Oral Presentations Session A

Undergraduate Students

UG01. Emma Christensen; Robert Campbell, PhD
Presentation Title: “Improving an Individual’s Overall Weight and BMI”
Abstract: This single study design uses the A3 Thinking Model and Kotter’s Change Management model. The purpose of this study is to observe how these tools affect a college student’s goal of weight gain. The overall goal of this study is to show an increase in a student’s weight recovering from disordered eating habits and improve the individual’s well-being and relationship to food. This study was conducted over a six-week time period during the student’s fall semester of her senior year. This study addresses the difficulties faced during the recovery process of gaining weight following an eating disorder. There has been previous research done regarding recovery following an eating disorder diagnosis, but this single subject design presents more in-depth data compared to larger studies involving a larger subject pool. Over the six-week period, the student had an overall weight gain of 13.2 lbs., as well as an increase to her overall BMI by 2.0. The topic of this study is an important area of research since a large portion of female college students face this issue nationwide. The goal of this study is to show a realistic viewpoint on disordered eating recovery.

UG02. Caroline Budo; Robert Campbell, PhD
Presentation Title: “Weight Gain”
Abstract: This study was conducted on a single subject’s weight gain after receiving a Non-Celiac Gluten Sensitivity diagnosis using A3 thinking and Kotter’s Change Management Model as tools to surpass the main goal. A3 thinking is a technique that provides individuals with the opportunity to use critical thinking skills to solve problems. By creating an A3 report, the issue at hand is presented in an organized manner and lists the possible solutions in a format that flows. The solutions are conducted in a process, giving the individual a chance to make corrections if an error occurs. Kotter’s Change Management Model consists of eight steps that act as a foundation for problem solving. The eight steps of the model are as follows; creating urgency, building a guiding team, creating a vision, communication for buy in, resilience, short term wins, enable action and creating a culture of change. Following these steps when implementing a change will ensure success. The ideas presented above strongly influenced the nature of this study and provide the subject with a way to explore options pertaining to their health.

Masters/Clinical Doctorate Students (i.e., MS, DPT, AuD)

MC01. Fernando Chivela, Ashley Burch, PhD; O. Elijah Asagbra, PhD
Presentation Title: “Analysis of Patient Portal Utilization Among Patients in Eastern North Carolina”
Abstract: Introduction: Patient portal utilization has been associated with positive patient engagement outcomes. Patient portals are secure online applications offering patients convenient 24-hour access to their personal health information (PHI) from anywhere with an Internet connection. Despite their benefits and adoption efforts, the evidence of patient portal utilization and their association with patient engagement and clinical outcomes is inconclusive. We conducted this study to analyze demographic variables that predict patient portal utilization metrics and the differences in portal utilization based on diagnoses, including chronic diseases. Additionally, this study aimed to extend knowledge on patient portal utilization at an academic medical center in eastern North Carolina. Method: This institutional review board-approved retrospective study analyzed Vidant’s data on Epic MyChart utilization. We examined patient portal activation and utilization for eastern North Carolina patients who received or sent messages through the MyChart portal and had a diagnosis performed between January 1, 2015, and November 31, 2021. Descriptive analysis and logistic regressions were employed to model predictors and calculate odds ratios. Predictors and odds ratios of MyChart utilization included demographic variables and patient diagnosis. Results: A total of 55518 patients were included in the final dataset. Time-trend analysis showed limed signs of attenuating utilization over
Hypertensive disease, obesity, diabetes, kidney diseases, and sleep disorders were part of the included diagnosis. Patient portal utilization was frequent among female, married, older, and white patients with hypertensive-related conditions. Conclusion: In this dataset sample, male, younger, and minority individuals showed lower patient portal utilization. Although we found independent effects of race, we did not find a statistically significant interaction between race and time. The pandemic might have affected utilization rates, but additional analysis, including other diagnoses, is needed. Portals can provide a reliable system for distributing personal medical information to active patients and may impact in-person hospital visits.

MC02. Haley Poythress; Anne Dickerson, PhD
Presentation Title: “The Use of Visual Supports for Individuals with Autism Spectrum Disorder: Can Visual Supports Improve Driving Performance?”
Abstract: Background: Driving is a valued instrumental activity of daily living that often signifies increased independence and occupational participation. However, individuals with Autism Spectrum Disorder (ASD) obtain their license at a lower rate than typically developing peers due to differences in motor skills, visual processing, and cognition. More specifically, teenagers and young adults with ASD have increased difficulty with visual attention, visual scanning, eye gaze, and hazard perception. Occupational Therapists play a vital role in providing specialized, evidence-based interventions to support occupational performance in driving. Visual supports are intervention tools that provide visual and/or tangible information to improve an individual’s understanding of an activity. One such intervention is Drive Focus®, an interactive app designed to target visual attention, scanning and hazard detection while driving. Although the use of visual supports is supported in the ASD clinical guidelines, there is a lack of research in their effectiveness for driving intervention. Methods: Thus, this study uses a pre- and post-test design to explore the use of a visual support, Drive Focus®, to improve driving performance using eye tracking technology and observational assessments of driving performance. Participants included 14 individuals with ASD from the ages of 14 – 25 with various driving experience. Results: Preliminary data showed the visual support intervention improved driving performance in all categories. Pre-test (MR = 64.11; MU = 60.20) and post-test (MR = 67; MU = 64.7333) scores indicate that the intervention resulted in an improvement in overall driving performance for the rural drives, t(5) = 1.137, p = .307, and urban drives, t(4) = 1.490, p = .210. Conclusion: Further analysis including all participants and eye-tracking technology will offer more specific information on hazard detection including significance of findings, how long it took a participant to find a hazards, the amount of time looking at a hazard, and how many times a participant looks at a specific hazard in pre- and post-simulated drives. These results combined with observational driving performance assessments will assist occupational therapists in understanding the effectiveness of visual supports as a strategy to assist in improving independence in driving for teenagers/young adults with ASD.

MC03. Jordan Harris; Lauren Sastre, PhD
Presentation Title: “An Exploration of the Career Trajectory, Experiences and Satisfaction of Registered Dietitian Nutritionists (RDNs) who hold the Certified Specialist in Sports Dietetics (CSSD) Credential”
Implants: Are Close Electrodes Always Better?”
Abstract: Due to the demand for experienced sports nutrition educators and practitioners, in 2006, the Commission on Dietetic Registration created the Certified Specialist in Sports Dietetics (CSSD) certification to tailor the job qualifications of the Registered Dietitian Nutritionist (RDN) to work exclusively with athletes. Despite the growth in the CSSD profession, little research has been done to explore the career development, experiences, and job satisfaction of CSSDs. Studies such as these can assess the specific barriers that sports dietitians face and begin to document strategies to overcome these barriers. This study seeks to identify and explore the development, experiences, and job satisfaction of CSSDs through a mixed-methods approach utilizing semi-structured interviews and an online survey. Quantitative survey data was collected on the participants’ age, education, gender, race, certifications, experience levels, length of time with RDN and CSSD credentials, and job satisfaction level and analyzed using IBM SPSS 26.0. Qualitative data was collected via audio-recorded phone interviews and transcribed using Rev. Open coding was used to synthesize the transcripts into themes. The preliminary results of our univariate analysis have revealed that study participants predominantly identify as white (89%) females (80%) in possession of advanced degrees (78%) who have maintained their status as RDNs for 12.51 years (SD = 8.47) & CSSDs for 6.08 years (SD = 4.54). Based on this analysis, CSSDs often work with college teams (14%) and in private practice (12%), but also commonly spend a portion of their career working outside of performance settings (74%). Overall levels of job satisfaction (82%) surpassed levels of salary satisfaction (51%) with the majority of participants (59%) confirming that they are more satisfied overall in sports than other areas they have worked. These findings will be useful to gain baseline knowledge on the experiences of CSSDs and to begin to identify common barriers to practitioners.
RD01. Shailesh Gardas; Christine Lysaght; Amy Gross McMillan; Shailesh Kantak; John Willson; Swati M. Surkar
Presentation Title: “An Accelerometry Based Approach to Quantify Intensity of Hand Arm Bimanual Intensive Therapy (HABIT) and Performance Gains in Children with Unilateral Cerebral Palsy”
Abstract: Background: HABIT improves bimanual coordination in children with unilateral cerebral palsy (cUCP). Historically, training intensity of HABIT is defined as total number of hrs of therapy delivered. An objective method that quantifies bilateral upper extremity (UE) movements will accurately determine the HABIT dosage. Traditionally, effectiveness of HABIT is determined as change in standardized assessments (capacity). However, these improvements don’t translate to increased UE use in daily life (performance). Hence, it’s crucial to understand if HABIT improves UE performance. Accelerometry is a novel method that quantifies various characteristics of UE movements. Thus, our goal was to quantify HABIT training intensity and assess UE performance gains using accelerometry in cUCP. Methods: Prospective, pre-, post-training study was conducted at a tertiary center including 12 cUCP (mean age=11.8±3.5 yrs) and MACS levels I-III. HABIT was delivered over 5 days using structured bimanual practice in playful context, 6 hrs/day. Children wore the ActiGraph GT9X accelerometers bilaterally during 30 hrs of training. HABIT intensity was quantified using descriptive analysis of accelerometer derived variables: affected extremity use count (AUC), use ratio (UR), and magnitude ratio (MR), which quantify amount of the affected extremity (AE) movement and movement intensity. To quantify UE performance gains, accelerometers were worn for 3 days pre- and post-HABIT and assessed using UR, MR, median acceleration (MA), and acceleration variability (AV). MA and AV quantify movement intensity and variability. UE capacity was assessed using box and block (BBT), nine-hole peg (NHPT) and Jebsen Taylor hand function (JHFT) tests. Capacity and performance gains were analyzed with paired t-test. Results: Across 5 days of HABIT, average AUC was 13930±1257 counts/day, UR: 0.89±0.04, and MR: –0.58±0.21. Post-HABIT, there was significant gains (p=0.01) in all performance outcomes - UR: pre- 0.74±0.13, post- 0.93±0.55; MA: pre-–1.85±2.0, post- –0.93±0.55; MA: pre- 20.57±13.93, post- 30.28±14.82; and AV: pre-71.79±17.62, post- 79.80±15.57, and all capacity outcomes (p=0.01) – BBT: pre- 23±11, post- 26±11 blocks; NHPT: pre-158.8±63.6, post- 112.3±42.8 sec; and JHFT: pre- 275.9±156.9, post- 193.8±94.1 sec. Conclusion/Significance: Accelerometers can objectively quantify HABIT intensity and may provide clinicians with meaningful metric to evaluate real-world improvements in affected UE after HABIT.

RD02. Taylor D. Snodgrass, MS; Thomas J. Sitzman, MD; Jamie L. Perry, PhD
Presentation Title: “Experiences from Launching a Multisite Velopharyngeal MRI Protocol”
Abstract: Background & Purpose: The use of MRI to evaluate the anatomy and physiology of the velopharyngeal valve in children with velopharyngeal insufficiency (VPI) is a new and highly innovative application of MRI. MRI can directly visualize the velar muscles and velopharyngeal valve, can be performed at rest and during phonation, and enables quantitative measurements of anatomic structures. MRI is also noninvasive and involves no ionizing radiation, providing distinct advantages over nasopharyngoscopy and videofluoroscopy. While velopharyngeal MRI has been successfully employed in numerous research studies, translating this imaging technique into clinical care requires cleft teams and hospitals to tackle several challenges. Most imaging centers have limited experience with performing MRI on awake children, have no experience capturing speech sound production during MRI, and have limited experience interpreting images of the velum. Aims: The purpose of this study is to provide guidance on how to successfully implement velopharyngeal MRI. This guidance is derived from experiences initiating velopharyngeal MRI protocols at over twelve centers. Methods: The authors have documented how MRI set up was completed at each hospital. This documentation will be coded and analyzed for themes, identifying common issues setting up the velopharyngeal MRI protocol and how to overcome these issues during initial setup. Results: Data has been obtained from hospitals that have already launched the VP MRI protocol. Data collection and analysis are ongoing for the additional sites and will be completed in Spring 2022. Conclusions: The results of this study will provide insights into providers’ perceptions of VP MRI, identify areas of improvement for VP MRI trainings, and identify factors that lead to successful implementation of VP MRI into the clinical workflow for cleft and craniofacial centers.
RD03. Imani R. Gilbert, Riwei Jin; Fangxu Xing, PhD; Ryan Shosted, PhD; Johnghye Woo, PhD; Brad Sutton, PhD; Jamie L. Perry, PhD

Presentation Title: “An Innovative Application of MRI to Describe Velopharyngeal Function”

Abstract: The production of speech is a dynamic process that involves many sudden and discrete movements. The velopharyngeal (VP) mechanism functions for closure between the oral and nasal cavities through lateral pharyngeal wall movement and superioposterior velar moment via contraction the levator veli palatini muscle. Incomplete closure of VP structures may result in velopharyngeal insufficiency (VPI), characterized by hypernasality and poor speech intelligibility. Clinical imaging methods for assessing function of the VP mechanism include nasendoscopy and videofluoroscopy. However, these methods are invasive and often not well tolerated by young children. Magnetic resonance imaging (MRI) has seen increased use as a tool for evaluating the function of the VP mechanism as it is non-invasive and well-tolerated by child population. Despite the current advances in MR use, the analysis of VP images is novel and can be time-consuming when used on a large scale. Methods: Dynamic speech images were gathered using a high-speed and high-resolution 3D MR sequence. Four healthy adult (2 male and 2 female) subjects underwent a 3D structural scan and 5 dynamic speech scans. Scans were obtained in less than 20 minutes. Stimuli of interest for this work included /p/ in varying contexts: “hamper” and “mom ‘n bob are happy.” All images were time-aligned according to novel procedures and combined to create a statistical atlas for each stimulus. Individual and atlas data were imported into Amira 3D Visualization Modeling Software to obtain linear measurements related to VP functioning. Of interest was possible variability in velar movements and configurations when the high-pressure consonant /p/ was produced (1) after a nasal consonant and (2) after a vowel. Results: Different velar configurations during the production of /p/ were observed at the individual level for the two stimuli. Trends revealed that there tended to be a longer and thinner velum for the /p/ in “hamper” when compared to the /p/ in “happy.” Greater velar height and flexion were also observed for the /p/ in “hamper.” All trends remained true at the atlas model level, giving validity to the created atlases. Conclusion: By applying novel MR methods, we accurately described velar movements and compared individual subject data to the atlases, highlighting subject-specific deviations. This work shows great potential in utilizing MR models that capture and compare discrete speech movements, an innovative tool for assessing and characterizing velopharyngeal functioning.

