



Emory University

Department of Rehabilitation Medicine

Division of Physical Therapy

Innovative Trends in Physical Therapy Research

Scientific Abstracts

by the

Doctor of Physical Therapy Class of 2024

May 7, 2024

Research Course Director

Shilpa Krishnan, PT, PhD

Up to 3.33 Continuing Competency Hours (CCH):

<https://form.jotform.com/EmoryDPT/2024posterday-PRE>

9.00am – 9.15 am **Introductory remarks**
9.20 am – 10.40 am **Session 1: 8 concurrent poster presentations**
10.50 am – 11.50 am **Session 2: 7 concurrent poster presentations**
12.00 pm – 1.00 pm **Session 3: 7 concurrent poster presentations**
1.00pm – 1.30 pm **Lunch**
1.30pm – 2.30 pm **Poster day awards and DPT III awards**

- *All students will present individually at least once.*
- *Each student/presentation will last 12-14 mins, followed by 3-5 min Q and A.*
- Q and A after each presentation can be answered by any student in the group.

Session 1 (9.20 am – 10.40 am)	Session 2 (10.50 am– 11.50am)	Session 3 (12.00pm – 1.00 pm)
Poster 1: Field-Fote, Thatcher	Poster 2: Borich, Ting	Poster 3*: Rendos 2, Fulk (diabetic neuropathy and sleep)
Poster 4: Willingham	Poster 5: Walston	Poster 6**: Reoli, JHH
Poster 7: Krishnan	Poster 8: Lyle 1 (ankle force perception)	Poster 9**: McLaughlin, JHH
Poster 10: Bethel, Wieland	Poster 11: Lyle 2, Nogi (galvanic stimulation)	Poster 12**: Young Jang: DPT-PhD
Poster 13: Fulk, Batts 1 (you can do it)	Poster 14*: Rendos 1, Lyle (ankle stiffness and gait)	Poster 15**: Chang: DPT-PhD
Poster 16: Kesar, Aloba	Poster 17*: Pullen, Nunez	Poster 18*: Harris
Poster 19: Sullivan, Ligh	Poster 20*: Fulk, Batts 2 (normal activity in community dwelling adults)	Poster 21*: Master, Edouard, Bishop
Poster 22: Krieger, Sharp		

Session 1:

- Each group will present 4 times, at the following times: 9.20-9.39, 9.40-9.59, 10.00-10.19, 10.20-10.39
- Groups presenting in sessions 2 and 3 will be observers at this session -- see page 3

Session 2:

- Each group will present 3 times, at the following times: 10.50-11.09, 11.10-11.29, 11.30-11.49
- **Posters 14, 17, 20***: The 3rd presentation in a group with 2 students will be presented by both students.
- Groups presenting in sessions 1 and 3 will be observers at this session -- see page 4

Session 3:

- Each group will present 3 times, at the following times: 12.00-12.19, 12.20-12.39, 12.40-1.00
- **Posters 3,18, 21***: The 3rd presentation in a group of 2 students will be presented by both students.
- **Poster 6, 9, 12, 15:**** (posters with one student) Student will present formally two times at 12.00 and 12.40. Student will stand next to their poster throughout the session to answer questions.
- Groups presenting in sessions 1 and 2 will be observers at this session -- see page 5

No.	Mentor(s)	Title
1	Field-Fote, Thatcher	The Effects of Psychedelics and Cannabinoids on Movement Related Outcomes Following Neurological Injury/Disease: A Scoping Review
2	Borich, Ting	Investigating Test-Retest Reliability of N1 Perturbation-Evoked Potential During Reactive Balance Control
3	Rendos, Fulk	Correlation of Physical Activity and Sleep Quality in Young Adults
4	Willingham	Integrating Tele-Exercise and Remote Monitoring to Overcome Barriers for People Living with MS
5	Walston	Evaluating the Potential of Remote Therapeutic Monitoring in Physical Therapy Care: A Qualitative Study
6	Reoli, JHH	Pediatric Acute Care: Optimal Frequency for Bone Marrow Transplantation
7	Krishnan	Assessing the Symptomology of Long COVID
8	Lyle	Sensorimotor Contributions to Ankle Force Matching Ability in Healthy Young Adults
9	McLaughlin, JHH	Assessing Access to Physical Therapy Services in Rural vs Non-rural Areas
10	Bethel, Wieland	Is Yoga Physical Therapy?
11	Lyle, Nogi	Descending vestibulospinal input influences heteronymous reflexes from Quad onto SOL
12	Young Jang	Accelerated Aging in Pediatric Cancer Survivors: A Review of Proposed Mechanisms and Clinical Presentation
13	Fulk, Batts	You Can Do It!: The Impact of Motivation on Improving Walking Speed in Inpatient Rehabilitation
14	Rendos, Lyle	Test-Retest Reliability of Passive Ankle Stiffness in Barefoot and Shod Conditions
15	Chang	Effects of post-traumatic osteoarthritis on joint kinematics following medial meniscal transection in rats
16	Kesar, Aloba	Probing Neural Mechanisms of Prism Adaptation Therapy
17	Pullen, Nunez	Current screening and assessment tools for chronic pain, trauma and analgesic use: A Scoping Review to inform a multidimensional screening tool for people living with HIV
18	Harris	Adjusting after Brain Injury: Coping Strategies, Affirmations, & Activities for Stroke Survivors and Caregivers
19	Sullivan, Ligh	The Role of Interoception in Physical Therapy and Patient Care Interventions
20	Fulk, Batts	The GATHER Study: Generation of Adult Testing of Health, Environmental, and Recreational Measures
21	Master, Edouard, Bishop	Physical Therapy Utilization in Postoperative Frail Patients
22	Krieger, Sharp	Rehabilitation Therapy Utilization and Functional Outcomes for Patients on ECMO Support

Poster 1

The Effects of Psychedelics and Cannabinoids on Movement Related Outcomes Following Neurological Injury/Disease: A Scoping Review

Sam Cai¹; dongyang.cai@emory.edu, Anna Gaines¹; anna.gaines@emory.edu, Anne Holland Lane¹, anne.holland.lane@emory.edu, Jason Lobdell¹; jason.lobdell@emory.edu,
Kelly L. Thatcher²; kelly.thatcher@shepherd.org, Edelle C. Field-Fote²;
edelle.field-fote@shepherd.org

¹ Graduate Division of Physical Therapy, School of Medicine, Emory University, Atlanta, GA, United States, ² Shepherd Center, Atlanta GA, United States

ABSTRACT

Background: Despite historic limitations of research into psychedelics and cannabinoids due to the passage of “The Controlled Substance Act” in the United States in 1970, there is a growing trend in research supporting the use of these substances for therapeutic purposes. Evidence supporting the use of cannabinoids and psychedelics for psychological diagnoses is rapidly expanding and even reaching clinical trials. The use of cannabinoids for the treatment of multiple sclerosis is well documented. Despite the increasing numbers of publications in these fields and anecdotal evidence for the efficacy of psychedelics and cannabinoids for treatment of neurological injury/disease, there is little to no clinical evidence to support or guide further research in this field.

Objective: To summarize the state of clinical research describing the use of psychedelics and cannabinoids for therapy or treatment of neurological injury/disease.

Methods: The scoping review included articles from PubMed, Cochrane Registry, Physiotherapy Evidence Database (PEDro), Web of Science, CINAHL, and EMBase with criteria including: pharmacological intervention (either psychedelic or cannabinoid) for therapy or treatment of neurological

injury/disease using motor function related outcome measures in participants >18 years old.

Results: The search yielded 1418 studies, 19 of which fit selection criteria. One-hundred twenty-one papers on the use of cannabinoids for treatment of multiple sclerosis were removed as it is already well represented in the literature. Of the 19 reports, there were zero publications on the use of psychedelics. Populations identified were dystonia (2), hyperkinetic movement disorder (1), Parkinsons Disease (7), Huntingtons Disease (1), spinal cord injury (2), stroke (1), amyotrophic lateral sclerosis (2), Alzheimers (1), Stiff Person Syndrome (1). Motor related outcome measures included objective measures.

Conclusion: The current evidence suggests there is a relationship between cannabinoids use and enhanced movement related outcomes in neurological injury/disease, more studies are needed. Understanding the relationship between cannabinoids dosage and movement improvement is important for advancing therapeutic outcomes post- neurological injury. The synthesized evidence will guide future research directions and policy development in the field.

