variety of medical conditions. This project will enhance the developing stimulation strategies that can selectively activate small of fibers that produce the desired clinical effect without producing undesirable side effects.

### Gretchen Meyer, PhD

**MEDIATED REGULATION OF SKELETAL MUSCLE FUNCTION AND METABOLISM**

*Funded by NIH RO1*

The goals of this project are to study SWELL1 regulation of AKT-mTOR signaling in skeletal muscle via plasma membrane and lysosomal mechanisms.

**TARGETED DELIVERY OF A PROANGIOGENIC AND PROMYOGENIC PROTEIN FOR REGENERATION OF DIABETIC ISCHEMIC LIMBSM**

*Funded by NIH RO1(GUAN)*

Current stem cell therapy for critical limb ischemia cannot rapidly restore blood perfusion in skeletal muscles, largely due to inferior cell survival and paracrine effects under the harsh ischemic conditions. Accomplishment of the proposed research will create a multifunctional stem cell delivery system that addresses current limitations leading to rapidrestoration of blood perfusion.

### Kerri Rawson, PhD, MS and Gammon Earhart, PT, PhD, FAPTA

**MOVING MINDFULLY:A MBSR-CENTERED APPROACH TO FREEZING IN PARKINSON DISEASE**

*Funded by NIH R34*

Freezing of gait (FOG) is a severe motor disturbance that prevents people from stepping normally and is associated with anxiety, frustration, sedentary behaviors, poorer quality of life, and falls. Mindfulness-Based Stress Reduction (MBSR) is an evidence-based practice that creates a culture to reduce stress and anxiety by increasing conscious awareness and self-compassion. In this grant, we are developing a mindfulness-based walking intervention to address both mental health and mobility challenges that constitute FOG.

### Susan Racette, PhD

**MIND YOUR HEART INTERVENTION FOR AMERICAN INDIAN WOMEN**

*Funded by the National Heart, Lung, and Blood Institute*

Premature deaths due to cardiovascular disease are increasing among American Indian women. This 3-year clinical trial planning project involves adaptation and investigation of the feasibility, acceptability, and initial efficacy of a multi-component cardiovascular health promotion intervention for American Indian women living in the southeast.

**LEGACY EFFECTS OF CALERIE, A 2-YEAR CALORIE RESTRICTION INTERVENTION ON HALLMARKS OF HEALTHSPAN AND AGING**

*Funded by National Institute on Aging*

Calorie restriction delays the onset and progression of age-related diseases in numerous model organisms and was shown to have numerous cardiometabolic and physiologic benefits in the multi-center CALERIE (Comprehensive Assessment of Long-term Effects of Reducing Intake of Energy) trial. It is unknown, however, whether two years of calorie restriction results in sustained improvements in biological, phenotypic, and functional hallmarks of human aging. Participants from the CALERIE trial will complete assessments 10-15 years after their trial participation to determine whether legacy benefits are present.

# Continuing Awards

## Ryan Duncan, PT, DPT, MSCI

**LOW BACK PAIN IN PARKINSON DISEASE**

*Funded by NIH K23*

## Gammon Earhart, PT, PhD, FAPTA

**WALKING AND MHEALTH TO INCREASE PARTICIPATION IN PARKINSON DISEASE (WHIP-PD)**

*Funded by NIH RO1*

**SING FOR YOUR SAUNTER: USING SELF-GENERATED RHYTHMIC CUES TO ENHANCE GAIT IN PARKINSON'S**

*Funded by NIH R61*

**SPARX STUDY IN PARKINSON DISEASE OF EXERCISE PHASE 3 CLINICAL TRIAL: SPARX3**

*Funded by NIH U01*

**GRACEFUL GAIT: COMMUNITY-BASED BALLET TO IMPROVE GAIT AND BALANCE IN OLDER ADULTS**

*Funded by National Endowment for the Arts*


PhD student **Lauren Tueth** with her poster titled " Sing for your Saunter: Musical Cues to Improve Gait in People with Parkinson Disease with and without Dementia" at the 2022 ASNR Conference.

## Marcie Harris Hayes, PT, DPT, MCSI

**COMPARISON OF MOVEMENT PATTERN TRAINING AND MANUAL THERAPY FOR PREARTHRITIC HIP DISORDERS: A PILOT RANDOMIZED CLINICAL TRIAL**