RD04. Omkar Dixit; Jill Firszt; Timothy Holden; Ning Zhou


Abstract: Multichannel Cochlear Implants (CIs) bypass non-functioning hair cells due to sensorineural hearing loss and electrically stimulate the auditory nerve to restore hearing. In CI users, temporal modulation sensitivity has been shown to strongly predict speech recognition outcomes. Previous studies reported that temporal modulation detection thresholds (MDTs) vary across the tonotopic axis and attributed this variation to patchy neural survival. However, correlates of neural health identified in animal models have been shown to depend on electrode position in humans. Nonetheless, the relationship between MDT and electrode location has not been explored. We tested 13 ears for the effect of distance on modulation sensitivity specifically targeting a question of whether electrodes closer to the modiolus are universally beneficial. The participants in this study were postlingually deafened and users of Cochlear Nucleus CIs. The distance of each electrode from the medial wall (MW) of the cochlea and mid-modiolar axis (MMA) was measured from scans obtained using computerized tomography (CT) imaging. All functioning electrodes were measured for MDTs. Five ears showed a positive correlation between MDTs and at least one distance measure across the array, 6 ears showed negative correlations and the remaining two ears showed no relationship. The ears showing positive MDT-distance correlations, thus benefiting from electrodes being close to the neural elements, were those performed better on the two speech recognition measures consisting of speech reception thresholds (SRTs) and AzBio. These results could suggest that ears that were able to take advantage of the proximal placement of the electrodes are likely to have better speech recognition outcomes. Previous histological studies in humans showed that speech recognition is correlated with spiral ganglion cell counts. Alternatively, ears with good speech recognition outcomes may have good overall neural health, which is a precondition for close electrodes to produce spatially confined neural excitation patterns that facilitate modulation sensitivity. These findings suggest that the methods to reduce channel interaction, e.g., perimodiolar electrode array or current focusing, may only be beneficial for a subgroup of CI users. Additionally, it suggests that estimating neural survival preoperatively is important for choosing the most appropriate electrode array type (perimodiolar vs lateral wall) for optimal implant function.
Oral Presentations Session B

**Undergraduate Students**

**UG03. Khadijah Hendrix; Elisa Morrissete-Smith, RDN; Brandon Stroud; Lauren Sastre, PhD**  
**Presentation Title:** “We Asked, Patients Answered: Preferences for a Produce RX Program”  
**Abstract:** Introduction: Produce prescription programs (PPP) provide a voucher for fresh produce and most commonly target low-socioeconomic (SES) patients at risk for food insecurity with a chronic disease (CD). Research examining patient perceptions prior to implementing a PPP are limited, therefore, the objective of this study was to examine the perceptions, preferences and needs of patients to best tailor and target a future PPP. Methods: Semi-structured interviews were conducted by phone between December 2020 and February 2021. Patient participants (n=26, 53.8% male) were recruited from a free and charitable clinic in rural, Eastern North Carolina. Interviews were audio-recorded and transcribed verbatim. Deductive content analysis was utilized to identify themes within three categories: PPP promoters and preferences, resources, and barriers to PPPs. Transcripts were reviewed and coded independently by research members (n=4) until consensus was reached regarding all themes. Results: Preliminary recurring themes suggested strong interest in weekly produce bundles, desire for nutrition education with a focus on the specific health and CD management benefits of produce. All participants reported being willing to try new produce, desired recipes and were interested in cooking classes, demonstrations and taste testing. Some patients faced transportation barriers to pick up produce and/or technology barriers to virtual resources. Discussion: Preliminary analysis suggests PPP are valued by rural, low-SES, patients and results indicate specific resources needed (e.g. nutrition education, recipes, delivery). While PPPs are a promising public health strategy to address management of CDs, continued research is warranted to examine best methods and resources for implementation and impact.

**Masters/Clinical Doctorate Students (i.e., MS, DPT, AuD)**

**MC04. Gabrielle Stowe; Camryn Heister; Eshan Schleif; Patrick Briley, PhD; Jamie L. Perry, PhD**  
**Presentation Title:** “Private Insurance vs. Medicaid: Impact on Initiation of Breast Milk Feeding Among Infants with CL±P”  
**Abstract:** Background: Breast milk is the recommended nutrition source for all infants (CDC, 2020). Breast milk feeding among infants with cleft lip with or without cleft palate (CL±P) is possible using expressed breast milk with specialized bottles due to anatomical barriers of the oral cavity. Successful breast milk feeding among this population is associated with access to breast pumps, feeding support, and lactation education. The 2010 Affordable Care Act (ACA) mandated private insurance companies to cover lactation support, counseling, and equipment rental. However, this mandate did not extend to Medicaid recipients. Limited access to services supporting breast milk feeding recommendations among infants with CL±P insured by Medicaid poses a potential disparity. The purpose of this study is to evaluate rates of breast milk feeding among infants with CL±P as a function of insurance status. Chi-square tests of independence were used to determine statistically significant differences among categorical variables. Logistic regression models were used to determine odds of breast milk feeding of mothers insured by Medicaid, using mothers with Private Insurance/Self-Pay as the reference group, while controlling for statistically significant maternal and infant characteristics. Results: Of 896 infants with CL±P and Medicaid, 527 (58.8%) were breast milk fed at discharge. Of 865 infants with CL±P and Private Insurance/Self-Pay, 621 (71.8%) were breast milk fed at discharge. After controlling for baseline demographic differences, results indicated that infants with CL±P in the Medicaid group had reduced odds of breast milk feeding compared to the Private Insurance/Self-Pay group (OR = .08; 95% CI 0.56, 0.96). Conclusion: Breast milk support services are often necessary for the initiation of breast milk feeding among infants with CL±P. However, these resources are likely not as readily available for those enrolled in Medicaid. These results suggest that infants with CL±P, enrolled in Medicaid, may experience reduced breast milk feeding rates due to limited resources to initiate breast milk feeding. Factors that may promote breast milk feeding among this population are discussed.

**MC05. Amber Ausley; Gabe Pate; Riley Horn; Chia-Cheng Lin, PhD; Stacey A. Meardon, PhD**  
**Presentation Title:** “Musculoskeletal Injury and Postural Control Across the Lifespan”
MC06. Emily Mitchum; Anne Dickerson, PhD

Presentation Title: “The Relationship Between Instrumental Activities of Daily Living and Naturalistic Driving Performance: Indications for Mild Cognitive Impairment Detection”

Abstract: The Assessment of Motor & Process Skills (AMPS), as a valid/reliable indicator of cognitive decline, has been shown to correlate with standard on-road driving evaluation (SODE) performance but has yet to be tested against naturalistic driving behaviors (NDBs). SODE has also shown some correlation with cognitive decline, suggesting NDBs may detect cognitive decline. This exploratory study examined the nature and strength of the relationships between these assessments in older adults to potentially determine the efficacy of NDB outcomes in predicting cognitive decline. A cross-sectional design compared the AMPS’s process skills with both naturalistic and standard driving outcomes in older drivers. Participants consisted of 41 older adult drivers recruited from the community over 65 years of age (M = 73 yrs). Participants agreed to drive with a location-tracking chip in their vehicle for 20 weeks. The chip collects data similar to GPS as well as driving performance including sudden stops, hard cornering, and number of trips. Each participant completed the AMPS assessment and a comprehensive driving evaluation. The P-Drive is an observational tool scored on quality of driving performance. While the mean score was 89.36/100, indicating normal performance, the scores were categorized by performance between those who did poorly (<80), passed (80-89), and did very well (>90). A one-way ANOVA found no significant differences in AMPS process scores based on the performance of the P-drive groups (F(23)=1.19, p<0.324). Using the same performance grouping, an ANOVA found a significant difference (F(24)=3.64, p<0.036) between MoCA scores and P-drive outcomes. Non-significance in the AMPS scores and P-Drive is not surprising, as these were community-living, active drivers. However, the individual with the lowest AMPS process score (0.9) had the lowest P-Drive score (73) and a significant difference existed between P-Drive score groups. Interestingly, the MoCA mean score was 24.95, indicating sub-normal cognition amongst the sample. While one might argue that the MoCA is more sensitive to cognitive change, we argue that the non-significant difference between AMPS and P-Drive is based on functional performance or functional cognition, which may be a more relevant measure. Results of NDB data analysis to support these findings is forthcoming.

MC07. Rachel Sorensen; Denise Donica, DHSc

Presentation Title: “Feasibility and Usability of the Virtual Reality System, RecoVR, for Children with Cerebral Palsy”

Abstract: Introduction: Neuroplasticity principles are important when working with children with cerebral palsy (CP) in creating therapeutic interventions to increase motor repetitions for long-term learning. Typical treatment includes 1 therapy session/week and a home program with reportedly low levels of compliance. Thus, a virtual reality system, RecoVR, was developed to increase compliance through a more motivating home supplemental program. This study explored the feasibility and usability of RecoVR focusing on motor repetitions for children with CP. Specifically, it explored if the RecoVR was an engaging supplemental therapeutic activity, children had a positive experience with the system, and parents had a positive experience facilitating its use. Methods: Children between the ages of 6-15 years old (n=5) were recruited who had some active motion at the shoulder and elbow and could follow two-step directions. Children were screened (SHUEE, MUUL, and Initial Questionnaire) to ensure eligibility criteria were met, then trained on usage of the system. Each child’s family borrowed a system for the child to play 1 hour/day 5 days/week for 4 weeks at home. Repetitions and time were recorded by RecoVR each use. Children completed the NASA-TLX after each use to determine perceived workload (play experience) and parents completed a weekly form questionnaire on their experience using Likert-style questions. Following the 4 weeks, the parent and child were interviewed in-person regarding their experiences. Results: Children (n=2) who used the system more than 50% of expected time (M=649 min) completed more repetitions (M=11,789), compared to those (n=3) who used the system
less than 10% of the expected time (M=44 minutes) who had much lower repetitions (M=436). None of the participants reported a high perceived workload, (avg=24.4-60.9) on a 0-100 scale, meaning this therapeutic activity likely fit the just-right challenge and needs of their therapy goals. High system satisfaction, ≥4.0 on a 0-5 scale, was found among parents of participants who had high usage and were more engaged playing the system. Conclusion: Preliminary data suggests RecoVR may be a beneficial supplemental therapeutic activity to explore further for benefits with those who have low to moderate CP.