Poster 2

Investigating Test-Retest Reliability of N1 Perturbation-Evoked Potential During Reactive Balance Control

Kendra Jones, SPT; Gaetan Munter, SPT; Alexander Poorman,
SPT; Michael Borich, DPT, PhD; Jasmine Mirdamadi, PhD; Lena
Ting, PhD Emory University School of Medicine, Division of
Physical Therapy

Purpose/Hypothesis

Studying electrical activity in the brain can provide insights into many functions and responses of the human body, including balance control and related impairments that may contribute to increased risk and occurrence of falls. The N1 signal is a perturbation-evoked brain response that occurs in the supplementary motor area 100-250 msec post-perturbation. Differences in the N1 across individuals are correlated both with age and varied levels of balance performance, suggesting the N1 may provide a neural biomarker of balance ability. However, studies to date have only assessed the N1 response during a single session, so the between-session reproducibility is unknown, a necessary prerequisite for a useful biomarker. The purpose of this study is to investigate test-retest reliability to determine its potential use as a clinical biomarker of balance control and subsequent fall risk. We hypothesize that the latency and amplitude of the N1 signal, both within younger (YA) and older adults (OA), will be reliable between sessions within one week for both groups.

Subjects

16 healthy participants have completed the study; 10 YA (age 24.3 ± 2.2 years, 6 female), and 6 OA (age 68.4 ± 3.7 years, 1 female). We anticipate $n=20$ (10 YA & 10 OA) at the completion of the study.

Methods

Participants completed two experimental sessions within one week, with a session start time of \pm one hour. Participants experienced three sets of 20 paired support-surface perturbations (120 total), and were asked to discriminate the direction of each

perturbation within the pairs.

64-channel electroencephalography (EEG) data were recorded during the task, with N1 amplitude and latency being extracted from a central (Cz) electrode. The test-retest reliability of said amplitude and latency was assessed using the intraclass correlation coefficient (ICC).

Results

The recorded N1 potentials showed variability between individuals and groups (YA amplitude: 11 μ V - 66 μ V, latency: 138 ms - 182 ms; OA amplitude: 4 μ V - 26 μ V, latency: 174 ms - 230 ms). However, within individuals, the N1 demonstrated high test-retest reliability (amplitude: $r = 0.94$; latency: $r = 0.97$)

Conclusion

Findings demonstrate that the N1 is reliable between testing sessions in both YA & OA. These results suggest that the N1 can provide a reliable index of perturbation-evoked cortical activity that may serve as a promising neural biomarker of balance ability. Future investigation of such responses could include determining the efficacy of different balance interventions on modulating the N1 response, as well as how the N1 has changed in patients with impaired balance and recurrent falls.

Clinical Relevance

Discovering reliable brain biomarkers related to balance control, particularly in older adult populations, can provide a current indicator of general balance ability, as well as a metric to be tracked over time in response to intervention. For a specific individual, it could also serve as an indicator that they would benefit from balance training as a preventative measure, before falls or other injury actually occur.

Poster 3

Emory University Division of Physical Therapy Department of Rehabilitation Medicine

Title: Correlation of Physical Activity and Sleep Quality in Young Adults

Authors: Georgina Gabbidon, SPT, Hui-Fen Hsu, SPT, Nichole K. Rendos, PhD, ATC, CSCS

Affiliations: Emory University, Division of Physical Therapy

Background

Ensuring adequate and high-quality sleep is imperative for memory consolidation and various physiological functions of the human body. Research has consistently shown that regular physical activity correlates with improved sleep patterns. Moreover, several studies have specifically investigated the effectiveness of exercise and moderate-intensity physical activity in ameliorating disrupted sleep. Recent research has highlighted the potential repercussions of insufficient sleep, including decreased levels of physical activity and cognitive performance. However, it is noticed that much of the existing literature relies on qualitative data obtained from subjective questionnaires.

Purpose

The purpose of this study was to collect sleep and activity data collected from a wearable accelerometer (Actigraph xGT3X-BT, ActiGraph LLC, Pensacola, FL, USA). The primary objectives of this investigation are to ascertain the accuracy of self-perceived activity levels when compared to objective quantitative data, explore the relationship between activity levels and sleep performance, and assess the association between sleep quality and cognitive status. The study hypothesized there would be a positive correlation between sleep quality and activity level and a negative correlation between sleep performance and cognitive status.

Subjects

9 young and healthy adults (4 F, 5M) were recruited in this study. Of these patients, the

median age was 26, with ages ranging from 22 to 29. Among the participants, 5 participants reported their race as Black, 1 reported being White, and 3 reported as Asian.

Method

Participants initially completed self-report questionnaires, including Pittsburgh Sleep Quality Index (PSQI), PROMIS Sleep Disturbance Short Form, PROMIS Sleep-Related Impairment Short Form, Quick Physical Activity Rating (QPAR) scale, and International Physical Activity Questionnaire (IPAQ) for detailing their daily activities and sleep patterns. Objective outcome measurements were conducted to evaluate cognitive function (Montreal Cognitive Assessment). Participants were instructed to wear the Actigraph xGT3X-BT accelerometer on their wrists continuously for the duration of seven consecutive days.

Results

The researchers will compare Actigraph-derived data, encompassing metrics including moderate to vigorous physical activity, sedentary time, non-sedentary time, step count, and metabolic equivalents, with subjective reports obtained through standardized instruments, including QPAR and IPAQ.

Regarding sleep parameters, researchers will focus on variables such as total sleep time, sleep efficiency percentage, wake after sleep onset, number of awakenings, and sleep onset latency, drawing from established methodologies. Subjective reports will be evaluated using instruments such as PSQI and PROMIS short forms. This comprehensive assessment will enable a nuanced understanding of the relationship between sleep quality, physical activity levels, and cognitive function.

Conclusion/Implication

These results will compare self-perceived measures of activity with quantitative measurements of activity levels. The results will also identify potential correlations between activity levels and sleep performance and a positive association between sleep quality and cognitive status. The clinical implication of these results may promote increased activity and improved sleep quality for healthy adults and clinical populations. Future research should focus on correlational analysis in participants with Diabetes Mellitus and their compared norms. Such research will create a screening tool for patients with Diabetes Mellitus.

Poster 4

Integrating Tele-Exercise and Remote Monitoring to Overcome Barriers for People Living with MS

Multiple sclerosis (MS) is an autoimmune disease that causes lesions in the central nervous system, leading to a range of symptoms including weakness, fatigue, spasticity, and coordination deficits. While disease-modifying therapies can help, they do not address downstream symptoms associated with neuromuscular dysfunction, which causes mobility impairments and reduced quality of life (Rejdak et al., 2010). Fortunately, research has shown that exercise can improve muscle strength, cardiovascular health, and functional mobility in people with MS (Adamson et al., 2015). However, people with MS face physical and environmental barriers to participating in exercise programs to improve overall health. While remote interventions, such as tele-exercise, have emerged as a potential solution to the barriers to exercise, the ability to clinically manage and evaluate these strategies is limited (Saei et al., 2021). This study aims to address the limitation by evaluating the safety, feasibility, and preliminary efficacy of integrating tele-exercise classes via the Bernalong platform with wearable Fitbit fitness trackers and mobile surveys to assess the effects of exercise on patients living with MS. The participants completed pre and post-intervention clinician and patient-reported outcomes to assess the effect of the 6-week intervention. These outcomes include the 5TSTS, 6MWT, T25FW, TUG, MSWS, MFIS, Neuro QOL for Fatigue, LE, and UE function to assess mobility, symptom perception, self-efficacy, and quality of life levels pre-and post-intervention. Regarding safety, no adverse outcomes were reported and none of the outcomes were negatively impacted by participation in the intervention.

Participants demonstrated moderate adherence rates to daily surveys (Adherence Rate=48.29 with SE=9.01), participating in tele-exercise (Adherence Rate=55.55 with SE=11.14), and wearing a Fitbit (Adherence Rate=69.87 with SE=10.08). Regarding efficacy, 5TSTS significantly decreased from 19.21 to 15.58 seconds +/- 7.2 seconds ($p=0.03233$); 6MWT significantly increased from 892.4 to 1064 feet +/- 298 feet ($p=0.001580$); TUG significantly decreased from 13.37 to 11.08 seconds +/- 4.5 seconds ($p=0.03379$), when comparing pre-and post-intervention measures. Our results indicate that tele-exercise integrated with remote monitoring is safe, feasible, and potentially efficacious for patients living with MS. Further research is warranted to fully understand the long-term benefits of tele-exercise and to optimize its implementation in clinical practice for patients with MS.