*Funded by the Foundation for Physical Therapy Research*

## Michael Harris, PhD

**MUSCLE GEOMETRY AND ITS INFLUENCE ON FUNCTION IN PATIENTS WITH DEVELOPMENTAL DYSPLASIA OF THE HIP**

*Funded by NIH K01*

**THE BIOMECHANICAL CONSEQUENCES OF FEMORAL VERSION DEFORMITY AND SURGICAL CORRECTION IN PATIENTS WITH HIP DYSPLASIA**

*Funded by The American Society of Biomechanics (ASB)*

## Mary Hastings, PT, DPT, MSCI, ATC

**MUSCLE, JOINT AND MOVEMENT DETERIORATION CONTRIBUTING TO NEUROPATHIC FOREFOOT DEFORMITY**

*Funded by NIH RO1*

## Catherine Lang, PT, PhD FASNR, FAPTA

**ISCHEMIC CONDITIONING AS A NEURORECOVERY AGENT FOR STROKE**

*Funded by NIH RO1*

**TRANSLATION OF IN-CLINIC GAINS TO GAINS IN DAILY LIFE AFTER STROKE**

*Funded by NIH RO1*

**VARIATION IN EARLY MOTOR FUNCTION IN AUTISM, CEREBELLAR INJURY AND NORMAL TWINS**

*Funded by NIH RO1*

## Jacob McPherson, PhD

**INTRASPINAL MICROSTIMULATION FOR MULTI-MODAL REHABILITATION**

*Funded by NIH RO1*

**RESTORATIVE NEUROPLASTICITY IN BRAINSTEM MOTOR PATHWAYS TO ENHANCE REHABILITATION**

*Funded by American Heart Association*

## Laura McPherson, PT, DPT, PhD

**CRCNS: IMPROVING BIOELECTRONIC SELECTIVITY WITH INTRAFASCICULAR STIMULATION**

*Funded by NIH-Florida International University Subaward*

WUPT students and Clinical Staff volunteered at the MO Special Olympics Fun Fitness event in March.

## Gretchen Meyer, PhD

**PROMOTING MUSCLE REGENERATION THROUGH ADIPOSE SIGNALING**

*Funded by NIH R01*

**FAT-MUSCLE CROSS-TALK IN THE INJURED ROTATOR CUFF**

*Funded by NIH R21*

**ROTATOR CUFF DEGENERATION AND REPAIR**

*Funded by NIH RO1*

## Susan Racette, PhD

**PERSONALIZING EXERCISE FOR PARKINSON'S DISEASE**

*Funded by The Foundation for Barnes-Jewish*

**ENHANCING THE CALERIE NETWORK TO ADVANCE AGING BIOLOGY**

*Funded by NIH R33*

**PRIDE SUMMER INSTITUTE IN CARDIOVASCULAR GENETIC EPIDEMIOLOGY**

*Funded by NIH R25*

## Linda Van Dillen, PT, PhD, FAPTA

**IMPACT OF HIP STRUCTURE AND FUNCTION ON THE CLINICAL PRESENTATION OF LOW BACK PAIN**

*Funded by the American Physical Therapy Association*

## Jennifer Zellers, PT, DPT, PhD

**DIABETES-RELATED TENDON CHANGES: INTEGRATING EX VIVO AND IN VIVO APPROACHES**

*Funded by NIH F32*

Orthopedic Physical Therapist, **Sydney Schack-Farnell**, with patient **Stanley Stremicki** as CE1 student **Wonhee Lee** PT25 looks on.

Speech Language Pathologist, **Carrie Mosley**, works with a patient in a private patient room.

Neurological Physical Therapist, **Beth Hughes**, works with a patient on obstacle course navigation in the open gym space at the new clinical practice at 4240 Duncan Ave.

# Clinical Practice

The mission of the Clinical Division is to provide high-quality, evidence-based care with compassion. As movement system experts, our clinicians strive to diagnose movement impairments and deliver individualized treatment to optimize function, health and wellness across the lifespan.

In an airy, light-filled space outfitted with state-of-the-art equipment, Washington University Program in Physical Therapy clinicians and learners are providing patients with the best in both orthopedic and neurological rehabilitation services. The new, 11,000-square-foot clinic opened in July on the first floor of the @4240 Heritage building, suite 120, at the corner of Boyle and Duncan Avenues, in St. Louis' Central West End.

Washington University Physical Therapy @4240 joins the program's other clinical locations: 4444 Forest Park Avenue; the Danforth Campus clinic for faculty, staff and students; and Progress Point in O'Fallon, Mo.

"We have the space and capabilities at the @4240 location to bring a number of rehabilitation disciplines together," says Dr. Gregory Holtzman, Division Director of Clinical Practice. In addition to physical, occupational and speech therapists, a clinical social worker is on site to help patients navigate needed resources.

Bringing together multiple disciplines under one roof benefits patients who need integrated therapy plans. For instance, patients with Parkinson's disease can receive physical therapy for both orthopedic and neurological issues without needing to travel to separate clinical sites.

"Here we have the entire team together," says Theresa Notestein, clinical practice manager. "We're combining specialists where they can easily communicate and collaborate."

"One unique aspect of the new clinic location is that patients complete a survey at their initial evaluation that focuses on social determinants of health – things like socio-economic status, drug history and transportation availability," says Notestein. "If anyone raises a concern, we connect them to local resources and assistance so they can receive the care they need to rehabilitate effectively. It's a complete experience where the patient can focus on their rehabilitation while getting additional help, which makes it unique."