Research Doctorate Students (i.e., PhD)

RD05. Wyatt Bunner; Jeremy Grissett; Erin Suellentrop; Denys Bashtovy; Liz Haris; Tuan Tran; Erzsebet M. Szatmari, PhD
Presentation Title: “Role of Rab10 in Alzheimer’s Disease Resilience”
Abstract: A recent focus of Alzheimer’s disease research is the identification of cellular and molecular factors that prevent neurodegeneration. One such protective factor is the small GTPase, Rab10. A rare variant in the 3’-UTR of Rab10 leads to reduced Rab10 activity and subsequently retention of normal cognitive function even in the face of dementia (“cognitive resilience”). Here we used Rab10+/− mice to identify novel molecular mechanisms by which reduced Rab10 level guards the aging brain. We found that physical attributes and brain morphology are normal in Rab10+/− mice compared to their Rab10+/+ littermates. Brain expression analysis of 880 genes involved in neurodegeneration showed that Rab10+/− mice have higher activation scores of pathways associated with neuronal metabolism; structural integrity; neurotransmission and neuroplasticity compared to their Rab10+/+ littermates. Lower activation scores were observed for pathways involved in neuroinflammation and aging. We identified several differentially expressed genes (DEG) including Stx2, Stx1b, Vegfa, Lrrc25 (downregulated); and Prkka2, Syt4 and Grind2d (upregulated). Transcriptome profiling was validated at DNA level by conventional qPCR. Behavioral testing using a battery of tasks showed that Rab10+/− mice perform better in a hippocampus-dependent spatial task (Object in Place Test; OIP), while their performance in a classical conditioning task (trace eye blink conditioning; trace EBC) was significantly impaired. Therefore, our findings indicate for the first time that Rab10 differentially controls the brain circuitry of hippocampus-dependent spatial memory (OIP) and higher-level behavior requiring intact cortex-hippocampal circuitry (trace EBC). Transcriptomic and biochemical characterization of these mice strongly suggest that Glutamate Ionotropic Receptor NMDA Type Subunit 2D is a potential mediator of Rab10+/− behavioral phenotypes. The Rab10+/− mice described here can be a valuable tool to study mechanisms of resilience in AD model mice on reduced Rab10 background and to identify novel therapeutical targets to prevent cognitive decline associated with normal and pathological aging.

RD06. Neda Tahmase bifard; Patrick M. Briley, PhD; Jamie L. Perry, PhD
Presentation Title: “Contributors to Negative Human Milk Feeding Outcomes Among Infants Admitted to the NICU with Cleft Lip and Palate”
Abstract: Objective: The purpose of this study was to compare intrinsic and extrinsic factors among infants admitted to a neonatal intensive care unit (NICU) with cleft lip and palate (CLP), as a function of human milk feeding status at discharge. Method: Data collected of mothers and their infants admitted to the NICU with CLP from the 2018 National Vital Statistics System were used for this study. Chi-square tests of independence were used to compare categorical variables among two groups of infants admitted to the NICU with CLP – those who did and did not receive human milk feeding at discharge. Independent samples t tests were used to compare continuous variables. Results: The sample included 660 infants admitted to the NICU with CLP, of which 353 were infants who had human milk feeding at discharge. Significant differences were found for marital status, mother’s education, maternal smoking record, total numbers of prenatal care visits, multiparity (having more than one baby at birth) record, gestational age, gestational weight, and using assisted ventilation for more than six hours. Conclusion: Results indicated that as a function of human milk feeding at discharge, mothers and their infants admitted to the NICU with CLP exhibit differences across a variety of intrinsic and extrinsic factors. These findings further our understanding of this sample of mothers and infants with CLP, while potentially identifying determinants to human milk feeding. This study provides insight into mother and infant characteristics that are most vulnerable to not breastfeeding.
**RD07. Ankur Padhye; John Wilson, PhD**  
**Presentation Title:** “Effect of Intrinsic Participant Characteristics on Joint Contact Force Asymmetry Following Anterior Cruciate Ligament Reconstruction”  
**Abstract:** Purpose: Anterior Cruciate Ligament (ACL) injury is one of the most common athletic injuries. The rehabilitation that follows an ACL reconstruction (ACLR) surgery is extensive yet often results in decreased quality of life, fear of movement, and negative attitude regarding physical activity participation. Additionally, even after rehabilitation, residual deficits in functional performance and joint kinetic asymmetries exist. These altered movement patterns and joint mechanics may accelerate long term degenerative joint disease but are difficult to detect in clinical settings. The purpose of this study is to test for predictors of such joint contact force asymmetries in people following ACLR. Method: 30 participants (19 females) with unilateral ACLR participated in the study. 30 control participants were selected to match the ACLR participants on sex, mass, and activity level. 3D motion capture was used to record lower extremity kinematics and ground reaction forces during walking and running, (1.25m/s and 2.7 m/s, respectively). A validated musculoskeletal model with an inverse dynamics-based static optimization routine was used to estimate bilateral hip, knee, and ankle joint contact force data and asymmetry indices (LSI) were calculated. Multiple linear regression was used to predict LSI with quadriceps strength, self-reported knee function and symptoms, fear of movement (kinesiophobia), and time since surgery as predictor variables. Clinical Relevance: Restoring kinetic symmetry following ACLR may be an important therapeutic target. However, estimates of joint contact forces require time and resources beyond the scope of practicing physical therapists. The results of this analysis may provide clinicians, coaches, and athletes a basis for decision-making and safer progression and return to play criterion following rehabilitation to minimize risk of post-reconstruction degenerative changes.

**Poster Presentations Session A**

**Undergraduate Students**

**UG10. Kathryn Fennie; Andrew J. Vermiglio, AuD; Virginia D. Driscoll, PhD; Ava Cunningham; Abigail Ormond; Erin Kokinda; Caitlyn Paulson; Reyse Stirret; Laura Hall**  
**Presentation Title:** “The Effect of Listener Group and Masker Condition on Auditory Working Memory”  
**Abstract:** The goal of this study was to determine the effect of listener group and masker condition on auditory working memory. Forty-five participants between the ages of 19-31 years with normal pure-tone thresholds were evaluated. Listener groups were assigned based on self-reported difficulty with speech perception in noisy environments. Participants who reported no difficulty were assigned to the control group. Participants who responded with difficulty were assigned to the King-Kopetzky Syndrome (KKS) group. Auditory working memory was evaluated using the Digit Span Forward Recall test in four listening conditions: four-talker babble forward, four-talker babble backwards, conversational masker forward, and conversational masker backwards. Effects of semantic information in maskers on auditory working memory performance was evaluated by comparing Digit Span scores in forward versus backward masker conditions. A statistically significant main effect was found for listening condition on Digit Span scores. Evidence also suggests that working memory ability may be compromised by semantic interference.

**UG11. Mary Phipps; Wyatt Bunner; Denys Bashtovyy; Ryohei Yasuda; Erzebet M. Szatmari, PhD**  
**Presentation Title:** “Centaurinα1-Bid Signaling in Alzheimer’s Disease Progression”  
**Abstract:** OBJECTIVES: The brain-specific Ras-anchoring protein, ADAP-1/Centaurinα1 (CentA1) is required for Aβ42-induced neuronal dysfunction. The hAPP-J20 mouse model of Alzheimer’s disease (AD), lacks CentA1 which reduces amyloid deposition, neuroinflammation and dendritic spines loss. To gain insights into the molecular mechanisms of this rescue, we performed transcriptome profiling. Using forebrain samples of wild type (WT), hAPP-J20 and hAPP-J20 x CentA1 KO mice, we identified the pro-apoptotic factor Bid (BH3-interacting domain death agonist) as a differentially expressed gene. As a member of the Bcl-2-family, Bid promotes death receptor-mediated apoptosis in neurons (Fig1). The goal of this study was to determine the role of Bid in the rescue of AD-like phenotypes in hAPP-J20 x CentA1 KO mice. Our working hypothesis is that CentA1 KO protects the brain from AD
progression by inhibiting the upregulation and/or mitochondrial translocation of Bid. METHODS: Three different groups of mice were tested: WT, hAPP-J20, and hAPP-J20 x CentA1 KO. We used transcriptome profiling to analyze gene expression; qPCR to validate transcriptome profiling results; mitochondrial isolation to obtain pure mitochondrial fractions from forebrain samples, and western blotting to evaluate the level of Bid in whole cell lysates vs. mitochondrial fractions. RESULTS AND CONCLUSIONS: We compared the expression of 880 genes across NanoString’s mouse Neuropathology and Neuroinflammation gene expression panels in matched forebrain samples from WT, hAPP-J20, and hAPP-J20 x CentA1 KO mice (n=5 mice/genotype; age 6-8 months). Plotting the pathway scores uncovered profound differences in multiple pathways associated with apoptosis and gliosis. At the individual gene level, CentA1 KO reduced the level of the pro-apoptotic protein, Bid. (Fig2). Next, this significantly altered Bid gene expression was validated by qPCR analysis performed on RNA isolated from corresponding frozen tissue (Fig3) and western blotting from whole cell lysates and mitochondrial fractions (Fig4). While the data shows a trend towards increased Bid levels in hAPP-J20 mice vs. WT and hAPP-J20 x CentA1 KO mice, there was no statistical significance at the gene or protein level, due to a low sample number. In conclusion, the data indicates involvement of Bid in AD-like phenotypes in hAPP-J20 mice, which can be rescued by lack of CentA1.

UG12. Thomas Abraham Willis; Santiago Rivero; Marc D. Pell; Kathrin Rothermich, PhD

Presentation Title: “The Effect of Task Demands on Processing Emotional Vocalizations and Speech”

Abstract: In daily life, humans use different types of vocal communication to express emotions, such as non-linguistic vocalizations or speech prosody. We have shown previously that vocalizations seem to be processed preferably compared to speech, revealing differences about 100ms after stimulus onset. We used event-related potentials (ERPs) to replicate these findings while participants process neutral, happy, and disgust vocalizations and pseudo-speech. In each trial, the auditory stimulus was followed by a face 400ms later, which was presented for a companion study. In contrast to the earlier study, where participants were focusing on the emotional content, we asked participants to judge attractiveness and age of the accompanying faces. For each of the 22 participants, EEG was recorded using 64 active electrodes. N100 and P200 components were analyzed for different regions of interest (frontal, midline, parietal), tasks (age, attractiveness), speech type (vocalizations, speech prosody), and emotions (neutral, happy, disgust). We found significant amplitude differences for speech type, emotion, and task for the N100 in frontal, parietal, and midline regions of interest. For the P200, we found effects of speech type in the frontal region, and for emotion and task in all three regions. As the subjects’ attention was not directed to the auditory stimulus, the current results may represent automatic affective processing. This could be behaviorally beneficial, for example in complex social settings. Significant differences found in the P200 by task indicate that the processing of auditory signals may be task-dependent, pointing to differences in the neuro-cognitive mechanisms of evaluating age or attractiveness.

UG13. Laura Hall; Andrew J. Vermiglio, AuD; Virginia D. Driscoll; PhD; Abigail Ormond; Erin Kokinda; Caitlyn Paulson; Reyse Stirrett; Ava Cunningham; Kathryn Fennie

Presentation Title: “The Effect of Musical Experience on the Ability to Recognize Speech in the Presence of Noise”

Abstract: The goal of this study was to determine the effect of musical experience and masker condition on speech perception in noise ability. Speech perception in noise ability was evaluated using the AzBio sentences with six maskers. Participants were divided into musician and control groups based on their musical experience. No statistically significant differences in speech perception in noise ability were found between groups across all masker conditions. A statistically significant main effect was found for masker condition.

UG14. Abigail Ormond; Andrew J. Vermiglio, AuD; Virginia D. Driscoll, PhD; Erin Kokinda; Caitlyn Paulson; Reyse Stirrett; Ava Cunningham; Kathryn Fennie; Laura Hall

Presentation Title: “The Effect of Semantic Interference on Speech Perception in Noise Ability”

Abstract: The goal of this study was to determine the effect of semantically meaningful masker content on speech perception. The maskers included four-talker babble and conversational maskers presented forward and in reverse. Speech perception in noise ability was determined using the AzBio sentences. Poorer speech perception was found
for the forward masker conditions than for the same masker conditions in reverse. Greater semantic interference was found for the four-talker babble conditions as opposed to the conversational masker conditions.

Masters/Clinical Doctorate Students (i.e., MS, DPT, AuD)

MC10. Emily J. Britt, OTS; Makayla E. Dillon, OTS; Lynne Murphy, EdD
Presentation Title: “How Older Adults Experience the Transportation Planning Process: A Case Study”
Abstract: Community mobility, an instrumental activity of daily living (IADL), is often tied to social participation and high levels of quality of life by providing individuals with a means to engage in meaningful relationships and occupations. Research has found that many older adults are outliving their ability to drive, which puts retired drivers at risk for emotional and mental health impairments (Foley et al., 2002; Liddle et al., 2008). The purpose of this study was to determine how older adults experience driving cessation and the role of occupational therapists in helping facilitate that lifestyle transition through the use of transportation planning. This case study was taken from a quasi-experimental, single group, pretest/post-test design. Researchers met with the participant three times over the course of three months to discuss community mobility preferences and integrate the use of alternative methods of transportation. The following assessments were administered to measure readiness for transition, quality of life, driving habits, and social participation: Assessment of Readiness for Mobility Transition (ARMT), Control - Autonomy - Self-Realization - Pleasure Scale, 19 items (CASP19), Modified Driving Habits Questionnaire (MDHQ), and Patient-Reported Outcomes Measurement Information System Satisfaction with Roles (PROMIS). Qualitative data was collected through informal interview questions. The study found that the transportation planning process provided the participant with the resources and knowledge to overcome barriers to driving cessation and helped to establish a readiness to transition to alternative methods of transportation in the future.