Poster 5

Authors: **Zachary Walston** (zachary@seconddoorhealth.com), **PT Solutions Physical Therapy & Second Door Health, Atlanta, GA**

Hyomin Shin (Hyomin.shin@emory.edu), Marko Aziz (marko.aziz@emory.edu), Paul Jr Szczesny (paul.szczesny@emory.edu), Emory Doctor of Physical Therapy Program, Atlanta, GA

Title: Evaluating the Potential of Remote Therapeutic Monitoring in Physical Therapy Care: A Qualitative Study

Abstract

Introduction: Digital physical therapy delivered through telehealth platforms has emerged as an alternative model of care to address barriers in accessing traditional in-person physical therapy. However, research on its efficacy remains limited.

Objective: This qualitative study aimed to evaluate the perceived benefits and challenges of incorporating Remote Therapeutic Monitoring (RTM) into physical therapy practice from the perspectives of clinicians who participated in a pilot RTM program and those who did not.

Methods: Thirteen focus groups were conducted with physical therapists from PT Solutions Physical Therapy, with seven groups having used the Limber RTM platform (intervention group) and six groups without prior RTM experience (control group). Semi-structured interviews explored themes related to patient engagement, workflow, communication, and the future integration of RTM.

Results: Both groups recognized RTM's potential for increasing access to care and enhancing continuity of care. The intervention group highlighted challenges with billing, administrative burden, and user interface issues. The control group expressed concerns about patient engagement, compliance, and the potential administrative burden. Quantitative data from PT Solutions' pilot studies showed an increase in visits per patient, improved patient engagement, and financial sustainability with RTM implementation.

Conclusion: RTM shows promise in improving access to care and patient engagement in physical therapy, but concerns regarding administrative burden, workflow efficiency, patient compliance, and user experience need to be addressed. Further research is needed to evaluate the long-term impact of RTM on treatment outcomes, cost-effectiveness, and scalability across diverse settings.

Poster 6

Objective: Bone marrow transplantation is frequently indicated for management of malignant and non-malignant pathologies and typically requires an extensive hospitalization period, which can result in patient immobility. The implications of immobility are well documented and may lead to a loss of overall function. Physical therapy aims to prevent and restore this decline of function.

The purpose of this systematic review is to investigate the optimal dosage of acute physical therapy intervention for pediatric patients undergoing bone marrow transplantation during hospitalization.

Methods: A preliminary search on the Johns Hopkins Welch Library was conducted. Experimental, quasi-experimental, and analytical observational studies were included that consisted of children and adolescents who underwent bone marrow transplantation, were under the age of 25, and received physical therapy or exercise intervention during their hospitalization stay. Articles included were written in the English language within the last twenty years. One independent reviewer assessed the studies met the inclusion criteria. Two additional independent reviewers assessed for quality.

Results: 272 articles were found, sixteen met the inclusion criteria. Exercise intervention during hospitalization was found to be safe and feasible. Optimal frequency was found to be 4-5 times a week. Additionally, factors to be considered for frequency dosing were identified to be the patient's autonomy, level of support, fatigue levels, hospital stay characteristics, prior level of function, developmental state, and anthropometrics.

Conclusion: Our review showed that 4-5 sessions per week was the optimal frequency dosing; however, a more concise frequency can be prescribed to this population and help providers reduce variability when considering additional patient factors.

Impact: The importance of this study is to provide physical therapists with further knowledge to prescribe therapy intervention for pediatric patients undergoing BMT with the goal of improving functional outcome measures in this population.

Poster 7

Assessing the Symptomology of Long COVID

Authors: Spencer Dyke, SPT¹, Ricky Le, SPT¹, Maya McIntyre, SPT¹, Noah Roberts, SPT¹, Lewis Kazis, PhD²; Mary Slavin PT, PhD², Ananya Vasudevan, MD², Gabriel Sosa-Ebert MD² and Shilpa Krishnan, PT, PhD¹

Affiliations: Emory University, Division of Physical Therapy¹, School of Medicine, Boston University, School of Public Health²

Background: Long COVID has overlapping symptomology with other fatigue-related conditions such as Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS). One of the hallmark symptoms of these diseases is post-exertional malaise (PEM) which is the worsening of symptoms following minor physical or mental exertion. Long COVID and PEM cause higher psychological distress, exhaustion, neuromuscular issues, and cognitive deficits. Those experiencing PEM also tend to have a higher disability. Due to their complex nature, diagnosing, and managing them effectively is crucial.

Purpose: The purpose of the study was to assess the symptoms related to Long COVID and evaluate outcome measures used to assess PEM that impacts the individual's activity and participation in their daily lives using the International Classification of Functioning, Disability, and Health (ICF) framework.

Subjects: 7 participants, 3 clinicians and 4 patients, were recruited for one-on-one interviews. Of the patient participants, the median age was 56, with ages ranging from 35 to 77. Of these patients, 75% reported their race as White and 25% reported being White and Asian. Of the clinician participants, the median age was 53, with ages ranging from 49 to 58. Of these clinicians, 66.66% reported their race as White and 33.33% reported their race as Asian.

Methods: This study utilized a mixed methods approach with a scoping review and qualitative research design. For the scoping review, 26 articles that assessed PEM outcomes were synthesized. For the qualitative research design, one-on-one interviews of clinicians and patients with Long COVID were recruited using convenience sampling and snowball recruitment. The interviews were conducted virtually via Zoom using a semi-structured interview guide and transcribed using Otter transcription services and quality-checked. Data was then analyzed using a thematic content analysis through an iterative process.

Results: The thematic content analyses from the interviews revealed a variety of symptoms associated with Long COVID. The most common symptom found was related to brain function/cognition (16%), followed by PEM (13%), autonomic-related symptoms (11%), and fatigue (8%). The least reported symptoms were related to gastrointestinal dysfunction (0.2%), neurological (0.6%), and viral-like symptoms (2%). Symptoms unique to Long COVID included participation and activity limitations due to disability and menstrual cycle changes. The participants also revealed barriers to timely access to appropriate care, for instance participants mentioned extensive clinic wait lists and misdiagnoses. Participants stated pacing and breathing strategies as interventions provided for Long COVID care. The review of literature revealed variability in outcome measures used to assess PEM. The Depaul Symptom Questionnaire (DSQ) was the primary outcome utilized.

Conclusion: Long COVID is a complex, debilitating disease that manifests as a multi-system pathophysiological process. Those affected have severe functional limitations. Furthermore, there are social, psychological, and psychosocial impacts as well.

Clinical Relevance: A thorough evaluation of symptoms in individuals experiencing Long COVID is crucial for distinguishing it from other fatigue-related conditions. This assessment can then inform treatment plans, including the implementation of effective pacing strategies, preventing patients from overexerting themselves, and managing both psychological and physical symptoms within the patient's tolerance level.

Poster 8

Sensorimotor Contributions to Ankle Force Matching Ability in Healthy Young Adults

Tori Crapes, Caroline Keinath and Grant Sadler

Research Advisors: and Bridgette Damewood, PhD, Mark Lyle, PhD, PT

Background: Proprioceptive feedback is traditionally considered important for influencing lower limb coordination and perceiving limb position in space. A less appreciated role of proprioceptive feedback is providing the brain with information about the forces muscles generate. Accurate integration of force-related feedback with that of the motor command is necessary for motor planning and learning. Currently, we lack a method to assess the distinct contributions of ascending force feedback and the motor command to sensorimotor integration in the lower limb. Here, we adapt a force matching paradigm used in the arm to quantify sensorimotor integration of ankle force generation. Force matching error of a voluntary force reflects perceptual acuity from integrating both ascending force feedback and the motor efferent copy. The unique contribution of force-related feedback will be quantified by having participants reproduce an involuntary force generated by muscle stimulation. Errors when matching an involuntary force reflect perceptual acuity from processing ascending force feedback alone. Thus, comparing force matching ability of voluntary and involuntary forces provides a new opportunity to identify force-related sensorimotor processing impairments.

Purpose: Assess feasibility of ankle force matching method and compare force matching ability when reproducing voluntary and involuntary ankle plantarflexor forces.

Hypothesis: We hypothesize force-matching error will be greater when attempting to reproduce electrically stimulated involuntary ankle force when compared to a voluntary muscle contraction.