**Joanie Steibel** greets patients at the front desk of the 4240 Clinical Practice.

Clinic staff includes four receptionists, two occupational therapists, four speech therapists, 10 physical therapists and one physical therapist assistant (PTA) specializing in neurological rehabilitation and 12 physical therapists and four PTAs who focus on orthopedic treatment. They work in 18 private treatment rooms and a large open gym space that includes an overhead track system for body-weight support, a dance floor for performing artists, and facilities dedicated to gait training, jumping, obstacle course navigation and sport-specific training. Up to 28 patients at a time can be seen for therapy, and about 1,000 patients visit the facility each week.

A high-tech "sensory station" helps therapists analyze reaction times for patients with a variety of diagnoses. The technology extends to the use of tablets to record and analyze slow-motion video of various types of movement and heart rate monitors to obtain real-time information on patients' response to treatment.

"When we found this space, we went through a complete and thorough renovation, starting with planning the architectural design through implementing that design during construction," Holtzman says of the yearlong process. He adds that the design process centered around providing evidence-based, one-on-one care, which is the foundation of the Program's practice. The design also carefully considered and included accessibility for individuals of all body sizes, abilities and modes of movement. The MacDonough Family Physical Therapy Fund, administered by the Barnes-Jewish Hospital Foundation, contributed to the clinic, supporting the purchase of equipment.

"Beyond the function and high-tech aspects, the space is also really inviting and beautiful," Notestine says. "It's a welcoming and safe space for all our patients." Holtzman agrees. "It's an incredible viewpoint of a historic building with massive windows and impressive space," he adds. "It really is visually stunning, and there's not another facility like it in the area."

WUPT Faculty Member and acting Clinic Coordinator works with a pro bono patient as WUPT students **Taylor Sheffield** and **Alexa Tucker** observe.

**Maysara Mitchell,** an MPH student from the Washington University Brown School of Social Work, checks patients in at the pro bono clinic's front desk in 4444 Forest Park. Mitchell serves as the interim clinic coordinator.

# Community Engagement

The Washington University Program in Physical Therapy's efforts to enhance diversity, equity and inclusion reach beyond increasing faculty, staff and learner diversity and understanding of systemic racism. Acting on these important aspects of practice is central to the Program's community engagement as faculty and learners provide care to underserved populations through a free clinic open to qualified individuals every Friday afternoon.

Integrated as an experience within the Program's new curriculum, the pro bono clinic opened in February and now operates at the 4444 Forest Park clinical location. Learners get real-world practice under the supervision of faculty, while uninsured and underinsured individuals needing care receive the evidence-based, top-quality care provided by the Program.

"The clinic is really learner-driven in terms of care, with physical therapists, an occupational therapist and a primary-care physician on site to oversee treatment sessions," says Dr. Stacy Tylka, Associate Professor and acting Clinic Director. Patients are referred to the clinic by the Barnes-Jewish Hospital emergency department and the Barnes-Jewish Center for Outpatient Health.

For Isha Tirupathi, one of four second-year learners who helped plan the clinic and now organizes learner schedules for clinic shifts, the clinic fulfills both a need to learn and a desire to provide care to those who face barriers. "It took us almost two years of planning to make the clinic happen," she says. "We thought about a lot of things, such as how to help patients with transportation needs. The focus isn't on us – it's on providing care to people who are denied it."

Tylka explains that individuals 18 and older who are Medicaid-eligible don't receive coverage for physical or occupational therapy in Missouri. "It's a big gap in care," she says. The Program participated in a previous pro bono clinic, which closed several years ago. "Since then, the need for active community outreach with this population has become even more obvious," she says. This time, the pro bono clinic's integration into the new DPT curriculum as a learning and practice opportunity will provide the structure needed to sustain it. Like Tirupathi, Tylka emphasizes that the clinic has a "patient first" model. "It's not just a lab experience for students," she says. "It's a clinical site where underserved patients can receive standard-of-care treatment for a range of issues."

Because the patients come first, Tirupathi notes that learners may need to defer to faculty when they reach the limits of their working knowledge. “We have to know when to back off,” she says. “If we don’t know how to approach something, we can reach out to one of our professors or a more experienced peer. Then we’re able to add to our knowledge by learning how a specific issue is dealt with. Patients always receive optimal care, but there’s only so much I can do, so the ability to partner with the faculty is great.”

The clinic space, located at one of the Program’s four clinical practice sites, is donated by the Program, and the Office of Medical Education provides funds for supplies. Tylka is joined by Dr. Maggie Bland as supervising clinician. In addition, the clinic uses “near-peer learning,” in which more-experienced learners mentor less-experienced learners. Each Friday afternoon, three pairs of learners work together, seeing about three patients each. Since opening, the clinic has provided about 100 patient encounters worth $27,000 of clinical services.

“We’re teaching our learners that there are large gaps in care within our own community,” Tylka says. “Through this experience they get a much greater understanding of these gaps and learn about interprofessional resources and strategies to provide needed care.”

Tirupathi, who plans to specialize in physical therapy for neurological conditions, clearly gets it. “We’re doing everything we can to give access to people who have fallen through the cracks in the health care system,” she says. “We’re learning the practice of physical therapy and also the importance of listening to our patients and providing appropriate care for their circumstances.”