MC11. Zana Devlin; Kelley Hulihan, PA-C; Shawn Wagner, PA-C
Presentation Title: “A Comparison of Treatment Strategies for Type 2 Diabetes in Adolescent Youth: A Literature Review ”
Abstract: Background: Despite the increasing prevalence of type 2 diabetes mellitus (T2DM) in adolescent youth, guidance for best treatment options with more effective glycemic control remains limited. Complications related to T2DM in adolescents contribute to substantial clinical and public health burden.1 Review of the literature, comparing treatment strategies for management of T2DM in adolescents, was performed in efforts to evaluate therapies that may yield better outcomes and maintenance of glycemic control. Methods: Databases (PubMed, CINAHL, ClinicalTrials.gov) were searched with key phrases such as: “adolescent diabetes type 2”, “hyperglycemia”, “metformin monotherapy”, “glycemic control”, and “GLP-1 receptor agonists”. Two randomized clinical trials, the TODAY study (completed in 2014) and the ELLIPSE study (completed in 2018), both of which led to FDA-approval of pharmacotherapies for management of T2DM in adolescents were analyzed and compared. Additional articles related to improvement of glycemic control in adolescents were included. Study findings reported here include outcomes specific to adolescent youth (ages 10-17) with T2DM in United States as well as other countries and exclude any studies that had patients with type 1 diabetes, history of heart disease, or any other endocrine disorders. Results: The TODAY study (n = 699) demonstrated a 51.7% rate of treatment failure with metformin, 46.6% with metformin plus lifestyle intervention, and 38.6% with metformin plus rosiglitazone, leading to initiation of insulin therapy for glycemic control.1,4 The ELLIPSE study (n = 135) demonstrated a decrease in HbA1c of less than 7% in 63.7% of patients treated with liraglutide as compared with 36.5% in the placebo group.5 Discussion: This literature review suggests that the recently approved liraglutide presents a safe and more efficacious option for management of T2DM in adolescents when compared to metformin and insulin. Therefore, GLP-1 RAs should be considered as better agents for youth with T2DM in efforts to delay long-term complications.

MC12. Ashlyn Kerls; Alesa Stallings; Sarah Johnson
Presentation Title: “Case Study: Running-Related Injury Prevention Post-Gluteus Medius Tear”
Abstract: Background: This case study examines a 39-year-old female runner who was diagnosed with a left gluteus medius tear at the aponeurosis using MRI technique. At the time of injury, the patient was running approximately 50 mi/wk, 8:30 pace, and training for the Boston Marathon. The patient reported she initially felt a
“twinge” during hill sprints. After a few days of rest, she completed a 10-mile run during which she experienced persistent, severe pain. The next day, she had swelling and a visible bruise down the left lateral aspect of her thigh. The patient received a corticosteroid injection but did not appreciate any benefit. The patient decided to proceed with conservative treatment and was referred to physical therapy approximately one-month post-injury. The patient’s goals included returning to the previous level of running, improving run form, and injury prevention. The purpose of this case study was to look at short- and long-term recovery and injury prevention with conservative management.

Case Description: The patient presented to ECU’s Physical Therapy Clinic with various impairments leading to activity limitations and participation restrictions. Prior to being cleared to return to running, our patient participated in core and bilateral lower extremity strengthening exercises, stretching, and manual and dry needling techniques to address functional impairments. Once cleared to run, she was prescribed a gradual return to running protocol, followed by a running analysis, all of which were completed by PT/SPTs. The main finding of the running analysis was the patient’s increased bilateral knee valgus and decreased knee window, most likely indicating reduced bilateral gluteus medius eccentric control. This may have led to the initial injury and may potentially lead to a recurrent injury. These results were discussed with the patient, and she was provided with visual feedback and a verbal external cue, “drive your knees forward”, to improve running technique in order to mitigate, or possibly prevent, future injury.

**MC13. Greg Schwartz, SPT; Michael Garrison, DSc**

**Presentation Title:** “Patient Expectations: The Problem and the Solution (A Scoping Review)”

**Abstract:** The relationship between patient expectations and various outcome measures has been a focus of research for decades due to its suggested impact on patient centered care. The literature suggests multiple areas of interest to patient outcomes such as positive versus negative expectations, relation to specific conditions or treatments, and a multitude of confounding variables including sex, education level, age, race, depression, marital status, patient-clinician relationship, etc. However, further analysis of the literature indicates a lack of standardization in terminology, measurement, and healthcare practice, creating extreme doubt in the findings of large-scale analyses and hindering a deeper understanding of this relationship. The aim of this paper is to highlight those issues and provide suggestions to improve the standardization of research and clinical application regarding patient expectations and outcome measures. For terminology, there are numerous accepted theories and descriptors regarding patient expectations, often presented in research without clear definitions. The lack of distinction in what dimension of patient expectations are being discussed or measured creates extreme heterogeneity in results across multiple studies. For measurement, there is an overwhelmingly large selection of instruments available, inherent lack of established validity and reliability, and heterogeneity in the dimension(s) of expectations being measured. This lack of standardization in the terminology and measurement of patient expectations inhibits the ability to draw conclusions across the literature and further understand the relationship between patient expectations and outcome measures. Clinicians can help further advance knowledge on patient expectations, as well as better treat their patients, through standardizing their practices. When measuring expectations, clinicians can follow general guidelines for instrument selection and application to increase standardization, reliability, and validity. They can also use specific terminology to increase the predictability of patient expectations through various modifiers such as clarifying the dimension of patient expectations being measured, referencing a timeframe in outcomes, and including functional goals. Research also suggests clinicians may have volitional influence on patient outcomes through how they express their own expectations.

**MC14. Reyse Stirrett; Andrew Vermiglio, AuD; Virginia Driscoll, PhD; Caitlyn Paulson; Erin Kokinda; Ava Cunningham; Kathryn Fennie; Laura Hall; Abigail Ormond**

**Presentation Title:** “The Effect of Tinnitus on Speech Perception in Noise Ability”

**Abstract:** Background: Gilles et al. (2016) found that young adults with tinnitus demonstrated decreased speech in noise perception abilities as compared to young adults without tinnitus (Gilles et al., 2016). According to Zeng et al. (2020) the effect of tinnitus on speech perception in noise is minimal. The purpose of this study was to determine the effect of tinnitus on the ability to recognize speech in the presence of background noise. It was hypothesized that better speech recognition in noise performances would be found for those who did not have tinnitus. Methods: Fifty-two native English speakers participated in the study. All participants had normal pure-tone thresholds (&lt; 25 dB HL, 0.25 - 8.0 kHz) except for two participants who had thresholds of 30 dB HL at 8000 Hz in the right ear. Participants who reported the presence of tinnitus were placed in the tinnitus group and all other subjects were placed in the control group. Speech perception in noise ability was determined using the Hearing in Noise Test (HINT; Nilsson et al, 1994; Vermiglio, 2008) and the AzBio test (Spahr et al, 2012). Results: An analysis of variance revealed a main effect for group for the HINT results (F = 4.67, p=0.036). An analysis of variance revealed a significant main effect for HINT
Mc15. Brittany Copeland; Grace Lee; Lynne Murphy, EdD  
**Presentation Title:** “How Older Adults Experience the Transportation Planning Process: A Case Study”  
**Abstract:** Community mobility is an important occupation to many older adults as it is linked to social participation and quality of life as a means to navigate one’s community. Although driving is the most common form of community mobility, alternative methods must be explored in order to provide older adults with options to maintain their meaningful roles following driving cessation. This case study is taken from a quasi-experimental, single group, pre-test post-test design. The purpose of this study was to explore how older adults who are currently driving experience the transportation planning process and how occupational therapists can assist in facilitating ease in a transition to driving cessation. This study used qualitative data gathered from interviews to explore how older adults, who are currently driving, experience the transportation planning process. Formal assessments measuring social participation and quality of life were used to assist in identifying what an older adult experienced during the transportation planning process. This study showed that introducing transportation planning prior to driving retirement increases acceptance to alternative community mobility methods.

Mc16. Erin Suellentrop; Jeremy Grissett; Wyatt Bunner; Erzsebet Szatmari, PhD  
**Presentation Title:** “Validation of Gene Signature Observed in nCounter Analysis of Rab10+/- Mice”  
**Abstract:** Transcriptome analysis can be useful as a first line of investigation in explorative studies including drug target discovery and identification of potential biomarkers for a specific disorder. Here we show validation of Rab10 +/- transcriptome profiling that was performed on cortical brain samples using the nCounter Analysis System from NanoString Technologies. This system employs unique fluorescent barcodes that enable direct, digital detection of hundreds (≤800) of different target molecules in a single run. For our experiments we used the mouse Neuropathology and Neuroinflammation Gene Expression Panels to evaluate about 880 genes associated with neuroinflammation; brain aging; neuronal metabolism; structural integrity; neurotransmission and neuroplasticity. First, we validated several significantly altered genes by conventional quantitative PCR (qPCR) analysis, performed on RNA isolated from corresponding frozen tissue specimens used for NanoString nCounter Analysis. While we observed similar changes in the subset of genes tested with NanoString platform and qPCR, only one of the individual genes (Grin2d) reached statistical significance in qPCR analysis. Next, we validated the NanoString and qPCR results using biochemical analysis performed on corresponding frozen tissue specimens. Western blotting analysis further validated the increase in Grin2D expression level in the cortex of Rab10+/- mice compared to wild type littermates. Grin2D is an NMDAR subunit, that has recently been identified to play role in neurodevelopment. Rare mutations in Grin2d gene have been associated with schizophrenia, autism, and epilepsy. In future experiments, we will study the role of Rab10 in cytoskeletal dynamics associated with exocytosis of glutamate receptors, particularly Grin2D.

Mc17. Kristy Loomis; Swati Surkar, PhD  
**Presentation Title:** “Upper Extremity Capacity versus Performance: A Comparative Study Between Children with Unilateral Cerebral Palsy and Typically Developing Children”  
**Abstract:** Background: Children with unilateral cerebral palsy (cUCP) have loss of upper extremity motor control, which affects their activities and participation. The standard clinical outcomes to assess the upper extremity (UE) function measure the child’s capacity. Capacity is defined as what a person can do in a standardized, controlled environment. Performance is defined as what a person actually does in their daily environment. Traditionally, it has been assumed that better capacity translates to better performance. Current evidence in individuals with stroke, suggest capacity do not always correlate with performance. However, such relationship has not been investigated in cUCP. Wrist worn accelerometers is emerging as a novel technology to assess performance. Therefore, the purpose of this study was to first compare the differences in capacity and performance measures between typically developing
children (TDC) with cUCP and to investigate capacity vs performance relationship in cUCP. Methods: 10 TDC children and 8 children with cUCP, ages 6-16 years participated in this study. We assessed UE capacity using Box and Blocks Test (BBT), Jebson’s Hand Function Test (JHFT), and grip strength. The UE performance was measured with wrist worn accelerometers for 24-hours. Use ratio, bilateral magnitude, and magnitude ratio were accelerometry derived variables to quantify performance. Results: There was a significant group main effect (P<0.01) for all capacity and performance measures. We compared non-dominant hand performance of TDC with the affected hand of cUCP. cUCP had lower manual speed (BBT: cUCP = 8.25 ± 5.96, TDC = 51.83 ± 5.88 blocks), lower manual dexterity (JHFT: cUCP = 275 ± 156, TDC = 86 ± 18.6 sec), and weak hand grip (cUCP = 1.15 ± 2.46, TDC = 26.23 ± 13.43 lbs). On performance measures cUCP had significantly lower use ratio (.63 ± .31 vs .97 ± .03), bilateral magnitude (82.56 ± 37.75 vs. 153.57 ± 22.53), and magnitude ratio (-1.83 ± 2.58 vs -0.37 ± 0.38). There was a moderate positive correlation (r=0.4) between AHA scores and bilateral magnitude. Conclusion: Standardized tests and accelerometry can objectively quantify capacity and performance in children. cUCP have reduced UE capacity and performance. Contrary to our hypothesis, impaired UE capacity in children with UCP contribute to reduced UE performance.