Methods: Ankle plantarflexor force matching ability was examined in ten adults (age: 24 ± 2 years; height: 175 ± 11 cm; weight: 83 ± 22 kg; 6 women) while seated with knee flexed 20° and ankle at 90° . The ankle was strapped to an instrumented footplate to record isometric plantarflexion forces. For the voluntary matching condition, participants isometrically plantarflexed to generate a steady force (~ 5 -8 s) of 15% max with visual feedback. After a 5 s rest period, participants were asked to precisely reproduce (i.e. match) the reference force without feedback. For the involuntary matching condition, a reference force of 15% max was

generated by electrical muscle stimulation while participants relaxed. After a 5 s rest, participants were asked to precisely reproduce the involuntary reference force without feedback. In both conditions, 10 reference-match force pairs were recorded. Participants were instructed to “focus on the sensation of the calf muscle force” during reference and force matching. Force matching accuracy was quantified as $(\text{match}-\text{reference})/\text{reference}$. Force matching precision was quantified as the standard deviation of constant error.

Results: Participants matching force was consistently greater than the reference force for both voluntary and involuntary reference force conditions. Force matching error was significantly larger when matching the involuntary compared to voluntary reference force (12 vs 53% reference force). Additionally, participants’ force matching ability was less precise during the involuntary condition (13 vs 21%).

Conclusion: Greater errors when matching involuntary plantarflexion forces reflect reduced ability to rely solely on ascending force-related feedback to reproduce ankle forces. However, several participants exhibited the ability to accurately reproduce forces with sensory feedback alone. Future work will examine whether the force-matching method can identify sensorimotor processing impairments due to aging and neuropathology (neuropathy, stroke).

Poster 9

Assessing Access to Physical Therapy Services in Rural vs Non-rural Areas

Femi Makinde, MPH, SPT¹, Kevin McLaughlin, PT, DPT, OCS, FAAOMPT²

¹Emory University, Department of Rehabilitation Medicine, Atlanta, GA, ²Johns Hopkins Hospital, Department of Physical Medicine and Rehabilitation
Baltimore, MD

Background: One of the most prevalent forms of pain in the United States is low back pain with a reported 15% to 45% prevalence of chronic low back pain.¹ Low back pain has been one of the top contributors to disability in the United States with rates up to 26% of industry insurance claims.^{1,2} This high prevalence of back pain leads to increased strain on the healthcare system with the use of imaging studies, pharmacological interventions, and other diagnostic testing, while underutilizing non- pharmacological treatments.² Early initiation of PT in episodes of LBP can accelerate recovery time while, limiting the need for additional healthcare services.^{2,3} However, for patients in rural communities access to PT services is unclear.⁴

Purpose: To examine access to physical therapy care for patients with low back pain living in rural areas, using commercial claims data. Before disparities can be addressed, they must first be identified. This work will identify rural-urban disparities in access to PT for patients with LBP which will help us develop strategies for improving access to PT for patients in these areas.

Subjects: Participants were gathered using the insurance claims for employment sponsored health insurance plans housed in the IBM MarketScan Research Database. contains deidentified health encounter information on 300 different health plans that cover approximately 30 million people.⁵

Participants ranged in age from 18 to 65 and were included in the study if there was an insurance claim for low back pain and at least one physical therapy visit during a 90 day period after index visit between June 2016 to December 2020.

Methods: A retrospective cohort study was conducted assessing the likelihood of patients living in rural areas to utilize PT services for LBP versus their counterparts living in non-rural areas between June 2016 and December 2020. The data analysis was conducted by using t-test and chi squared test to assess for any statistical significance between the groups while controlling for age and sex.

Results: Out of the original 1,478,377 patients that were selected in this cohort 493,158 were dropped because of LBP diagnoses or they underwent lumbar spine surgery in the 6 months prior to their index visit. In the final cohort of 985,219 it was found that there was a significant difference in likelihood of rural patients to utilize PT in the 90 days following initial diagnoses of LBP.

Conclusion: The analysis showed that patients in rural areas were 35% less likely to utilize PT in the 90 days following a diagnosis of LBP when compared to those living in non-rural areas.

Some of the limitations of this study were that we were unable to assess how the effect of pain medication prescription on utilization of PT. The information from MarketScan was limited to the ages of 18 to 65.

Clinical Relevance: Barriers to healthcare in rural communities is well understood, but there is limited research assessing how these barriers affect PT utilization. This study can also inform future studies in assessing how each barrier affects PT utilization.

Poster 10

Is Yoga Physical Therapy?

Yoga vs. PT/Exercise for the Treatment of Chronic Low Back Pain

Aaron Wang, SPT; Elizabeth Meriteghan, SPT; Michael Martinez, SPT; Tori Garman, SPT; Kelli Bethel PT, DPT, C-IAYT University of Maryland Baltimore, Graduate School; ; Maxwell Bethel, MSc; L Susan Wieland MPH, PhD, University of Maryland School of Medicine.

Background

Chronic low back pain (CLBP) is characterized by persistent pain or discomfort in the lower back region. CLBP is known to significantly impact a person's quality of life and their ability to perform daily, occupational, and recreational activities. Treatment for this condition is often multifaceted and includes a number of varying interventions, including physical therapy and yoga.

Methods

This research study aims to show that there are similarities in physiological and biomechanical approaches between the intervention groups (yoga vs. exercise), leading to the observed effects at 3 months post-intervention. Our study also analyzed how these protocols (yoga and physical therapy) align with the JOSPT 2021 CPG for CLBP, the incorporation of mindfulness and body awareness into the therapeutic protocols, as well as the qualifications of the individuals delivering the interventions. The inclusion criteria from the Cochrane review studies included men and women aged 18–55 years who complained of non-specific CLBP persisting for ≥ 12 weeks, pain rated ≥ 4 on a 0- to 10-rating scale, and were able to read/understand English, which resulted in five (5) studies (Saper 2017, Tekur 2008, Sherman 2011, Nayez 2019, Demirel 2019) being chosen for this review due to the accessibility of detailed intervention strategies that compared yoga to traditional exercises. Data extractions were completed from the Cochrane review articles and the JOSPT CPG articles. This included identifying common yoga poses and a literature review on the muscles activated during these poses from the Cochrane Review studies. A similar review of the physical therapy/exercise protocols of each Cochrane

Review study and the JOSPT 2021 CPG studies was also conducted where it was identified which exercises target specific muscle groups. The juxtaposition of the yoga interventions and exercise interventions, JOSPT 2021 CPG and yoga interventions, and JOSPT 2021 CPG and exercise interventions were analyzed. The yoga poses and physical therapy/ exercise intervention(s) were then matched with one of four JOSPT 2021 clinical practice guideline categories (Muscle Strengthening and Endurance, Specific Trunk Muscle Activation, Movement Control, and Trunk Mobility) for specific types of exercise. Aerobic exercise was excluded from the categorization because none of the included studies described aerobic exercise as an intervention for either the PT/exercise group or the yoga group.

Results: The results demonstrate that all five studies reviewed had more than one similarity between muscles activated or relaxed between the physical therapy/exercise (control) groups and the yogic intervention groups. It is proven that both yoga therapy and PT interventions/exercise have similar movement strategies that target trunk activation, trunk strengthening, movement control, trunk mobility, and relaxation.

Conclusion: It was found that there were no clinical differences in chronic low back pain symptoms after 3 months in the Cochrane review due to the similarity of exercises and usage of similar movement patterns between the yoga interventions and the PT/exercise interventions.

Many studies had at least one of the same interventions performed in both groups. These findings warrant more yoga studies on CLBP to determine the true effectiveness of the practice and concurrently point to potential benefits when integrating yoga therapy with traditional PT management of CLBP.

Poster 11

Descending vestibulospinal input influences heteronymous reflexes from Quad onto SOL

Authors: Caroline Fredericks cgfrede@emory.edu, Regine Jean-Louis regine.jean-louis@emory.edu, Sarah McNamee sarah.mcnamee@emory.edu, Allison Nogi Allison.nogi@emoryhealthcare.org, Bridgette Damewood Bridgette.ann.pouliot.damewood@emory.edu, Mark Lyle mark.lyle@emory.edu

Emory University School of
Medicine Division of Physical
Therapy
ReAMP Lab

Abstract:

Background: The vestibular system plays an essential role in coordinating lower limb muscles to maintain posture and balance. However, little is known about how the vestibular system influences coordination of lower limb muscles. Past studies suggest descending vestibulospinal inputs may facilitate task appropriate coordination by modulating the strength of heteronymous reflex pathways, but whether vestibulospinal input influences heteronymous reflexes in humans remains unknown. Galvanic vestibular stimulation (GVS) offers a way to selectively activate vestibular afferents and examine the influence of descending vestibulospinal input on lower limb heteronymous reflexes. Addressing this gap in knowledge is expected to provide new insight about how the vestibulospinal actions on spinal circuits facilitate postural control in health and how impaired vestibular function manifest as severe imbalance and gait unsteadiness.