Pro Bono clinic leadership. From left: acting Clinic Director, **Stacy Tylka**, Associate Professor of Physical Therapy Orthopaedic Surgery, and Obstetrics & Gynecology; **Audrey Coolman**, Community Engagement Project Manager, Office of Diversity Programs Washington University School of Medicine; **Brittany Jones**, Community Referral Coordinator, St. Louis Integrated Health Network; **Jessica Dashner**, Assistant Professor of Occupational Therapy and Neurology; **Barbara Lutey**, Assistant Professor of Medicine; **Maggie Bland**, Associate Professor of Physical Therapy, Neurology and Occupational Therapy.

# Named Scholarships

**The Barton Family Scholarship** is awarded to students based on need and merit who have interest in Endurance Sports Rehabilitation.
**Adele Looper, PT23**

*This scholarship is possible through a gift from:*
*the Kari and Fred Barton Charitable Foundation.*

**The Timothy B. Burnight Scholarship** is awarded to a student who demonstrates exceptional academic promise.
**Luqi Zhao, PT25**

*This scholarship is possible through a gift from:*
*Mr. Tom Burnight*

The **Susan and Robert Deusinger Scholarship** is awarded to a student who has demonstrated exceptional and enduring leadership in the classroom, clinic and/or community.
**Alexa Tucker, PT24**

*This scholarship is possible through a gift from:*
*Dr. Robert H. Deusinger*
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**The Karen Donahue Scholarship** is awarded to a student with a record of consistent and outstanding service to the profession and/or the community.
**Kiera Olson, PT24**

**The Gina Prescott Earnest Scholarship** is awarded to a student who demonstrates both exceptional academic and clinical performance, and outstanding professional growth and promise.
**Cameron Swick, PT24.**

*This scholarship is possible through a gift from:*
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**The Anne Furlong Scholarship** is awarded to a student who demonstrates outstanding academic performance in their undergraduate work.
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**The Guebert/Lake Scholarship** is awarded to a student who demonstrates success in the areas of scholarship, clinical promise, class leadership and service to the community.
**Caitlin Clute, PT24 and Abriana Berkowitz, PT24.**

*This scholarship possible through a gift from:*
*Mrs. Marilyn Kirkham*
*Mr. John Kirkham*

**The Anita Hefti Frumson Scholarship** is awarded to a student who demonstrates need and merit.
**Elisha Li, PT24.**

*This scholarship possible through a gift from:*
*Mrs. Anita Hefti Frumson*

## Patient Care
Then & Now

1942

**No Practice.**

2022

**50,000+ patient visits per year across the four outpatient clinical locations.**


WUPT students participated in a Cheer Station at the 2022 Girls on the Run race in November.

**The Robert J. Hickok Scholarship** is awarded to a student who has demonstrated exemplary personal integrity, consistent professional commitment, leadership and excellence in clinical work. **Ming Luo, PT24**

*This scholarship possible through a gift from:*
*Mrs. LisaM. Waeckerle*
*Mr. William R. Waeckerle*

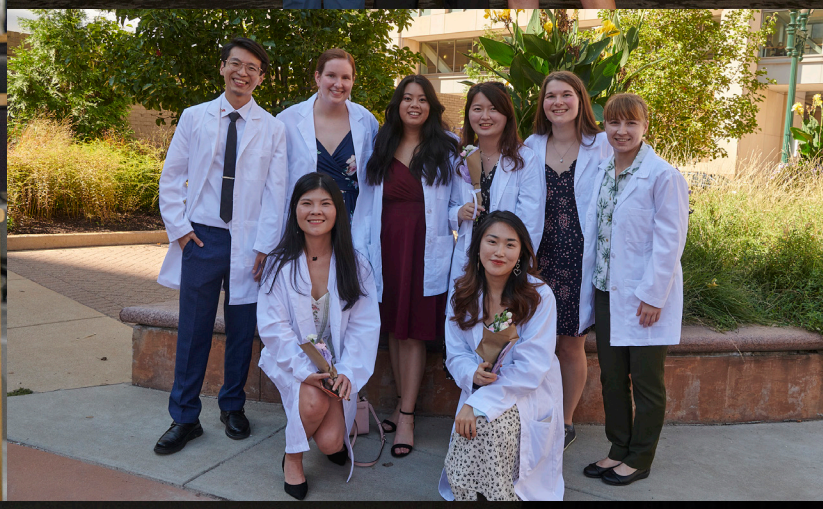
**The Steven J. Rose Diversity Development Award** is awarded to students who have demonstrated academic excellence and contributed to educational diversity in the Program in Physical Therapy.
**Madison Blackburn, PT23; Tyler Blake, PT23; Shauna Montoya, PT24; Erin Huttula, PT24; Amy Kang, PT25; Manon Milczynski, PT25**

*This scholarship possible through a gift from:*
*Ms. Carol Lynne Enkoji*
*Dr. Richard Scott Nelson*

The **Sahrmann Assistantship** provides funding for a student to conduct research related to musculoskeletal impairments. **Lauren Froehlich, PT25.**

*This scholarship possible through a gift from:*
*Elsevier*
*Dr. Shirley A. Sarhmann PT58 GR71 GR73 HS*


Washington University School of Medicine




Washington University School of Medicine
Program in Physical Therapy
7th Annual
White Coat Ceremony


WUPT Faculty **Dr. Linda Van Dillen** with **Lindsay Durand**, PT21 and **Stephanie Weyrauch**, PT15 at the APTA House of Delegates meeting in August.