MC18. Hunter Etheridge; Sarah Johnson, DPT
Presentation Title: “Effects of Long-term Run Form Changes in a Runner with Chronic Hamstring Tendinopathy”
Abstract: Purpose: To determine the long-term effects of run form changes in a runner with chronic hamstring tendinopathy. Background: Patient is 39 y/o male recreational runner with R proximal hamstring tendinopathy. Injury originated in November of 2020 following a week of increased sprint training. Originally presented as groin pain, then transitioned into hamstring pain. Presents as pain that is worse after running, at times rating it 8/10 pain. Prior to injury, patient was running on average 20 miles/week at an average of 8.5 min/mile pace. Methods: Patient received physical therapy at the ECU Student Run Clinic on 4/14/21 and 4/22/21. They then attended a long term follow up session on 8/5/21. Running biomechanics were evaluated using a 2D video and slow-motion analysis at each session. Patient was educated on appropriate run form changes, run form cueing, and lower extremity strengthening exercises at the initial two sessions. Run form cueing included increasing cadence to ~180 steps/min as well as focusing on driving knees straight forward while running to prevent crossing over. Results: Compared to the initial session, the runner had decreased stride length, decreased foot inclination at initial contact, less foot cross over, decreased foot pronation during stance phase, and a decrease in bilateral hip drop. Cadence also increased to 176 steps/min from 168 steps/min at the initial session. Discussion: Overall, the patient’s hamstring pain went away over time. He initially did the prescribed exercises 2-3 times per week for ~2 weeks, then stopped doing the prescribed exercises due to decreased pain. With cueing, the patient felt the most benefit from the two different cues while running and thought about these cues during every run throughout the 4-month time period. The patient reported that he feels stronger than ever, is running faster than ever, and is increasing mileage/week with no pain. Conclusion: The runner was able to maintain run form changes for 4 months after initial treatment session and saw a decrease in hamstring pain related to chronic hamstring tendinopathy. Clinical Relevance: Increasing cadence and decreasing crossing over may be beneficial biomechanical changes to treat runners with chronic hamstring tendinopathy.

MC19. Kelly MacDonald; Mallory Serpan; Sarah Dickey; Young Joo Kim, PhD
Presentation Title: “Impact of Children with Cerebral Palsy’s Enjoyment and Feedback on Mastery Motivation and RecoVR System Usage”
Abstract: Background: Children with cerebral palsy who engage in intensive motor activity have the potential to create neuroplastic changes in the cortex to increase motor functioning. Previous research has indicated that virtual reality can lead to increased motor functions in those with hemiplegia and that a child’s motivation and enjoyment might play a role in their participation in an intervention. Although this method of remote intervention offers high repetitions of upper extremity movements necessary for neuroplasticity, use of virtual reality for children with cerebral palsy is limited. Objective: This study investigated the relationships between child enjoyment/feedback and RecoVR System usage and between child enjoyment/feedback and mastery motivation. Method: This study used a cross-sectional design. Participants’ (n=5) were children with cerebral palsy aged between 6-15 years who showed the minimum amount of movement and control required to use the RecoVR System. After receiving the training and interview, participants were instructed to use the RecoVR System at least one hour/day and five days/week for four weeks at home. RecoVR System usage was tracked by recording total playing time and number of sessions for four weeks. Their motivation and feedback towards the RecoVR System were measured weekly with the Child Questionnaire. Mastery motivation was measured with the Revised Dimensions of Mastery Questionnaire rated by parents before the intervention began. Results: Descriptive data with graphs showed that participants who reported
better enjoyment/motivation had higher RecoVR System usage. In addition, participants who reported better enjoyment/motivation had higher mastery motivation. Conclusion: Our findings indicate positive relationships between enjoyment/motivation and virtual reality system usage and motivation towards challenging tasks in children with cerebral palsy. Further research with larger sample size is needed to study the impact of motivation toward a virtual reality system and challenging tasks on a virtual reality system.

MC20. Kendall Thomas, SPT; Brittany Wall, SPT; Shellie Zsoldos, DPT; Chia-Cheng Lin, PhD
Presentation Title: “Validation of Measuring Near Point of Convergence Using Two Different Tape Measures”
Abstract: Purpose: Near point of convergence (NPC) is described as the location of intersection of the lines of sight when the eyes are at their greatest point of convergence without double vision. Convergence insufficiency (CI) is associated with decreasing the distance in NPC after concussion. The purpose of this study was to validate a customized digital tape and regular tape measures to measure NPC in healthy participants. Methods: Thirty-one healthy participants (age from 12-85 y.o.) without any visual disorders were recruited in this study. Evaluated methods were NPC measurement via an Accommodation and Near Point rule (ANP rule), a regular measuring tape, and a customized digital tape measure. All tools had a target to focus on: “OK” in black ink and 14-point font. Participants were instructed to move the target towards the tip of their nose and let the evaluator know when they had double vision. Divergence (away from nose until the target was clear to see) values were also recorded. All values were recorded three times. The NPC and divergence values from the regular measuring tape and the digital tape were compared with the ANP rule. Intraclass correlation coefficient (ICC) estimates were computed using SPSS statistical package (version 25, IBM Inc, Armonk, NY) based on a mean-rating (k=3), absolute agreement, 2-way mixed-effect model. Results: All ICC values found were between good and excellent ranges. Good ICC values (0.850, p &lt;0.001) for divergence and excellent ICC values (0.965, p &lt;0.001) for convergence were found when comparing ANP ruler and digital measures. Excellent ICC values (0.975, p &lt;0.001) for divergence and excellent ICC values (0.925, p &lt;0.001) for convergence were found when comparing ANP ruler and the regular tape measures. Conclusion: The regular measuring tape and the digital tape were reliable tools to measure NPC. The ICC values suggested using regular measuring tape may fit the need to measure NPC in clinical settings. Clinical Relevance: The NPC measurement is a key criterion to assess and is important for prognosis. Using valid and reliable measurement tools for NPC will help with the prognosis after concussion.

MC21. Samantha Alexander, OTS; Taylor Faircloth, OTS; Denise Donica, DHSc
Presentation Title: “Using Digital Literacy Tools to Enhance Virtual Handwriting Interventions”
Abstract: Introduction: In today’s ever-advancing technological climate, and with the pertinent impact that COVID-19 has had on increasing technology use, it is more critical than ever to understand the effectiveness of technology-based handwriting intervention. Occupational therapists focus on handwriting intervention to facilitate and support children’s participation in school, which is largely dependent on their ability to successfully write, especially in earlier elementary grades. By the age of six, children with typically developing handwriting skills should be able to copy simple shapes like triangles, print their name, and copy a good portion of lower and uppercase letters. This means that most children should have functional handwriting skills by roughly first or second grade. Methods: Our study implemented a 6-week virtual handwriting program for self-referred elementary school students aged 5-7 years old with handwriting difficulties (n=4). The study focused on improving the handwriting legibility (as measured by The Print Tool) and handwriting skill self-perception of the participants (as measured by Here’s How I Write). Each week, the participants logged on to Cisco WebEx to attend a 75-minute session (beginning with a 15-minute full group followed by two 30-minute small group mini-sessions). The students were instructed to focus on either 2 or 3 lowercase letters of the alphabet each mini-session, working to identify and print each letter with each week building on the previous week’s knowledge. Results: This poster will review the performance of the 4 participants on the two outcomes measures noted above. Conclusion: Our research study is vital to begin exploring the use of digital literacy tools to enhance the participants’ handwriting skills through virtual intervention. By utilizing our occupational therapy skills through this program, we were aiding in the prevention of the potential need for additional occupational therapy services in the school setting while providing extra support for children struggling with this foundational school-based skill.
MC22. Brian McGill; Ryan D. Wedge, PhD; Blake Jones; Paul De Vita

Presentation Title: “Effects of Prioritizing Joint Loads on Metabolic Energy Expenditure During Loaded Treadmill Walking”

Abstract: The Metabolic energy expenditure (MEE) is a primary determinant of gait, and another possible determinant is joint loading. Loading an individual with vest-borne loads may require balancing these determinants when walking. PURPOSE: The purpose of this study was to investigate the effects of balancing joint loading with MEE while walking with vest-borne loads. We hypothesized that prioritizing joint loads would lead to increased MEE. METHODS: Twelve healthy participants (6 males [BMI = 22.19 ± 1.57]; 6 females [BMI = 20.12 ± 1.33]) between 20-25 years of age completed three 10-minute walking trials on an instrumented treadmill at 1.4 m-s-1 with no load, 15% body-weight (BW) and 30% BW (weighted vest). The participants received no feedback for the first five minutes, then during the second five minutes, they were told to lower peak vertical ground reaction forces (PVGRF), based on visual feedback of those forces. Expired gases were collected to estimate MEE, then normalized by body mass (BM) and BM plus external load (BMEL). A 2-way ANOVA (p &lt; 0.05) was used to compare main effects of feedback and load for each of the load normalizations. RESULTS: When trying to lower PVGRFs, MEE significantly increased (p &lt; 0.001) by 23%, 38%, and 53% in the no load, 15% BW, and 30% BW conditions, respectively. Normalizing MEE with BMEL versus BM alone, led to estimates of MEE that were 13% (15% BW) and 32% (30% BW) less than normalizing by BM alone. CONCLUSION: In young, healthy participants that walk with and without vest-borne loads, MEE increases when given feedback to minimize PVGRF. This finding indicates that MEE optimization is preferred and changing gait mechanics to meet a PVGRF objective comes at a substantial metabolic cost. How MEE is normalized in external loading studies should also be examined because accounting for BMEL led to less relative MEE in bouts of short walking. Further research should include BMEL normalization which may allow for better understanding of how we accommodate for increasing loads and determine if there is a similar relationship at higher loads and with longer bouts of walking.

MC23. Maggie Bowman; Madison Heavner; Anne Dickerson, PhD

Presentation Title: “Description Through Case Examples of a Participant in a Driving and Community Mobility Bootcamp”

Abstract: Individuals with Autism Spectrum Disorder have difficulties with executive functioning, emotional regulation, and social communication impairment that directly affects their ability to drive and navigate the community. Through the use of case study examples, this research poster will present the quantifiable outcomes of specific driving interventions used in a driving and community mobility bootcamp. This poster will display two separate 2021 bootcamp participants who participated in the five day intervention. The poster will offer information about their background, pretesting, goals and objectives for driving, and the resulting outcomes. Specifically, we will discuss how two different individuals achieved a successful outcome of a driver’s license after participating in this occupational therapy intervention.

MC24. Chelsea Carre; Christine Johnsen; Lauren Turbeville, OTD; Denise Donica, DHSc

Presentation Title: “Exploring the Effectiveness of a 6-Week In-Person Handwriting Program for Improving Handwriting Legibility, Speed, and Self-Perception for 6–7-year-old Students”

Abstract: Handwriting is a necessary skill for kids to acquire. Through learning handwriting, kids gain independence and confidence in their abilities to communicate and to engage in school-related activities. This study examined the effectiveness of a 6-week in-person handwriting program designed to improve handwriting legibility, speed, and self-perception of handwriting in 6–7-year-old students. Three students engaged in a 6-week in-person handwriting program, based on the handwriting curriculum, Learning Without Tears. Sessions occurred weekly for 75 minutes. Before the start of the program, participants were assessed using the Minnesota Handwriting Assessment (MHA) to evaluate legibility, form, alignment, size, and spacing. Here’s How I Write (HHIW) was used to determine the child’s perception of their own handwriting. Both the MHA and HHIW were used prior to the program for baseline evaluation and following the program as a post-test to determine changes for each participant. The results of this study will look at the changes in legibility, form, alignment, size, and spacing by comparing the scores from the pre-test and post-test. Results will also examine the pre-test and post-test results of the HHIW to determine if the child’s self-perception of their handwriting changed. This study is important to demonstrate the effectiveness of a handwriting program on the improvement of handwriting skills and self-efficacy for students in the first and second grade. Through previous research performed and our own research study, the trend of improvement of handwriting skills is prominent and proves Handwriting Without Tears is an effective program.
MC25. Alyssa Adamkowski; Shellie Zsoldos, DPT; Megan Ferderber, MD; Stacey A. Meardon, PhD; Chia-Cheng Lin, PhD

Presentation Title: “Comparison of Characteristics between Concussed Adolescents with and without Physical Therapy Referral for Vestibular Rehabilitation”

Abstract: Purpose: The purpose of this study was to examine the outcomes using post-concussion symptoms scales (PCSS) and Near-point convergency (NPC) function in concussed adolescents with and without referral to physical therapy (PT) for vestibular rehabilitation. Methods: A retrospective chart analysis included adolescent cases with concussion in ECU Family Medicine Center from June 2015 – June 2019 that met the following criteria: 1) primary diagnosis of concussion and 2) aged between 12-18 years old. We reviewed 161 charts and 111 charts were included (38 with PT referral) in the statistical analysis. Records with only one visit or one PCSS score were excluded. Participants were classified into no PT treatment (No-PT) and PT with vestibular rehabilitation (PT-VR) groups to compare age, sex, days until the first clinic visit, initial and discharged PCSS, and initial and discharged NPC function. Between group differences for categorical and continuous variables were examined with Chi-square with Fisher exact tests (α=.05) and Mann-Whitney U-tests (α=.05), respectively. Results: PT-VR group received PT intervention in 31 ± 21 days after concussion and underwent 4 ± 3 visits. No group differences were found in age (PT-VR: 16 ± 1 y.o.; No-PT: 16 ± 2, p= .15) or days to the first clinic visit (PT-VR: 9.72 ± 10.53 days; No-PT: 9.08 ± 8.69 days, p=.98). PT-VR group had more females (PT: 76%; No-PT: 20%, p<0.01), more cases with abnormal NPC function (52.3% vs 30%, p=.02), and higher PCSS scores (54.36 vs 28.79, p<0.01) compared with the No-PT group at initial PT evaluation. Improvement in PCSS scores from initial visit to discharge were greater in the PT-VR group compared to the No-PT group (PT-VR:40.34 ± 27.47 points; No-PT: 25.94 ± 20.55 points; p=.01). PCSS scores (PT-VR: 9.75 ± 16.73 points; No-PT: 5.96 ± 11.19 points, p=.23) and normal NPC function (PT-VR: 88.9%; No-PT: 92.8%, p=.49) did not differ between groups at discharge. Conclusions: Patients referred to PT for vestibular rehabilitation tended to: be female, present with abnormal NPC function, and report more severe post-concussion symptoms. Patients referred to PT for vestibular rehabilitation demonstrated improvement in post-concussion symptoms and NPC function to levels comparable to No-PT groups.