Purpose: The purpose of this study is to examine whether the vestibular system influences heteronymous excitation and inhibition from the quadriceps onto soleus. The independent influence of vision will be tested by assessing heteronymous reflexes with eyes open (EO) and eyes closed (EC).

Hypothesis: We hypothesize that vestibulospinal inputs will increase heteronymous excitation and decrease inhibition from quadriceps onto soleus. We hypothesize that the changes will be greater with EC compared to EO.

Methods: Participants were placed in supine with their head supported and right foot secured in a brace at 0 degrees of dorsiflexion to prevent ankle motion. Heteronymous reflexes from the quadriceps onto soleus were examined via femoral nerve stimulation (FNS) (~30% of maximal motor response) and quantifying excitatory and inhibitory reflexes as increases and decreases in tonic soleus EMG (20% maximum voluntary contraction) in nine healthy participants (average age 25.78 ± 1.79 years old, 7 female and 2 male). The effect of descending vestibulospinal inputs on heteronymous reflexes was evaluated by stimulating vestibular afferents via GVS 100 ms prior to FNS. Heteronymous reflexes were examined with EO and EC to test whether vestibulospinal weighting changes with vision.

Results: GVS applied prior to FNS resulted in a significant decrease in soleus inhibition when compared to FNS alone with EO ($-50.6 \pm 31.6\%MVIC*ms$; $p < 0.002$) and EC ($-58.5 \pm 65.1\%MVIC*ms$, $p = 0.027$). In 5 of 9 participants, the reduced heteronymous inhibition from GVS stimulation was larger with EC compared to EO. There was no effect of GVS on heteronymous excitation for EO or EC ($p > 0.05$), though 6 of 9 participants demonstrated increased soleus excitation when GVS was applied (49.51 ± 24.87 , $p < 0.005$).

Conclusion: The study findings are the first evidence in humans that descending vestibulospinal inputs influence lower limb heteronymous reflexes. The consistent reduction in heteronymous inhibition from GVS stimulation suggests vestibulospinal actions on inhibitory interneurons (Golgi tendon organ or Renshaw cells) or their synaptic contacts onto soleus motoneurons. The reduced heteronymous inhibition and nonsignificant trend for increased excitation suggest the GVS elicited simulation of a rapid change of head motion may facilitate ankle muscle motor output. Future study vestibular system interaction with lower limb proprioceptive reflexes is critical to enhance understanding of postural instability since vestibular function becomes impaired with age and neuropathology.

Poster 12

Accelerated Aging in Pediatric Cancer Survivors: A Review of Proposed Mechanisms and Clinical Presentation

Elizabeth van der Bijl, SPT¹ ecalucas@emory.edu; Young C. Jang, PhD^{2,3}

yjang@emory.edu; Jonathan Morris, MD² jmorris@emory.edu

Emory School of Medicine, Department of Physical Therapy¹; Emory Musculoskeletal Institute²; Georgia Institute of Technology, Department of Applied Physiology; Atlanta, GA

Introduction:

Over the past several decades, childhood cancer treatment has improved so drastically that survivability has increased to over 85% in 2020¹. Despite this improved survivability, CCS are experiencing significant long-term complications of cancer treatment with mortality rates more than eight times higher than their siblings². CCS are more likely to report frailty symptoms and aging-related diseases such as cardiovascular disease and malignant neoplasms decades earlier than their peers³. Because of this, many CCS are described as experiencing “accelerated aging”

Nine hallmarks of aging have been described including genomic instability, telomere attrition, epigenetic alteration, and cellular senescence⁴. While these hallmarks are seen in normal aging, they are observed pathologically in CCS. Despite improving documentation of this phenomenon, physiological mechanisms are not well understood.

Purpose:

The purpose of this review is to outline the proposed mechanisms of accelerated aging in cancer survivors, describe the measurement of accelerated aging by epigenetic clocks, and detail the impact of accelerated aging on childhood cancer survivors.

Methods:

Extant literature was searched for representative publications describing physiology of accelerated aging mechanisms in childhood cancer survivors. Abstract and full text screening was performed and only peer-reviewed full-text publications involving CCS subjects and accelerated aging were included.

Results/Discussion

Chemotherapeutic treatment was found to have significant impact on aging phenotypes.

Generation of reactive oxygen species (ROS)⁴, decreasing telomere length⁵, and hypermethylation of CpG islands^{4,6} appear to be major mechanisms by which chemotherapeutic drugs cause accelerated aging phenotypes.

In recent years, predictive, epigenetic clocks can estimate risk of development of certain comorbidities including cardiovascular disease⁷. PhenoAge⁸ and GrimAge⁹ use blood biomarkers and methylation patterns respectively to determine factors associated with aging and morbidity.

Use of these and other epigenetic aging clocks indicate accelerated epigenetic aging in childhood cancer survivors

Functionally, CCS experience significantly higher rates of chronic health conditions than their non-survivor siblings¹⁰. Physiologic reserve is found to be so reduced that CCS mobility, strength, and endurance was found to be similar to individuals 30-40 years older¹¹. The Fried Frailty phenotype has been well documented in CCS and is found to be three times higher in CCs than their siblings².

Conclusion:

Many CCS experience an “accelerated aging” phenotype. This is measurable by epigenetic aging clocks that study biomarkers including telomere length and CpG island methylation. Young adult CCS display functional aging with frailty rates similar to individuals in their 60s-70s. With increasing rates of childhood cancer survivorship, clinicians must be aware of this accelerated aging phenomenon, and further research must be performed into clinical implications and opportunities for intervention.

Poster 13

You Can Do It!: The Impact of Motivation on Improving Walking Speed in Inpatient Rehabilitation

Hampton Jeu de Vine,

SPT Allison McCutchen,

SPT Elizabeth Scott, SPT

Rachel Speicher, SPT

Keenan Batts, PT, DPT

Michael Borich, PT, DPT, PhD

George Fulk, PT, DPT, PhD,

FAPTA

Abstract Text:

Purpose/ Hypothesis: Previous research has shown that feedback about performance following a daily walking test increased gait speed for individuals with stroke in an inpatient rehabilitation setting. Knowledge of results feedback has been shown to positively contribute to motor learning and may have a positive impact on motivation. The aims of this study are to assess the feasibility of implementing knowledge of results feedback on walking speed in an inpatient rehabilitation setting and to assess the results of this feedback on both gait speed changes over time and motivation for various patient populations involved in the study.

Number of Subjects: 23 participants from Emory Rehabilitation Hospital inpatient rehabilitation with a range of neurological or complex medical diagnoses.

Materials and Methods: Participants were included if they could walk 50 feet with less than moderate assistance and met cognition requirements. Participants performed 2 trials of a 10- meter walk test (10MWT) every other day throughout their length of stay. Immediately after the 10MWT, participants were given specific feedback on their change in gait speed from the previous session. A visual representation of gait speed changes over time was displayed in the participants' rooms. Participants completed a short survey at the end of each session about the feedback's impact on their motivation

and participation in the study. All testing was performed in the evening to avoid interfering with their scheduled therapies.

Results:

Within the first month of data collection, 25 of the 27 participants approached for consent agreed to participate in the study. At least 1 assessment was performed for 23 participants with an average of 3 assessments collected prior to discharge. All participants demonstrated an improvement in gait speed during their rehabilitation stay. The mean percent change in gait speed across all participants was 59% (SD +/- 42%) with a range of increase from 8% to 146%.

Average survey scores were 11.28 points (SD +/- 0.93) out of a total of 12 points with scores of greater than 7 points indicating a positive impact of the feedback on motivation.

Conclusions: Findings from implementing the 10 MWT suggest incorporating feedback can impact functional outcomes such as walking speed during inpatient rehabilitation. Discussions with the care team on access and eligibility to each patient enhanced this project's feasibility. Feasibility was demonstrated through patients' enjoyment shown by a high enrollment percentage. Awareness of hospital requirements for patient interaction and education for staff on study protocols contributed to successful implementation of this study. Further research is warranted to validate these findings and extend their application to diverse patient populations in rehabilitation settings.

Clinical Relevance:

The surveys on motivation and enjoyment collected provide insight into the feasibility and benefits of implementing this study into a clinical setting. Based on the Optimal Theory, knowledge of results feedback can be beneficial for patient motivation.

Outcome measures are typically expected for insurance reimbursement, but this study shows it can provide more than a requirement, it can provide motivation. This study provides a cost-efficient, timely, and patient-oriented intervention that can improve rehabilitation outcomes and patient satisfaction.