WUPT24 on the last day of 1st year classes.

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**Dr. Steven Ambler** welcomes admitted students at the 2022 Preview Day.

**Dr. Julian Magee** and **Dr. Patty Navarro-McGee** speak with WUPT23 learners.

## Training Programs

Then & Now

1942

- **Bachelors**

2022

- **Doctor of Physical Therapy (DPT)**
- **PhD in Movement Science**
- **Residency in Women's Health PT**

# Class Notes and Program Honors

**Dr. Catherine Lang and her team on received a MERIT Award from the NIH. This is a first in the history of WUPT and a very prestigious and rare honor.** MERIT stands for Method to Extend Research In Time. You cannot apply for a MERIT Award; instead you must be chosen for one by NIHstaff. The award recognizes investigators of exceptional competence and productivity, and provides long-term stable support expected to foster continued creativity and spare investigators from the administrative burdens associated with preparation and submission of full-length research grant applications. To be selected awardees must meet the following criteria:

- The Principal Investigator (PI) demonstrates exemplary scientific leadership and accomplishment.
- The PI has at least a 10-year history of independent federally-funded research.
- The grant application must be a highly meritorious R01 application submitted by a single PI who is well-recognized in the scientific field and who has a history of service to the scientific community.
- The proposed study must be one of high significance and scientific merit that represents the primary research focus of the investigator.
- The award is for 5 years with the option for 5 years of additional support, pending satisfactory progress.

**Pat Banker** of PT24 was selected to serve on the Provost's LGBTQ Advisory Committee. This committee advises the provost on how to make Washington University fully inclusive and welcoming to LGBT students, staff, alumni and faculty.

**Marcie Harris-Hayes became the PI for the final year of the NIH K12 CORRT** (Comprehensive Opportunities in Rehabilitation Research) program that she has been involved with for many years.

**Marcie Harris-Hayes joined a newly funded NIH R25 grant called Training in Diversity education program**, or TiDe, which will train current clinician scientists in the skills and knowledge needed to transform the culture of research to support the development of clinician scientists from populations underrepresented in biomedical science

**Carey Holleran received an Academy of Educators Small Grant** to support her project entitled, "Feasibility and Perspectives on Entrustment Assessment in Facilitating Learning in DPT Clinical Education: A Pilot Study".

**Julian Magee** was **selected to participate in the invitation-only NEDIC Summit 2022: Building Partnerships, Creating Spaces, and Developing Opportunities to Increase Racial and Ethnic Diversity in Physical Therapy**. This event, sponsored by the National Equity, Diversity, and Inclusion Committee of the American Council of Academic Physical Therapy, gathered 100 health professionals who have shown to be committed to building, creating and sustaining racial and ethnic diversity.

**Linda Van Dillen** received the **2022 Career Excellence in Biomechanics Research Award** from the Biomechanics Special Interest Group (SIG) within the Academy of Physical Therapy Research.

The **Program in Physical Therapy** received the **APTA Minority Initiatives** award this summer. **Dr. Julian Magee** received the award on behalf of the Program.

**Shirley Sahrmann** received the **2022 Distinguished Alumni Award** at Washington University's Founders Day event on Saturday, November 5, 2022. The Founders Day Distinguished Alumni Award recognizes outstanding professional achievement, public service, and exceptional service to WashU.

**Jacob McPherson** was **awarded a grant supplement from the NIH.** This supplement is to promote research continuity and retention of NIH first-time recipients of NIH Research Project Grant (R) Awards and will facilitate his ongoing R01 entitled, "Intraspinal Microstimulation for Multi-modal Rehabilitation".

**Jacob McPherson** was also **awarded a research grant from the Department of Defense** Spinal Cord Injury Research Program. His project, entitled "Targeted spinal cord plasticity for alleviating SCI-related neuropathic pain", entails both an animal model and a pilot clinical trial in humans, in collaboration with Aiko Thompson at the Medical University of South Carolina

**PT24 and organizer CJ Owens PT24 hosted a successful blood drive.** They collected 63 pints of blood, enough to save up to 183 lives!

**Tracy Spitznagle** received the APTA **Academy of Pelvic Health Physical Therapy President's Award** recognizing her leadership as the Chair of their Clinical Practice Guidelines Committee.

Women's Health Residency leader, **Tracy Spitznagle**, and residents **Martina Mapa and Julia Foster** launched a new pro bono service line. They **provide care at Casa de Salud**, an organization that delivers high quality health services to uninsured and underinsured patients, with a focus on immigrants and refugees in St. Louis. https://www.casadesaludstl.org/

**Congratulations to our new clinical specialists in orthopedic (OCS) and neurologic (NCS) physical therapy!** These certifications reflect specialized knowledge and advanced clinical proficiency, as well as a great deal of commitment and diligence to earn the certification.