MC26. Dominique Bellardini; Taylor Budzynski; John Willson, PhD; Swati Surkar; PhD

Presentation Title: “Effects of Remote Ischemic Conditioning on Lower Extremity Gait Kinematics in Children with Cerebral Palsy”

Abstract: Cerebral palsy (CP) is the most common childhood movement disorder caused by damage to the developing brain. Children with CP often demonstrate altered gait characteristics (i.e. crouched gait) that reduce gait speed and efficiency and promote premature fatigue, which further contribute to reduced participation in physical activity. Children who present with crouched gait exhibit excessive hip and knee flexion, impacting their ability to produce force for forward propulsion while walking. Rehabilitation efforts to improve gait deviations demonstrate conflicting results in regard to required dosage and production and retention of therapeutic effects. Remote ischemic conditioning (RIC) is a novel rehabilitation approach with potential to improve strength, promote motor learning, and diminish altered gait mechanics in children with CP. Although therapeutic mechanisms of RIC have been well documented in adults, their effects on gait kinematics in children with CP are unknown. The purpose of this study was to test if RIC combined with lower extremity strengthening yields greater improvements in hip and knee joint extension angles while ambulating compared to strengthening alone in children with CP. Methods: For this ongoing study, laboratory assessments of quadriceps isometric and isokinetic strength, quadriceps and hamstring muscle activity, 3D gait mechanics, and walking velocity were performed in 10 children with bilateral CP (age 5-16 years and Gross Motor Function Classification System levels I-III). Participants were randomly assigned to participate in a standardized 4-week rehabilitation protocol promoting balance and lower extremity strength training with or without RIC. Laboratory assessments were repeated at the conclusion of the training interval and at 1 month after training to assess retention of therapeutic effects. Changes in hip and knee extension angles throughout the stance phase of ambulation will be evaluated between groups and over time using separate between (group [RIC, no RIC]) – within (time [pre, post, 1 month]) 2 factor ANOVAs. Clinical relevance: The long term goal of this project is to improve rehabilitation effectiveness in relation to functional outcomes (i.e. mobility) in children with CP. Results from this study aim to provide insight to the potential addition of RIC to current rehabilitation strategies to contribute to improved neuroplasticity and musculoskeletal adaptations in children with CP.
MC27. Victoria Jarvis; Donghai Zheng; Joseph A. Houmard; G. Lynis Dohm; Terry Jones, PhD

Presentation Title: “Skeletal Muscle Fatty Acid Oxidation Pre- and Post-high Fat Feeding in Individuals that are Overweight”

Abstract: Skeletal muscle fatty acid oxidation rate has a trending relationship directly related to lactate production, which is produced when skeletal muscle has fat as a fuel source. The rates of fatty acid oxidations are lower in obese individuals compared to individuals that are lean, which illustrates the relationship of adiposity to lactate. Currently, there is not any published data on lactate production in overweight individuals eating a high-fat diet. The purpose of this study was to observe overweight individuals’ response to a high fat diet with respect to fatty acid oxidation and lactate production. We recruited participants that were considered overweight (BMI (25-30 kg/m2)) but otherwise healthy male and female individuals. A DXA scan was used to determine the individual’s adiposity and blood samples were used to determine circulating lactate. We then required participants to fast after midnight and report for a blood draw and muscle biopsy the following morning. For three days, the participants were required to track and consume a diet consisting primarily of fat, with fat accounting for up 70% of calories. They were then required to return for another fasted blood draw and muscle biopsy. Using YSI, blood plasma was analyzed for lactate and muscle homogenates were analyzed for palmitate. With this data, we were then able to determine the relationship of visceral adiposity and lactate. We were also able to compare fatty acid oxidation as it relates to lactate prior to high fat feeding, and fatty acid oxidation as it related to lactate after high fat feeding.

MC28. Meghan Caison; Sarah Collins; Young Joo Kim, PhD

Presentation Title: “Measuring Activity Levels Using an Activity Monitor During Daily Activities: Which Measurement Site to Use?”

Abstract: Background: ActiGraphs are widely used in research to measure motion acceleration and quantify physical activity through count per unit of time which can be converted to metabolic equivalent of task (MET) using an algorithm. MET levels show a ratio of energy expenditure during physical activity compared to energy expenditure at rest. ActiGraphs can be placed on various locations of the body, including wrist and hip; however, there is lack of agreement among previous research in determining the most accurate measurement site during different types of activities. Objective: This study investigated the differences in activity levels using ActiGraphs during instrumental activities of daily living and physical activity among dominant and non-dominant wrist and hip measurement sites in adults. Method: Participants (n=38) were young adults aged 18-39 years without cognitive impairment who can perform 40 mins of moderate-intensity activities. Activity levels were measured by total activity counts and MET levels using ActiGraphs during bed-making, vacuuming, dishwashing, and walking 3mph activities. All activities selected were moderate-intensity activity (3-3.3 METs). ActiGraphs were placed on participants’ non-dominant and dominant wrists and hips. Results: There were significant differences in total activity counts among non-dominant wrist, dominant wrist, non-dominant hip, and dominant hip measurement sites for bed-making, vacuuming, dishwashing, and walking in both female (p < 0.001) and male (p < 0.001) participants. In addition, there were significant differences in MET levels among non-dominant wrist, dominant wrist, non-dominant hip, and dominant hip measurement sites for bed-making, vacuuming, dishwashing, and walking in both female (p < 0.001) and male (p < 0.001) participants. However, these differences were mostly found between wrist and hip measurement sites, not between non-dominant and dominant measurement sites of wrist or hip. Conclusion: Fewer ActiGraph placements may be necessary for future research studies with similar populations to reduce costs needed for the study and improve participant recruitment and retention.

MC29. Tyler Ebeling, SPT; Michael Garrison, DSc

Presentation Title: “Implementing the PAASS Framework for Return to Sport Considerations in a High School Football Player with Chronic Ankle Instability: A Case Report”

Abstract: Background and Purpose: Chronic ankle instability is a prevalent condition among athletes and often leads to repeated lower extremity injuries throughout an athlete’s career, if left untreated. While ankle sprains are the most common recurrent injury, other musculoskeletal lower extremity injuries can also result from chronic ankle instability. The purpose of this case report is to describe the evaluation process and treatment approach of a high school football player with chronic ankle instability and achilles tendinitis utilizing the PAASS framework. Case Description: The patient was a seventeen-year-old high school football player referred to outpatient physical therapy by his primary care physician. He suffered a left lateral ankle sprain three weeks prior to therapy and was diagnosed with left achilles tendinitis two days before being seen in the physical therapy clinic. Key impairments included left ankle pain, limited range of motion, reduced function, and diminished left lower extremity motor performance.
Outcomes: After twelve visits over a four-week period, the athlete was able to return to his prior level of performance as an offensive lineman. He attended multiple football camps and recruitment events over the summer and was able to play the entire fall season without incident or re-injury. Discussion: Successful return to sport with chronic ankle instability can be challenging. This case report describes the evaluation and treatment of a seventeen-year-old high school football player with left chronic ankle instability and achilles tendinitis utilizing the PAASS framework and targeted, sport-specific activities.

MC30. Julia Arriaga; Chia-Cheng Lin, PhD; Swati M. Surkar, PhD

**Presentation Title:** “Analysis of Neural Correlates of Bi-manual Performance in Children with Unilateral Cerebral Palsy Compared to Typically Developing Children”

**Abstract:** Background: Unilateral CP is a leading cause of childhood disability. Children with UCP (cUCP) have bimanual coordination deficits. Evidence suggests that brain damage in cUCP leads to deficits in cognitive, sensorimotor, and visual integration that may increase the cognitive resources required for performing bimanual tasks.1-4 While many studies investigate the contribution of neuromuscular impairments, a knowledge gap persists in the understanding of bimanual coordination deficits at the cortical level. This study used an ecologically valid bimanual coordination task (cup stacking) to delineate the differences in cortical activation between cUCP and typically developing children (TDc). We used functional near-infrared spectroscopy (fNIRS) to compare the prefrontal (PFC) and sensorimotor (SMA, M1) cortical activation levels of cUCP and TDc during cup stacking. This data will help drive research for therapeutic interventions in cUCP. Methods: This study involved 12 cUCP (mean age=11.8±3.5yrs), MACS levels I-III, and 12 TDc (mean age=11.6±3.2yrs). The cup stacking task involved three complex patterns. After one practice trial, participants were instructed to complete three trials of each pattern as fast and accurate as possible using both arms. Bimanual performance was quantified as the average movement time across 9 trials. Each trial started with 30 seconds of rest (baseline) followed by 30 seconds between each trial. We used fNIRS (NIRsport, NIRx, Germany) to assess activation within bilateral PFC, SMA, and M1. Cortical activation was determined by changes in oxygenated/deoxygenated hemoglobin concentration. Additionally, children performed Box and Blocks test (BBT) and Nine-Hole Peg test (NHPT) to assess manual speed and dexterity. Differences between groups for all outcomes were measured with independent t-tests. Results: There was a significant group main effect (P<0.01) for each outcome assessed. Typically developing children were faster in completing NHPT (21.82±3.42sec), moved more blocks during BBT (52.54±7.51 blocks) and had faster average movement times during cup stacking (19.45±5.86sec) compared to cUCP (125.85±38.87sec; 23.00±10.82 blocks; 33.34±12.10sec). In addition, cUCP had less activation in the SMA and M1 during BBT (52.54±7.51 blocks) and had faster average movement times during cup stacking (19.45±5.86sec) compared to cUCP (125.85±38.87sec; 23.00±10.82 blocks; 33.34±12.10sec). Conclusion/Significance: Overall, these results indicate that brain damage in cUCP impacts sensorimotor cortex activation, which may impair bimanual coordination.

Research Doctorate Students (i.e., PhD)

RD10. Eshan Schleif; Neda Tahmasebifard; Imani R. Gilbert; Taylor D. Snodgrass; Gabrielle Stowe; Myoung Keun Lee; Seth M. Weinberg; Jamie L. Perry

**Presentation Title:** “Examining Effective Velopharyngeal Ratio in Healthy Children using Magnetic Resonance Imaging”

**Abstract:** Background: Velopharyngeal (VP) ratio has been described and reported among children with normal anatomy using a variety of imaging modalities including lateral cephalograms and magnetic resonance imaging (MRI). While VP ratio has been a useful tool in surgical planning for individuals with cleft palate, recent findings suggest that the effective VP (EVP) ratio at rest may be a more appropriate indicator of normal parameters for speech. Furthermore, EVP ratio is better correlated with VP function than VP ratio and provides a more consistent ratio of VP function across the age span. There is a need for normative data to be established for EVP ratio to be used in evaluation of VP function and surgical planning. The purpose of this study is to establish normative data for EVP ratio among children with normal anatomy. Additionally, secondary analysis will examine the presence of sex differences in VP and EVP ratios. Methods: Participants in this study included 1,165 healthy nine- and ten-year-old girls and boys. We then used these measures to calculate the EVP ratio. Results: The mean EVP ratio in girls was 0.64 (SD = 0.25); the median value was 0.59 (range:
The mean EVP ratio in boys was 0.60 (SD = 0.22); the median value was 0.55 (range: 0.14–2.16). The distribution in girls and boys showed significant deviation from normality. The non-parametric Wilcoxon rank sum test showed that the EVP ratio was significantly greater in females compared to males (p = 0.009). Analysis with data collected thus far showed no meaningful relationship between age and EVP ratio. Data collection is ongoing, and the results will be expanded and updated as additional data becomes available. Conclusion: Girls and boys show differences in the EVP ratio at ages nine to ten years. The results of this study can help improve our understanding of normal variation in clinically relevant VP measures. Furthermore, reported EVP ratio among children with normal anatomy may aid in the evaluation of VP function and surgical planning for children with repaired cleft palate.