Poster 14

Test-Retest Reliability of Passive Ankle Stiffness in Barefoot and Shod Conditions

Authors: Erika Leeds, SPT; Alex Spencer, SPT; Jorjie M. Wilson, MS; Kristen L. Jakubowski, PhD; Mark Lyle, PT, PhD, Nicole K. Rendos, PhD, ATC, CSCS

*Division of Physical Therapy, Department of Rehabilitation Medicine, Emory University
School of Medicine, Atlanta, GA, USA*

nrendos@emory.edu

Abstract

Background: Ankle joint stiffness is a critical variable that influences ankle joint leverage for propulsion during gait. Quasi-stiffness is the resistance to an applied moment and is described as the slope of the relationship between joint position (angle) and joint moment. There are both active (voluntary and stretch- reflex mediated contraction of muscle) and passive (ligaments, tendons, connective tissues) components of ankle quasi-stiffness to consider during the gait cycle. The capacity of an individual to modulate ankle stiffness is important for gait performance.

Purpose: To evaluate the test-retest reliability of passive ankle stiffness measures, with (shod) and without shoes (barefoot) in healthy able-bodied individuals.

Participants: 9 healthy-able bodied participants (4 females, 5 males), ages 18-30 years old

Methods: Participants underwent passive ankle stiffness testing utilizing the isokinetic dynamometer (Humac Norm, Computer Sports Medicine, Inc., Stoughton, MA). Once seated and stabilized in the dynamometer, passive ROM of the right ankle joint into plantarflexion (PF) and dorsiflexion (DF) was measured and recorded. Participants performed maximum voluntary isolated contractions (MVICs) into PF and DF followed by passive rotations through the recorded ROM at constant angular velocities of 10° and 30°/s. EMG activity was monitored and recorded from the lower limb muscles (tibialis anterior, medial/lateral gastrocnemius, medial

soleus) throughout all passive testing procedures. Additionally, right shoe stiffness was measured using a shoe stiffness tester (GT-KA16 Shoes Stiffness Tester, GESTER) for each participant.

Results: Pending results.

Conclusion: Pending conclusion.

Clinical Implications: Ankle stiffness contributes to propulsion during gait, and the ability to modulate or modify ankle stiffness allows for adaptability in different environments. The relative contribution of both the active and passive components of ankle stiffness may differ between populations and in individuals with chronic disease.

POSTER 15

Effects of post-traumatic osteoarthritis on joint kinematics following medial meniscal transection in rats

Marin Plemmons^{1,2,*}, Seyed Mohammadali Rahmati¹, Rachel Watermeier¹, Liang-Ching Tsai³, Jarred Kaiser^{2,4}, Young-Hui Chang¹

¹Comparative Neuromechanics Lab, School of Biological Sciences, Georgia Institute of Technology, Atlanta, GA, USA

²School of Medicine, Emory University, Decatur, GA, USA

³Department of Physical Therapy, Georgia State University, Atlanta, GA, USA

⁴Atlanta VA Medical Center, Decatur, GA, USA

*Co-corresponding author's emails: mplemmo@emory.edu

Purpose/Hypothesis: Traumatic knee injuries not only disrupt connective tissue integrity but also increase the risk of developing knee osteoarthritis (OA) tenfold [1,2]. Post-traumatic osteoarthritis (PTOA) may appear 10-20 years sooner than aging-associated OA [2]. This study investigates how PTOA progression alters knee joint kinematics in rats by comparing pre- and post-surgical data. We hypothesized that knee PTOA progression would disrupt 3D joint kinematics across the entire limb during stance phase post- surgically compared to the pre-surgical baseline. To assess these hypotheses, we developed a novel three- dimensional (3D) modeling technique to obtain accurate, high-throughput joint angles during locomotion in the rat.

Subjects: Current data taken from one rat over 10 gait cycles before and six weeks after surgery. Future work will analyze nine rats before and eight weeks after surgery.

Materials/Methods: Nine Lewis rats underwent medial meniscal transection (MMT) on their left hindlimb in a GaTech IACUC approved protocol. Rats engaged in controlled dose wheel running activity before and after injury. Prior to surgery and six weeks after, when mild/moderate PTOA is expected in this well- established model [2], 3D locomotor movements during treadmill running were captured using biplanar X- ray videography [3]. These data were processed with DeepLabCut and XMALab to reconstruct 3D positions of bone landmarks to accurately map key points on a bone mesh to corresponding landmarks. Bone axes were

established, allowing for the modelling of 3D joint angles across all cardinal planes.

Results & Conclusion: The following data represent findings from one rat. In the affected hindlimb, we observed significant changes in joint angles and the total range of motion (ROM) from pre- to 6 weeks post- surgery. Notably, the knee varus angle at the onset of swing significantly decreased from $9\pm 1.5^\circ$ pre- surgically to $6\pm 2^\circ$ post-surgically ($p=0.004$). During the onset of the stance phase, marked changes were seen in hip flexion (decreasing from $33\pm 2^\circ$ to $28.7\pm 3^\circ$, $p=0.004$), and in ankle adduction (decreasing from $16.2\pm 4^\circ$ to $6\pm 3.3^\circ$, $p<<0.001$). Furthermore, analyses of total ROM highlighted significant reductions in hip Flex-Ext (from $59.7\pm 5.1^\circ$ to $55.2\pm 2.2^\circ$, $p=0.02$) and ankle I-E Rot (from $23\pm 2.4^\circ$ to $17.2\pm 2^\circ$, $p<0.001$) throughout the gait cycle. In contrast, duty factor did not show a significant difference. Taken together, our findings suggest that the overall temporal pattern of gait might be preserved, whereas the observed changes in joint angles and ROM indicate post-surgical change in the spatial control of limb movements.

Clinical Relevance: Given the high incidence of knee injuries [5] and subsequent early onset of PTOA, uncovering kinematic abnormalities arising secondary to injury is critical to understanding the progression of cartilage degeneration, prophylaxis, and rehabilitation techniques. In this study, we demonstrated that PTOA progression results in a broad joint kinematics deviations across multiple planes of motion and the entire gait cycle. Leveraging rats and computational modelling serves to increase efficiency of biomechanical research by studying the most used biomedical model, and by streamlining high-throughput analysis to enhance insight to pre-clinical biomechanics [6].

Poster 16

Probing Neural Mechanisms of Prism Adaptation Therapy

**Julia Betchart BA², Cayla Bodner BS², Caroline Cofer BS², Emmanuel Noel BS²,
Maithri Muthukumar³, Fisayo Aloba PT DPT^{1,2}, Trisha Kesar, PT, PhD^{1,2}**

*¹Emory University Neuroscience Ph.D. Program, ²Emory University School of Medicine,
Department of Physical Medicine and Rehabilitation, ³Emory University Undergraduate
Program*

Contact information: julia.betchart@emory.edu; cayla.bodner@emory.edu;
caroline.cofer@emory.edu; emmanuel.noel@emory.edu; maithri.muthukumar@emory.edu;
olufisayo.aloba@emory.edu; trisha.m.kesar@emory.edu

Purpose/Hypothesis: Stroke is a leading cause of disability in the United States. Approximately 50% of individuals following a right-brain stroke exhibit some form of spatial neglect (SN), a post-stroke disorder defined as an impairment in the processing of information in contralesional space.¹ SN alters the representation of spatial information, thus adversely affecting action planning and execution. Prism Adaptation Therapy (PAT) is a non-invasive treatment for SN, which targets the output dimension of the visuo-spatial attention pathway.^{2,3} Neuromuscular electrical stimulation (E-Stim) is an adjunct non-invasive treatment and has been shown to improve cortical motor excitability and representational visuospatial deficits with usage on the affected limb. The purpose of this study was to evaluate the effects of combining PAT and E-Stim on (1) upper limb pointing task performance and (2) corticomotor excitability assessed via transcranial magnetic stimulation (TMS).

Subjects: This is a randomized control trial that will eventually include data from able-bodied younger adults, older adults, and post-stroke individuals with SN. Our current study data were on 12 older adults (inclusion criteria: 45-90 years).

Materials/Methods: The study employed a repeated measures crossover design. Participants underwent a baseline neurophysiology assessment which consisted of recording corticospinal tract output via motor-evoked potentials (MEPs) of the bilateral flexor digitorum indicis, and left tibialis anterior and soleus in response to 15-20 suprathreshold TMS pulses. Following this baseline data, participants completed a behavioral assessment of an upper limb pointing task,

then performed pointing tasks while wearing prism glasses that induced a rightward visual shift, coupled with either E-Stim or Sham control. Two pairs of stimulation electrodes were placed on the muscle bulk of the left biceps and flexor digitorum superficialis. Three SN behavioral outcome measures were collected immediately pre- and post-PAT. Following training, participants received a post-PAT neurophysiology assessment with the same protocol as pre-PAT. After a >3-week washout period, the entire procedure was repeated with the participant undergoing the alternative protocol.