» Tyler Detmer, PT, DPT, OCS
» Josh Hubert, PT, DPT, OCS
» Beth Hughes, PT, DPT, NCS
» Dena Priluck, PT, DPT, NCS

**Linda Van Dillen** received the **2022 Rose Excellence in Research Award** from the Academy of Orthopaedic Physical Therapy. The award is granted to a published article that has significant impact (immediate or potential) upon the practice of orthopaedic physical therapy. Dr. Van Dillen received the award for her article: Effect of Motor Skill Training in Functional Activities vs Strength and Flexibility Exercise on Function in People With Chronic Low Back Pain: A Randomized Clinical Trial. JAMA Neurol.
2021 ;78(4):385-395.

**WUPT will be recognized with an Honorable Mention** for our fundraising efforts this year to support the Foundation for Physical Therapy.

**Pat Banker** of PT24 received the **Bayard Rustin Bridge Builder Award** from WashU's Center for Diversity and Inclusion. This award recognizes an individual who helps forge connections and build authentic spaces within LGBTQIA* communities through a people-centered approach.

# Publications


WUPT students participated in the 2022 Go! Marathon in October.

WUPT Students participated in the 2022 Gamecock Challenge to raise funds for the Foundation for Physical Therapy Research. The WUPT Team rowed a total of 50,000 meters. This national event combines Fundraising, service and physical activity in the spirit of transforming society through movement.

**Baudendistel ST**, Schmitt AC, Balthaser KC, Wade FE, Hass CJ. Parkinsonism Relat Disord. 2022 Nov;104:81-84. doi: 10.1016/j.parkreldis.2022.10.013. Epub 2022 Oct 13. PMID: 36265297

Barth J, Waddell KJ, **Bland MD, Lang CE.** Accuracy of an Algorithm in Predicting Upper Limb Functional Capacity in a United States Population. Arch Phys Med Rehabil. 2022 Jan;103(1):44-51. doi: 10.1016/j.apmr.2021.07.808. Epub 2021 Aug 21. PMID: 34425091

**Bohnert KL, Zellers JA, Jeong HJ,** Chen L, York A, **Hastings MK.** Remote Research: Resources, Intervention Needs, and Methods in People with Diabetes and Peripheral Neuropathy. J Diabetes Sci Technol. 2022 Jun 30:19322968221103610. doi: 10.1177/19322968221103610. Online ahead of print. PMID: 35770988

**Cao C,** Friedenreich CM, Yang L. Association of Daily Sitting Time and Leisure-Time Physical Activity With Survival Among US Cancer Survivors. JAMA Oncol. 2022 Mar 1;8(3):395-403. doi: 10.1001/jamaoncol.2021.6590. PMID: 34989765

Liu J, Zong X, Vogtmann E, **Cao C,** James AS, Chan AT, Rimm EB, Hayes RB, Colditz GA, Michaud DS, Joshipura KJ, Abnet CC, Cao Y. Tooth count, untreated caries and mortality in US adults: a population-based cohort study. Int J Epidemiol. 2022 Aug 10;51(4):1291-1303. doi: 10.1093/ije/dyac072. PMID: 35388877

**Foster SN, Spitznagle TM,** Tuttle LJ, Lowder JL, Sutcliffe S, Steger-May K, Ghetti C, Wang J, **Burlis T,** Meister MR, **Mueller MJ, Harris-Hayes M.** Pelvic Floor Mobility measured by Transperineal Ultrasound Imaging in Women with and without Urgency and Frequency Predominant Lower Urinary Tract Symptoms. J Womens Health Phys Therap. 2022 Apr-Jun;46(2):100-108. doi: 10.1097/jwh.0000000000000224. PMID: 35757164

Song K, Pascual-Garrido C, Clohisy JC, **Harris MD.** Elevated loading at the posterior acetabular edgeof dysplastic hips during double-legged squat. J Orthop Res. 2022 Sep;40(9):2147-2155. doi: 10.1002/jor.25249. Epub 2022 Jan 11. PMID: 35015910

Gaffney BMM, Williams ST, Todd JN, Weiss JA, **Harris MD.** A Musculoskeletal Model for Estimating Hip Contact Pressure During Walking. Ann Biomed Eng. 2022 Jul 21. doi: 10.1007/s10439-022-03016-w. Online ahead of print. PMID: 35864367

Payne ER, **Harris MD, Harris-Hayes M,** Nahal C, Kamenaga T, Clohisy JC, Pascual-Garrido C. Greater hip abductor size in prearthritic patients with developmental dysplasia of the hip versusfemoroacetabular impingement. J Orthop Res. 2022 Aug 10. doi: 10.1002/jor.25426. Online ahead of print. PMID: 35949149

**Harris MD, Shepherd MC,** Song K, Gaffney BMM, Hillen TJ, **Harris-Hayes M,** Clohisy JC. The biomechanical disadvantage of dysplastic hips. J Orthop Res. 2022 Jun;40(6):1387-1396. doi: 10.1002/jor.25165. Epub 2021 Aug 30. PMID: 34415648

Brown-Taylor L, **Harris-Hayes M,** Foraker R, Vasileff WK, Glaws K, Di Stasi S. Treatment decisions after interdisciplinary evaluation for nonarthritic hip pain: A randomized controlled trial. PM R. 2022 Mar;14(3):297-308. doi: 10.1002/pmrj.12661. Epub 2021 Aug 16. PMID: 34181823 Clinical Trial.