Poster Presentations Session B

Undergraduate Students

UG15. Kendal Brice; Pavitra Rao Makarla; Gitte Henssel Joergensen; Carolina Sprinkle; Kathrin Rothermich

Presentation Title: “Are They Sincere? A Cross-Cultural Study on Politeness Perception Contrasting Adults from the US and the UK”

Abstract: Insincere language is widely used in daily interactions and carries social functions such as mocking, criticizing, and being humorous. While some studies have revealed differences in sincerity perception based on socio-cultural context, little research has been done using dynamic, context-rich scenarios. The current study used short videos to test the perception of sincere and insincere language in participants who grew up in the UK and the USA. We focused on five forms of sincere/insincere language: sincere positive, blunt, sarcasm, teasing, and prosocial lies. The participant’s task was to identify if the actors in the videos were being sincere (i.e., if they mean what they say) and how polite they perceived the statements to be. They also completed two surveys about their communication preferences: the Sarcasm Self-Report Scale (SSS) and the Conversational Indirectness Scale (CIS). Results reveal that people from the UK perform better when identifying prosocial lies as insincere. They also use sarcasm more often in daily life when compared to people from the US, as measured by the SSS. Some of the variance we found in the data can be explained by significant correlations between the SSS, CIS, and performance on the behavioral task. We discuss our results in the context of the Tinge Hypothesis and politeness theories. The results of this study will benefit intercultural awareness and support building relationships, especially when interacting in naturalistic settings.

UG16. Hill Hollowell; Megan L. Pajski, PhD; Ted G. Graber, PhD

Presentation Title: “Changes in Voluntary Activity Patterns in Adult vs. Older Adult Mice Following Aerobic Training”

Abstract: During aging, physical function gradually deteriorates, and this is exacerbated by the development of sarcopenia (age-related reduction of muscle mass and strength) and frailty (failure to maintain homeostasis). Prior investigations have shown that exercise is successful at mitigating the progression of these neuromuscular diseases and restoring overall functional capacity. Additionally, these investigations have shown that older adult mice run for similar durations as younger adult mice but at a slower pace, thus reducing total running volume. We hypothesize that aerobic training may restore the intensity of running pace and improve their propensity for volitional activity – even if the total distance run is not affected due to fewer total intervals. To test these hypotheses, we compared data from 6-10-month-old adult C57BL/6/mice (n=8, 10m, which correlates to mid-20’s to early 30’s in humans) and 22-26-month-old elderly adult C57BL/6 mice (n=10, 26m, which correlates to 70’s to 80’s in humans) who spent four days out of every week housed in cages equipped with running wheels to encourage voluntary aerobic activity. An additional 10m sedentary control (SED, n=6) did not run. All mice underwent functional aptitude pre- and post-exercise-training using our composite CFAB (comprehensive functional assessment battery) scoring system. We found that neither exercise group showed a significant change in CFAB (measured in standard deviations, sd) between pre- and post-training (26m, CFAB difference of 3.418 ± 0.956 sd, p=0.139; 10m difference -3.251 ± 1.352 sd, p=0.061), while the 10m sedentary group showed a significant decrease in CFAB (-6.422 ± 1.438 sd, p=0.007). Comparing pre- and post-training results, no measure of activity (number of intervals on the wheel, distance ran, speed, or power) showed noteworthy change for any group, though the 10m exercise group trended towards fewer
active sessions on the wheels (from 207.3 ± 36.6 to 116.7 ± 18.9 sessions, p=0.058). However, both exercise groups consistently exhibited greater voluntary activity post-training compared to the sedentary group, running further and faster (p=0.041, both groups), and with more power (26m p=0.052; 10m p=0.035). These results do not support our original hypothesis but emphasizes the importance of physical activity as a means of maintaining physical function during aging.

UG17. Ava Cunningham; Andrew J. Vermiglio, AuD; Virgina D. Driscoll, PhD; Abigail Ormond; Erin Kokinda; Caitlyn Paulson; Reyse Stirrett; Kathryn Fennie; Laura Hall
Presentation Title: “The Relationship Between Speech Recognition in Noise Ability & Listening Effort”
Abstract: The goals of this study were to determine the relationships between speech recognition in noise (SRN) ability vs. perceived listening effort and between perceived listening effort across masker conditions. SRN ability was evaluated using the A2Bio sentences in four masker conditions. A seven-point scale was used to measure listening effort. No statistically significant relationships were found between A2Bio scores vs. perceived listening effort across masker conditions. However, statistically significant relationships were found between listening effort ratings across masker conditions.

UG18. Molli Sholar; Michael Wheeler, PhD
Presentation Title: “Vitamin B12 Regulation of PUFA Synthesis”
Abstract: Low-grade, chronic inflammation is associated with a range of diet and age-related disorders, including diabetes, arthritis, and cognitive deficits. Inflammatory cells have the capacity to synthesize complex PUFA called specialized pro-resolution mediators (SPMs) that regulate the extent and duration of inflammatory responses. Humans have a limited capacity to synthesize SMPs, especially as we age, due to decreased expression of the elongase and desaturase enzymes required in their conversion from dietary PUFAs. It was recently shown that vitamin B12, an essential micronutrient, enhances the cognitive benefits of dietary n-3 PUFAs. It is hypothesized that B12 will increase macrophage SPM synthesis and subdue pro-inflammatory cytokine production. To test this hypothesis, RAW264 macrophage cell line was stimulated with LPS/γIFN, which promotes robust pro-inflammatory gene expression. Cells were also stimulated in the presence of 50 uMl cobalamin (B12). Gene expression profiles were assessed using signal cell RNA-seq. The addition of B12 had no significant impact on the expression of most prototypical pro-inflammatory genes. However, it was demonstrated that B12 significantly increased elov5 expression, suggesting that B12 does indeed regulate PUFA biosynthesis in macrophages. Moreover, B12 enhances the expression of Trem2, a novel anti-inflammatory transcript associated with neuro-protective effects. While pro-inflammatory responses in general were not changed, B12 selectively regulated expression of key factors involved in neuro-protective pathways. It is concluded that B12 differentially regulates macrophage responses and may be beneficial in mitigating chronic inflammation associated with age-related pathologies.

Masters/Clinical Doctorate Students (i.e., MS, DPT, AuD)

MC31. Madeline Funke, BM; Molly Jacobs, PhD; Patrick Briley, PhD
Presentation Title: “Environmental Influences Associated with the Presence of Stuttering”
Abstract: Purpose: Stuttering is a complex communication disorder that is commonly regarded as being a multifactorial disorder. Concordance of stuttering in twin studies have provided evidence that the presence of stuttering can be precipitated by both genetic and environmental factors. However, researchers and clinicians are unclear what environmental factors might be capable of influencing such an outcome. The purpose of this study was to utilize population data to identify exogenous factors that are associated with presence of stuttering in children. While causality cannot be assigned to associated variables, it is hoped that this investigation will inform future researchers and studies. Method: Data were obtained from the Fragile Families and Child Wellbeing Study (FFCWS). The FFCWS includes 4,898 children born in the United States. Data was collected on these children at birth and then at ages 1, 3, 5, 9, and 15. The current project includes data that was collected at age 9 (Wave 5). The FFCWS includes responses to questions asked of mothers, fathers, and children pertaining to their family structures, living situations, mental health, finances, and physical health. Included in the survey questions when the children were 9 years of age was if the “Child had stuttering or stammering in the past 12 months”. Using this question to identify the presence of stuttering in children, associations are being explored between stuttering and exogenous factors. Results/Conclusions: Analysis is ongoing and will be completed before the 2021-2022 CAHS Student Research Day.
Utilization of this dataset will allow us to develop a demographic profile of children who were identified as those who stutter. Additionally, this project will identify if factors related to adverse family experiences are associated with the presence of stuttering.

**MC32. Dylan Sampson, SPT; Stacey Meardon, PhD; John Willson, PhD**

**Presentation Title:** “Patellofemoral Joint Loads during High Intensity Interval Training (HIT) and Prolonged Running”

**Abstract:** Purpose/Hypothesis: Patellofemoral joint (PFJ) symptoms are a common musculoskeletal complaint in active populations with a high rate of chronicity and recurrence. This study aimed to compare PFJ contact forces during a HIT session to both caloric expenditure and time-matched prolonged running. Subjects: 20 physically active adults (10M, 10F; 25.3±2.6 years) Materials/Methods: Participants completed a 25-min HIT session comprised of 5 bouts of running at 95% estimated VO2 max speed (3.9 ± 0.3 m/s) for 2 min and walking at preferred speed (1.3 ± 0.1 m/s) for 3 min. At least 48 hours later, participants completed a 25-min prolonged run at their 5km training pace (2.8 ± 0.3 m/s). Lower extremity 3D kinematics and ground reaction forces from 5 strides were recorded during each HIT interval and every 3 min during the prolonged run. PFJ contact force peak, impulse, and loading rate were compared across activities and cumulative peak PFJ contact force and force impulse were compared between sessions using repeated measures ANOVA (α=.05) and partial eta square (η2) effect sizes. Results: Peak PFJ contact force and loading rate were greatest at the HIT run speed compared to preferred run and walk speeds. Cumulative peak PFJ force was 28% and 44% lower in the HIT session than calorie- and time-matched running, respectively. Like peak PFJ force, cumulative PFJ impulse during the HIT session was 25% and 42% lower than calorie and time-matched running. Fewer running load cycles were observed during the HIT session relative to both calorie and time-matched running. Conclusion: Despite having the highest peak loads, a HIT session comprised of 2:3-minute bouts of high-intensity running and walking exposed participants to significantly less cumulative PFJ load than both calorie- and time-matched running. Results are most likely explained by fewer high-intensity load cycles in HIT relative to prolonged running. Clinical Relevance: HIT may be a viable alternative exercise modality for people with PFJ symptoms exacerbated by the high cumulative loads of prolonged running.

**MC33. Taylor Luibrand, SPT; Chia-Cheng Lin, PhD; Kevin O’Brien, PhD; Riley Horn; Stacey Meardon, PhD**

**Presentation Title:** “Determining the Predictive Validity of the STEADI Fall Risk Algorithm with and Without Somatosensation Inputs”

**Abstract:** Purpose/Hypothesis: Postural control declines with age, leading to increased fall risk. Somatosensation provides critical inputs for postural control and also declines with age and disease. However, the relative importance of somatosensation for fall risk is not well established. This study compared the predictive ability of the CDC’s Stopping Elderly Accidents, Death, and Injuries (STEADI) 12-question fall risk tool with and without measures of somatosensation and co-morbidities. Number of Subjects: N=139 Adults: Young (25-44 yo) n=50 (24M, 26F), Middle-age (45-64 yo) n=40 (15M, 25F), Older (65-85 yo) n=49 (20M, 29F) Materials and Methods: Participants completed the STEADI 12-question tool and survey of co-morbidities. Somatosensory inputs of pressure sensation threshold (PST) and vibration pressure threshold (VPT) were measured at 10 sites. Balance relevant somatosensory thresholds were averaged across feet for input to statistical analysis. To characterize function, participants underwent Timed Up and Go, 30-second sit to stand, 4-stage balance, and the Activity-specific Balance Confidence and Fall Efficacy scales assessments. Logistic regression was used to identify predictors for fall history (yes/no) in the last year. A three-block variable selection process used a forward stepwise approach based on the likelihood ratio (SPSS ver. 27.0). Block 1 entered a modified STEADI score, block 2 allowed selection of somatosensory threshold variables, and block 3 allowed selection of co-variates (age, co-morbidities, and function). Results: Of the 130 adults included in this analysis, 17 older adults reported a fall in the last year. With a cutoff of .3 in the logistic, the STEADI score alone identified 52.9% of fallers and 93.8% of non-fallers correctly (p<.01). Predictive ability increased to 58.8% and 94.6% for fallers and non-fallers with the inclusion of 3 somatosensory variables (p<.01) and to 82.4% and 93.8% with the inclusion of somatosensation and age (p<.01). Conclusion: The ability of the 12-question STEADI fall risk tool to identify individuals who have fallen in the last year is markedly improved with the addition of somatosensory inputs, particularly metatarsal PST, and age. Future prospective study is needed to confirm usefulness. Clinical Relevance: Clinicians should consider both age and somatosensation when using the STEADI 12-question tool for fall risk screening.
MC34. Anna Patterson; Annie Zarama, MS; Ryan D. Wedge, PhD

**Presentation Title:** “Muscle Contributions for Gait Asymmetry In Able-Bodied Participants”

**Abstract:**
Purpose/Hypothesis: Preferred gait patterns in able-bodied individuals generally result in the least metabolic energy expenditure and are symmetric. People with physical asymmetries (e.g. amputees), tend to have greater metabolic energy expenditure when walking. A prosthesis has less power at push-off than a biological limb, which results in asymmetric gait. The purpose of this study was to examine estimated muscle activations and forces during able-bodied, asymmetric gait. We hypothesized gastrocnemius and soleus would be the least symmetric and that muscle activations and forces would be greater during early adaptation.