Results: We observed an increased leftward after-effect PAT + E-Stim condition compared to the PAT + Sham control condition with visual proprioceptive pointing, but no significant differences for proprioceptive pointing without visual input. Both PAT conditions induced a modulation of TMS-induced MEP amplitudes.

Conclusions: Our study results provide novel insights into the combinatorial effects and complementary neural mechanisms of E-Stim and PAT on visuospatial motor behavior and corticomotor excitability in older adults.

Clinical relevance: Evaluation of the effects of PAT and E-stim in older adults is an important step for parsing out the effects of stroke versus aging on the neural and behavioral effects of novel visuospatial motor treatments such as PAT. The long-term goal of this research is to address knowledge gaps in our understanding of neural mechanisms of SN. This research aims to enhance the current practice and development of clinical interventions for the rehabilitation of people post-stroke with SN.

Poster 17

Current screening and assessment tools for chronic pain, trauma and analgesic use: A Scoping Review to inform a multidimensional screening tool for people living with HIV

People living with HIV (PLWH) are more likely to experience chronic pain than their HIV-negative counterparts, with underlying complexities associated with opioid use and trauma. However, a strategy to rapidly screen at risk patients and refer to specialized care has not been established. This scoping review aimed to identify existing literature on chronic pain, trauma, and opioid use screening tools to guide the development of new tools in adults over 18 years of age. Forty-one studies met the inclusion criteria by encompassing validated tools for assessing chronic pain, trauma, and opioid use in adults. The findings will aid in development of a multidisciplinary and multidimensional screening tool for chronic pain among PLWH, aiming to improve patient outcomes and quality of care.

Poster 18

Adjusting after Brain Injury: Coping Strategies, Affirmations, & Activities for Stroke Survivors and Caregivers

Shawanda Harris^{1,3}; Taylor Brown, SPT^{2,4}; Stephanie Sawtelle, SPT^{2,5}

iProvide Home Care Solutions- Duluth, GA¹, Emory University School of Medicine:

Division of Physical Therapy- Atlanta, GA²

shawanda@iprovidehcs.com³ taybrown24@gmail.com⁴ stephanielambeth97@gmail.com⁵

Purpose: Write a workbook for stroke survivors and caregivers that provides education regarding stroke recovery, self-reflection, positive mindfulness, and affirming workbook activities to create healthcare access, raise awareness, and extend resources to support individuals who are navigating this new normal.

Background: A stroke is a neurovascular event that can result in significant changes in both functional independence and cognitive abilities.¹ The strongest risk factor for a second stroke is a prior stroke.² In addition, a comparison of health literacy, between a healthy control group and a stroke group, found that the health literacy level in stroke patients was significantly lower.² This study also identified socioeconomic status and low levels of education as risk factors for stroke because of poor access to healthcare and lack of knowledge about disease etiology.²

Making post-stroke lifestyle changes can be challenging as functional limitations may be present. Some lifestyle considerations include diet and nutrition. Malnutrition negatively impacts wound healing and muscle growth.³ A healthy diet includes reducing salt intake to monitor blood pressure, reducing sugar intake to prevent blood vessel damage, and avoiding saturated fats that increase LDL cholesterol.⁴ Physical activity is also important and the benefits include increased muscular endurance and strength that positively impact quality of life, participation in activities of daily living, and decreased reliance on a caregiver.⁵

Practicing positive affirmations can also improve outlook post-stroke by increasing focus, reducing stress and anxiety, and opening oneself up to receive positive actions.⁶ To live a positive life, it is important to have a positive mindset in order to improve physical health and reduce negative response to stressors.⁷ The steps to living a

positive life begin with positive self-talk, surrounding oneself with positive people, performing positive actions, improving physical health, and reducing stress.⁷

Two-thirds of stroke survivors require caregiver assistance due to the impact a stroke has on functional independence, and many of these caregivers are family members.⁸ Mental health and wellness of the caregiver is intimately linked with patient care and outcomes.⁸ In addition, increased stress or burden on the caregiver is linked to increased hospitalization and mortality in adults.⁸ Overall, the caregivers' emotions, education, and mental health are important to consider for improving patient outcomes.

Methods: A rough draft of the workbook was provided. Editors provided illustrations, chapter revisions, new crossword and wordsearch puzzles and presented them each week. The criteria for revision consisted of: health literacy at a 6th-grade reading level, revision of grammatical errors, formatting the book, original illustrations, and reflection pages.

Results: The book was completed February 2024 and will be printed and published as a spiral-bound hardcover copy.

Conclusion: A need was identified within the stroke survivor community to provide a resource that included stroke recovery education, reflection opportunities, and workbook activities. This resource provides accessible content that considers health literacy of an individual, physical capabilities, and cognitive abilities. Stroke survivors and caregivers now have an accessible resource to use during this new normal.

Poster 19

Authors: Analee Carpenter,¹ Morgan Levy,¹ Matt Rowan,¹ Andrea Willis,¹ Marlysa Sullivan,² & Elmer Ligh³

¹ Division of Physical Therapy, Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, GA

² Empower Veterans Program, Atlanta VA Health Care System (AVAHCS), Atlanta, GA, USA ³ Central Virginia VA Health Care System, Richmond, VA

Title: The Role of Interoception in Physical Therapy and Patient Care Interventions

Purpose and Background: The purpose of this review was to explore the relevance of interoception to physical therapy (PT) practice. Interoception can be defined as the capacity to sense, be aware of, and interpret the body's internal physiological signals.^{1,2,3,4} This process links physiology, emotion, thought, and behavioral self-regulation through sensing, integrating, assessing, and responding to stimuli including nociception, temperature, sense perception, proprioception, emotions, and memory.^{4,5} Interoception has important repercussions for various patient populations where autonomic regulation is affected such as chronic pain, PTSD, and cardiovascular disease. Increased awareness of interoceptive skills-building for physical, emotional,

and behavioral well-being is useful for determining patient populations that benefit from these skills and the interventions already used by PTs that support adaptive interoception.

Methods: For this narrative review, two streams of searches using Pubmed were performed. One search included keywords of interoception and patient populations of chronic pain, posttraumatic stress disorder, pelvic floor, athletes, and cardiovascular disease. The second search included interoception and interventions that PTs use including mindfulness, mindful movement, psychologically-informed practice, biofeedback, breathing practices, progressive muscle relaxation, and manual therapy. These physical therapy intervention protocols were explored. Specific mechanisms for interoceptive skills including autonomic regulation, resilience, cognitive appraisal of sensation, and emotional regulation were highlighted.

Discussion and Future Directions: This narrative literature review explores the relationship and relevance of interoception to clinical populations and interventions in physical therapy practice. Healthy interoception supports physiological well-being via regulation of the autonomic nervous system, emotion, and behavior through the learning of adaptive responses to inner and outer stimuli. Adaptive interoceptive skills have been linked to decreased stress, anxiety, pain, and pain interference, as well as enhanced performance in physical activity, overall health, and quality of life. Facilitating interoceptive awareness can be incorporated into physical therapy treatment to improve pain management, activity performance, chronic condition outcomes, and overall quality of life. Physical therapy interventions incorporating interoceptive learning include manual therapy techniques, mind-body practice (e.g. mindfulness, mindful movement, psychologically informed practice), targeted exercise interventions, and biofeedback. Interoceptive interventions in physical therapy clinical practice are an underutilized resource and crucial to helping patients reach their goals. The existing literature provides relevant and potential interventions to integrate interoceptive skills-building into physical therapy practice for various clinical populations and outcomes.

Conclusion and Clinical Relevance: Research supporting the relationship between interoception and improved physiological, emotional, cognitive, and behavioral regulation continues to grow. Physical therapy practice will benefit from a greater understanding of the clinical populations and interventions that benefit from interoceptive skills-building.

Poster 20

The GATHER Study: Generation of Adult Testing of Health, Environmental, and Recreational Measures

Danielle Audain, SPT; Obi Ntiasagwe, SPT

**Keenan Batts, PT, NCS; Trisha Kesar, PT, PhD; George Fulk, PT, PhD,
FAPTA**

Daudain@emory.edu; obinna.ntiasagwe@emory.edu;
trisha.m.kesar@emory.edu; keenan.whitesides@emoryhealthcare.org;
george.david.fulk@emory.edu

*Division of Physical Therapy, Department of Rehabilitation Medicine,
Emory University School of Medicine*

Purpose/Hypothesis: Establishment of normative values for standardized outcome measures across a variety of ages and ethnic/racial groups is essential for evaluation, treatment planning, and intervention progression. The objectives of this study were to determine age-referenced normative values of commonly used clinical outcomes in healthy, community-dwelling adults, and assess the feasibility of collecting a battery of tests within a diverse community-dwelling adult population. We hypothesized that factors such as gender, age, and social determinants of health would influence physical activity and sleep outcomes.