Koch K, Semciw AI, Commean PK, Hillen TJ, Fitzgerald GK, Clohisy JC, **Harris-Hayes M**. Comparison between movement pattern training and strengthening on muscle volume, muscle fat, and strength in patients with hip-related groin pain: An exploratory analysis. J Orthop Res. 2022 Jun;40(6):1375-1386. doi: 10.1002/jor.25158. Epub 2021 Aug 18. PMID: 34370330 Clinical Trial.

Commean PK, Mueller MJ, Chen L, Wolfsberger MA, **Hastings MK.** Computed Tomography and Magnetic Resonance Correlation and Agreement for Foot Muscle and Adipose Tissue Measurements. J Comput Assist Tomogr. 2022 Mar-Apr 01;46(2):212-218. doi: 10.1097/RCT.0000000000001275. PMID: 35297577 Free PMC article.

**Haussler AM, Earhart GM.** The Effectiveness of Classical Ballet as a Therapeutic Intervention: A Narrative Review. Altern Ther Health Med. 2022 Sep 23:AT7640. Online ahead of print. PMID: 36150009

**Holmes CJ, Racette SB,** Symonds L, Arbeláez AM, **Cao C,** Granados A. Feasibility and Efficacy of Telehealth-Based Resistance Exercise Training in Adolescents with Cystic Fibrosis and Glucose Intolerance. Int J Environ Res Public Health. 2022 Mar 11;19(6):3297. doi: 10.3390/ijerph19063297. PMID: 35328985 Free PMC article.

**Holmes CJ, Racette SB,** Symonds L, Arbeláez AM, Cao C, Granados A. Comparison of Bioelectrical Impedance Analysis with DXA in Adolescents with Cystic Fibrosis before and after a Resistance Training Intervention. Int J Environ Res Public Health. 2022 Mar 29;19(7):4037. doi: 10.3390/ijerph19074037. PMID: 35409718 Free PMC article.

Sullivan K, Metoyer CJ, Hornikel B, **Holmes CJ,** Nickerson BS, Esco MR, Fedewa MV. Agreement Between A 2-Dimensional Digital Image-Based 3-Compartment Body Composition Model and Dual Energy X-Ray Absorptiometry for The Estimation of Relative Adiposity. J Clin Densitom. 2022 Apr-Jun;25(2):244-251. doi: 10.1016/j.jocd.2021.08.004. Epub 2021 Sep 24.PMID: 34756706

**Hooker QL, Lanier VM,** Roles K, **van Dillen LR.** Motor skill training versus strength and flexibility exercise in people with chronic low back pain: Preplanned analysis of effects on kinematics during a functional activity. Clin Biomech (Bristol, Avon). 2022 Feb;92:105570. doi: 10.1016/j.clinbiomech.2021.105570. Epub 2022 Jan 3. PMID: 35045374 Clinical Trial.

Liao J, Hu M, Imm K, **Holmes CJ,** Zhu J, **Cao C,** Yang L. Association of daily sitting time and leisure-time physical activity with body fat among U.S. adults. J Sport Health Sci. 2022 Oct 12:S2095-2546(22)00101-6. doi: 10.1016/j.jshs.2022.10.001. Online ahead of print. PMID: 36240998

**Jeong HJ,Mueller MJ, Zellers JA,** Commean PK, Chen L, **Hastings MK.** Body mass index and maximum available midfoot motion are associated with midfoot angle at peak heel rise in people with type 2 diabetes mellitus and peripheral neuropathy. Foot (Edinb). 2022 May;51:101912. doi: 10.1016/j.foot.2022.101912. Epub 2022 Feb 11. PMID: 35255403 Free PMC article.

**Jeong HJ**,Cha B, **Zellers JA,**Chen L, **Hastings MK.** Midfoot and ankle movement coordination during heel rise is disrupted in people with diabetes and peripheral neuropathy. Clin Biomech (Bristol, Avon). 2022 Jun;96:105662. doi: 10.1016/j.clinbiomech.2022.105662. Epub 2022 May 7. PMID: 35569256

PT22 students in Total Contact Casting lab.

# Publications *Continued*

WUPT Faculty and Staff presented "Transforming the Health of Society Through Competency-Based Physical Therapy Education: Implementing and Adapting" at the 2022 ELC meeting in Milwaukee, WI.

**Johnathon Callum**, PT25, studies for an assessment.

**Konrad, J.**, Marrus, N., & **Lang, C. E.** A Feasibility Study of Bilateral Wrist Sensors for Measuring Motor Traits in Children With Autism. Perceptual and Motor Skills. 2022https://doi.org/10.1177/00315125221125275

**Lang CE, Holleran CL,** Strube MJ, Ellis TD, Newman CA, Fahey M, DeAngelis TR, Nordahl TJ, Reisman DS, **Earhart GM, Lohse KR, Bland MD.** Improvement in the Capacity for Activity Versus Improvement in Performance of Activity in Daily Life During Outpatient Rehabilitation. J Neurol Phys Ther. 2022 Aug 4. doi: 10.1097/NPT.0000000000000413. Online ahead of print. PMID: 35930404 No abstract available.

**Lanier VM, Lohse KR, Hooker QL, Francois SJ, van Dillen LR.** Treatment preference changes after exposure to treatment in adults with chronic low back pain. PM R. 2022 Sep 15. doi: 10.1002/pmrj.12897. Online ahead of print. PMID: 36106673

**Lawrence RL,** Soliman SB, Roseni K, Zauel R, Bey MJ. In vivo evaluation of rotator cuff internal impingement during scapular plane abduction in asymptomatic individuals. J Orthop Res. 2022 Jul 26. doi: 10.1002/jor.25423. Online ahead of print. PMID: 35880416

Braudy R, Atoms B, Coghlan J, Staples M, Moga D, Tollefsrud R, **Lawrence RL,** Ludewig P, Koehler L. Shoulder Kinematics of Axillary Web Syndrome in Women Treated for Breast Cancer. Arch Phys Med Rehabil. 2022 Oct 4:S0003-9993(22)01615-X. doi: 10.1016/j.apmr.2022.09.014. Online ahead of print. PMID: 36202228

**Lawrence RL,** Veluswamy B, Dobben EA, Klochko CL, Soliman SB. Predictors of infraspinatus muscle degeneration in individuals with an isolated supraspinatus tendon tear. Skeletal Radiol. 2022 Oct 5. doi: 10.1007/s00256-022-04201-7. Online ahead of print. PMID: 36195776

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Faculty Member **Nancy Bloom** looks on as PT24 students practice in lab.

**Kris Gordon,** DPT, of Washington University Physical Therapy, assists patient Nick on the Biodex Balance System.

# Publications *Continued*

WUPT students at the Run4Research Bake Sale.

WUPT Faculty **Dr. Steve Ambler** with PT25 students **Gustavo Rivera** and **Jason Lee** dressed up for Halloween.


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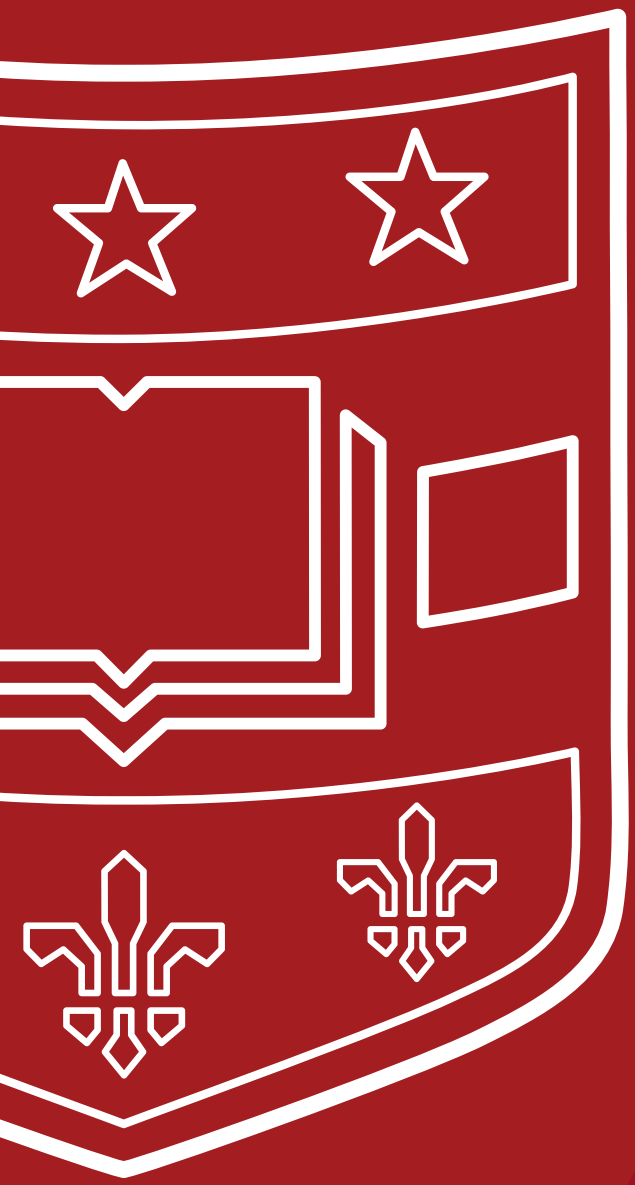
**Alexa Tucker,** PT24, with Faculty Member Stacy Tylka.

# Congratulations,

## Class of 2022!



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