Number of Subjects: 19 able-bodied participants (38.83+/-12.94 years, 9 males, 68% White and 32% Black/African American) were recruited through convenience sampling from Emory University and the surrounding Atlanta area.

Materials and Methods:

All participants completed the Protocol for Responding to and Addressing Patients' Assets, Risks, and Experiences (PRAPARE) to assess social determinants of health. Physical activity was assessed via the Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function Short Form 10, sleep data via the PROMIS Sleep-Related Impairment Short Form 8 and PROMIS Sleep Disturbance Short Form. Resting blood pressure and heart rate were recorded. Additionally, grip strength, 5x sit-to-stand, gait speed (self-selected and fast), and the Gait Disorientation Test were evaluated. Finally, participants wore an activity monitor (Actigraph wGT3X-

BT) for 5 days to record their step activity and sleep.

Results:

Average resting blood pressure and heart rate for participants was 121/78 mmHg and 73 bpm (+/- 7.3). Participants scored an average of 49.72 (+/- 0.57) out of 50 total points on the PROMIS Physical Short Form, 49.44 (+/-6.18) on the PROMIS Sleep Disturbance Short Form, and 51.54 (+/-6.89) on the PROMIS Sleep-Related Impairment Short Form. Self-selected and fast gait speeds were 1.39 m/s (+/-0.14) and 2.25 m/s (+/-0.36), respectively. Average grip strength was 88.59 lbs (+/- 28.11) for the dominant and 84.35 lbs (+/- 29.96) for the non-dominant hand. Participants completed the 5x Sit to Stand in 7.07s (+/- 1.49). Future analysis of the physical and self-reported outcome measures data will evaluate correlations with age, race, gender, economic status, education level, healthcare access and history, geographical location, and sleep.

Conclusions:

We developed and demonstrated the feasibility of our novel GATHER protocol. Our results for gait speed, grip strength, and 5 times sit-to-stand were consistent with established norms. PROMIS data in our sample demonstrated higher scores than established norms, which may be due in part to their younger age and absence of medical conditions impacting mobility. PROMIS Sleep scores showed slightly lower levels of sleep disturbance (average scores < 50) and slightly elevated Sleep-Related Impairment (average scores >50).

Clinical Relevance:

In addition to rehabilitation frequency and quality, social determinants of health can influence a patient's prognosis and recovery, but these variables are often poorly documented. By analyzing the association of these factors with physical function, clinicians can better understand how to treat, educate, and share resources individually tailored to optimize function. Our study data on a battery of common outcome measures in community-dwelling adults across a wide range of age, racial, and ethnic groups will aid with interpretation and application of these test results.

Poster 21

Physical Therapy Utilization in Postoperative Frail Patients

Author List: Abdourahman Jallow, SPT, Amirah Louketis, SPT, Kathy Lee Bishop PT, DPT, FNAP, Vincent Carter, PhD, MBA, Edouard Nicaise, MD, Kenneth Ogan, MD, Viraj A. Master, MD, PhD

Background: Frailty is defined as a biologic syndrome of decreased reserve and resistance to stressors, resulting from cumulative declines across multiple physiologic systems¹. Individuals with frailty are more vulnerable to adverse outcomes post-operatively². Physical therapy (PT) can help improve fatigue and fall risks associated with frail populations³. PT is often misallocated in the acute care setting⁴. There is a gap in understanding the relationship between the utilization of acute care PT among postoperative frail individuals³. Bridging this gap can better inform referring providers of the value of PT which may result in improved readmission rates, functional mobility, and quality of life in frail individuals³.

Purpose: This study investigated the use of PT in frail and non-frail postoperative populations and impact frailty has on the ability to improve functional mobility scores and readmission rates. The hypothesis of this study was that frail participants are more likely to receive and benefit from PT compared to their non-frail counterparts.

Subjects: A cohort of 1156 participants was obtained from a prospective frailty study at the Winship Cancer Institute with review of additional factors. Inclusion criteria: over 18 years old and underwent major surgery requiring at least 1 night stay between January 1, 2012 to October 1, 2023. After applying the inclusion criteria, the final number of study participants was 820. The study cohort was made up of 75% males, 71% White, 26% African American, and 3% Asian.

Material/Methods: This was a retrospective, observational cohort study. Frailty scores were prospectively obtained at the time of preoperative surgical visits classifying patients as either not frail (0), pre-frail (1-2), or frail (3-5) according to Fried's Criteria¹. Independent variables included: gender, age, race, height, weight, body mass index (BMI), Eastern Cooperative Oncology Group (ECOG) performance status, American Society of Anesthesiology (ASA) scale, Charlson Comorbidity Index (CCI), surgical complications, and readmissions within 90 days from discharge. Postoperative PT initial evaluation, number of sessions, average time of all sessions, and AMPAC™ "6-Clicks" score calculations from initial and final sessions was gathered. Stata Version 15.1

was used to calculate Chi-Square, Mann Whitney U, and logistic regression.

Results: The final preoperative sample consisted of 129 (25%) frail and 378 (75%) not frail participants. A statistically significant relationship between stepwise increase in frailty score increasing the probability of receiving PT (OR=1.22, p=0.020). Receipt of PT evaluation was greater in frail participants reporting preoperative weight loss than those who did not (76% versus 24%; p=0.020). Unintentional weight loss increased the probability of receiving a postoperative PT evaluation (OR=2.51, p=0.019). There was no significant relationship between ECOG, ASA, CCI or BMI on postoperative PT utilization.

Conclusion: These results demonstrated a significant relationship between higher preoperative frailty scores and PT utilization during the postoperative period.

Preoperative weight loss was a key factor in receipt of PT in frail populations.

Clinical Relevance: Preoperative frailty assessments can be utilized by healthcare providers to objectively determine patients that may benefit from PT. Further research is needed to better determine this utilization and effects of PT in postoperative frail population.

Poster 22

Rehabilitation Therapy Utilization and Functional Outcomes for Patients on ECMO Support

Nicole Farolan SPT, Deondria Hawkins SPT, Zach Rumble SPT, Dallas
Vaughn SPT Briana Krieger PT, DPT, Jennifer Sharp PT, DPT, CCS

Purpose. This study investigated the relationship between rehabilitation therapy utilization and functional outcomes in patients on ECMO support. A secondary objective was to analyze patient discharge disposition in relation to rehabilitation therapy and functional outcomes.

Sample. In this retrospective chart analysis, physical therapy sessions, Boston University “6- Clicks” Activity Measure for Post Acute Care (AMPAC) scores, John-Hopkins Highest Level of Mobility (HLM) scores, and discharge dispositions were obtained or calculated from electronic medical records of 160 patients at Emory University Hospital from January to December of 2021.

Results. Patients who received PT on ECMO support had increased hospital length of stay ($p < 0.001$) and increased time spent in the ICU ($p < 0.001$). Patients who received PT on ECMO were more likely to recover ($p < 0.001$), survive to hospital discharge ($p < 0.001$), and continue therapy at home or another facility after discharge ($p < 0.001$). PT intensity was determined according to the number of days between PT sessions where >3 days between sessions would indicate a high intensity, >3 and <7 days would indicate medium intensity, <7 days would indicate low intensity. Patients in higher intensity groups obtained higher HLM scores which showed positive between session trends which peaked at the 7th session. Lower intensity groups demonstrated a steep decline in HLM scores within the first-third sessions. Patients in the higher PT intensity group experienced better functional outcomes than patients receiving PT with less frequency. Patients who started with higher levels of mobility in their first PT session continued to progress with additional PT sessions. Patients discharged home with outpatient physical therapy achieved higher levels of mobility during their episode of care at EUH in comparison to patients discharged with home health PT, acute rehab, or to a long-term acute care facility. Patients who expired during their episode of care demonstrated a consistent decline in functional mobility the longer they stayed in the ICU.

Conclusion/Implication. Patient, frequency of PT sessions, and ECMO-related

factors were correlated with higher intensity sessions, increased survival rates, increased likelihood of recovery, and continuation of therapy after discharge. These findings support the implementation of early and frequent PT treatment to improve functional outcomes of patients on ECMO support.