Materials and Methods: Three participants walked for five minutes on a split-belt treadmill for five separate conditions; tied belts at 1.25 m · s⁻¹ (trials 1, 3, 5), right belt faster (1.25 m · s⁻¹) than left (0.75 m · s⁻¹) (trial 2), and left belt faster than right (trial 4). We collected motion data with optical marker tracking (200 Hz) and force plate data (1200 Hz). We used OpenSim 4.2 to create subject specific musculoskeletal models and complete static optimization. The objective function for static optimization was muscle activations cubed, representing minimization of muscle effort. We analyzed the muscle activations and forces for the medial gastrocnemius, soleus, biceps femoris long head, and vastus lateralis. A three-way ANOVA was completed using factors of side, condition, and time.

Results: There was a significant main effect of side for medial gastrocnemius activation (p = 0.04) and force (p = 0.01). There was a significant interaction of side and condition for medial gastrocnemius (p &lt; 0.001), indicating that the right and left sides were significantly different between conditions for the medial gastrocnemius and therefore are driving locomotor adaptations to different belt speeds. Conclusions and Clinical Relevance: The medial gastrocnemius, but not the soleus, was the least symmetric muscle across the conditions and had the greatest role in adapting to the asymmetric belts. The medial gastrocnemius is one of the largest contributors to locomotor propulsion and if limited can lead to asymmetric walking. Understanding the underlying factors that contribute to asymmetric gait, can help to address gait asymmetries in rehabilitation and direct research to improve devices.

MC35. Tori Urban; Ashley Arensford; Blake W. Jones; Paul DeVita; Ryan Wedge, PhD

**Presentation Title:** “Coordination Variability with External Loads”

**Abstract:** People in the military frequently carry external loads, leading to increased joint loading. They most likely adopt strategies to minimize joint damage therefore need to vary movement patterns even with load. How external loads affect movement flexibility is unclear. PURPOSE: The purpose of this study was to determine the effect of external loads on movement flexibility while walking, represented by coupling angle variability (CAV). We hypothesized that CAV would increase across loading conditions and as people walked longer with load. METHODS: Ten participants (22 ± 1.4 years old, 1.75 ± 0.1 m, 65.30 ± 12.9 kg) walked for three 5-minute trials on a split-belt treadmill with 0%, 15%, and 30% of body mass added with a weighted vest. Kinematics were determined from motion capture (200 Hz) and Visual 3D. Segment CAV between the thigh and shank was determined for sagittal (thigh-sagittal (shank) (sag-sag) planes, sagittal-transverse (sag-tra) planes, and frontal-frontal (fro-fro) planes with circular statistics from five strides from the first, third, and fifth minute of each condition. Differences in CAV were analyzed via 2-way repeated measures ANOVA. RESULTS: Sag-sag CAV increased 2.16% (p &lt; 0.001), Sag-tra CAV increased 2.87% (p &lt; 0.001), and Fro-fro CAV increased 4.31% (p &lt; 0.001) across the loads. The amount of time walking during the 5-minute trial did not significantly affect CAV (p-values 0.867 – 0.960). DISCUSSION: Participants increased CAV with increasing loads across the three segment couples throughout the 5-minute walking trial. More CAV may allow for better load accommodation through increased movement adaptability. Segments that can vary patterns while walking can self-optimize for loading and potentially avoid joint damage. Our young, healthy participants walked for short periods of time on a treadmill for each condition, which may not represent the movement flexibility in people carrying loads for long duration over challenging terrain.

MC36. Taylor Budzynski, SPT; Dominique Bellardini, SPT; John Willson, PhD; Swati Surkar, PhD

**Presentation Title:** “Impact of Remote Ischemic Conditioning on Voluntary Quadriceps Muscle Recruitment Patterns for Children with CP”

**Abstract:** Cerebral palsy is a prominent childhood disorder that stems from damage to a young child’s growing brain and creates significant therapeutic challenges. Common characteristics seen in children with CP include an impaired gait pattern with decreased gait speed, increased energy cost, quick fatigue, and leads to decreased physical activity participation. Rehabilitation efforts often require a higher intensity with only modest results and limited retention. Ischemic conditioning is a new rehabilitation technique that is used with conventional treatment to potentially improve muscle strength, motor learning, and reduce the altered gait pattern in children with CP. While
MC37. Alexander Clark, BS; Blake W. Jones, BS; John D. Willson, PhD; Paul DeVita, PhD; Ryan D. Wedge, PhD

Presentation Title: “Knee Joint Loading Distribution with Vest-Borne Loads”

Abstract: PURPOSE: To determine the effects of load carriage on total, medial (MTFJ), and lateral (LTFJ) tibiofemoral joint contact forces, and to determine if biomechanical plasticity is present during load carriage. METHODS: Twelve young healthy adults (6 males and 6 Females; 22 + 1.6 yrs), walked for 5 minutes per condition at 1.4 m/s on an instrumented treadmill while carrying vest borne loads of 0%, 15%, and 30% body weight during 3D motion capture. Kinetic and kinematic data were used in a custom LabView program to estimate TFJ, MTFJ, and LTFJ via an inverse dynamics driven musculoskeletal model. Kinematic, and TFJ comparisons were made via repeated measures ANOVA. RESULTS: From 0% load to 15% and from 0% to 30%, Total peak TFJ increased 14% and 32% (p<0.05), peak MTFJ increased 12% and 26.5% (p<0.05). Peak LTFJ increased 13% and 38%, and leg stiffness decreased 10% and 28% (p<0.05). Discussion: Young healthy participants do not attenuate the increase in total and medial knee joint contact forces with increasing magnitude of load carriage. They respond to load by decreasing joint stiffness through small increases in dorsiflexion, knee flexion, and hip flexion, which does increase shock absorption and assist with energy transfer. These minor increases in flexion coupled with increases in vertical ground reaction forces with load carriage led to the approximately proportional relative percent increase in TFJ and MTFJ as compared to the increase in load. However, the increase in LTFJ from 0% load to 30% load was 8% greater indicating a disproportional increase in the lateral compartment. Further research should investigate if greater increases in load magnitude continue to lead to proportional increases in total TFJ and MTFJ, and disproportional increases LTFJ, especially in military populations who are constantly carrying heavy loads.

MC38. Mary Hannah B. Wilson, BS; Taylor D. Snodgrass, MS; Megan N. Andrew, BS; Kevin O’Brien, PhD; Thomas J. Sitzman, MD; Jessica L. Williams, MS; Davinder Singh, MD; Jamie L. Perry, PhD

Presentation Title: “Using Velopharyngeal MRI for Comparison of Intravelar Length and Extravelar Length”

Abstract: Background: Velopharyngeal (VP) closure is when the velum elevates to separate the nasopharynx and the oropharynx, and the levator veli palatini (LVP) is the most important muscle VP closure (Perry, et al., 2013, Ha et al., 2007, Moon & Kuehn, 2004). In individuals with cleft palate, there are differences in the LVP which can lead to velopharyngeal insufficiency (VPI) (Ha, 2007, Kotlarek et al., 2017; Kotlarek et al., 2020). 5-45% of individuals born with cleft palate require a secondary surgery to correct velopharyngeal insufficiency (VPI) (Bardach & Morris, 1990; Ysunza et al., 2002; Bicknell, McFadden, & Curran, 2002). Two common types of palatal re-repair techniques used for secondary surgery are buccal myomucosal flaps and the Furlow double-opposing Z-plasty. The purpose of this study is to 1. explore the impact of secondary surgery type on intravelar and extravelar segments of the LVP pre-operatively and post-operatively and 2. to evaluate differences in intravelar and extravelar segments pre-operatively and post-operatively compared to typical LVP anatomy. Methods: Structural magnetic resonance images were obtained for 12 children pre- and post-secondary surgery to correct VPI (6 received buccal myomucosal flaps; 6 received a Furlow double-opposing Z-plasty). These MRIs were compared to data from 12 controls matched for age. Quantitative measures of intravelar length and average extravelar length were obtained. Pre- and post-operative measurements
were compared using analysis of covariance. Subjects with history of VPI were compared to typical controls using analysis of variance. Results: There were not statistically significant differences for intravelar length or extravelar length between the two palatal re-repair strategies compared; however, descriptive analysis of the data suggest there may be some preliminary differences. When compared to control data, there are significant differences in the intravelar length and average extravelar length for children with a history of VPI, both pre-operatively and post-operatively. Conclusions: Palatal re-repair surgery to correct VPI did not appear to improve intravelar length and average extravelar length. Preliminary descriptive data suggests the two surgical re-repair types may impact intravelar length and average extravelar length. Future studies should explore differences between the two surgical techniques to see the impact on the LVP and management of VPI.

MC39. Victoria A. Broome, OTS; Madison F. Foulke, OTS; Anna E. Tyson OTS; Kristen L. Maselli, OTS; Heather Panczykowski, DHSc

Presentation Title: “Effects of a Collaborative Occupational Therapy Interactive Vaulting Program on Executive Function and Group Participation in Children with Disabilities”

Abstract: Purpose: This research aimed to explore the influence of a collaborative occupational therapy interactive vaulting program on activity participation, social interaction, and group membership in children with disabilities. Compared to typically developing peers, children with disabilities have increased deficits in executive and social functioning. Therefore, this research focuses on improving those deficits through group activities utilizing the horse as a partner and tool in intervention. Method: This study utilized a quasi-experimental one group pretest-posttest design to explore the impact of a collaborative occupational therapy group on fifteen children with behavioral dysfunction over a 10-week period. Interventions were designed using the Cognitive Orientation to Daily Occupational Performance Approach in occupational therapy where participants played an active role in designing their own goals to focus on throughout the program. The Social Profile was used to objectively assess behavioral interactions of children to evaluate level of activity participation, social interaction, and group membership. The Wilcoxon Signed Ranks test was used to compare pre-and-post-test results of activity participation, social interaction, and group membership within parallel, associative, and basic cooperative aspects. Results: Results indicated significant improvement in activity participation (associative and basic cooperative) and social interaction (associative and basic cooperative) as measured by the Social Profile. There was no significant difference in group membership and roles as measured by the Social Profile. Conclusion: This study provides preliminary evidence supporting the effectiveness of occupational therapy interactive vaulting programs in improving activity participation and social interaction in children and adolescents with disabilities.

MC40. Caitlyn Paulson; Andrew Vermiglio, AuD; Virginia Driscoll, PhD; Erin Kokinda; Reyse Stirrett; Abigail Ormond; Ava Cunningham; Kathryn Fennie; Laura Hall

Presentation Title: “Speech Recognition in Noise Performances vs. Perceived Listening Difficulty”

Abstract: The purpose of this study was to investigate the relationship between speech recognition in noise (SRN) performances and perceived listening difficulty. SRN ability was evaluated using the AzBio test with steady-state noise and 10-talker babble maskers. After each sentence list, participants were asked to rate their speech recognition ability on the rating scale from Schoepflin (2012; very poor-excellent). A statistically significant relationship was found between the rating of listening ability rating and the AzBio performance in steady-state noise.

MC41. Emma Weis, SPT; John D. Willson, PhD; Stacey Meardon, PhD

Presentation Title: “Hip, Knee, and Ankle Joint Contact Force Symmetry During Walking and Running Following ACL Reconstruction”

Abstract: Purpose: Altered joint contact force (JCF) may contribute to increased risk of developing posttraumatic osteoarthritis following ACL reconstruction (ACLR). Decreased knee JCF has been observed following ACLR in just the surgical limb, particularly during high demand activities. Whether this knee joint unloading promotes compensatory hip or ankle JCF asymmetry is unknown. We aimed to compare inter-limb hip, knee, and ankle JCF symmetry during walking and running between people with and without a history of ACLR. Subjects: Subjects included were 30 recreational athletes (19female, 22.3 years) with a unilateral ACLR in the previous 2-7 years (47±15mo) and 30 participants with no previous lower extremity surgery matched on sex, mass, and activity level. Methods: 3D lower extremity kinematics and ground reaction forces collected during walking and running on an instrumented treadmill. Resultant hip, axial knee and axial ankle JCF were calculated using a validated musculoskeletal model with an inverse dynamics-based static optimization routine. Hip, knee, and ankle peak JCF and JCF impulse inter-limb symmetry indices (LSI) were compared between ACLR and control participants using separate 2-factor (groupxtask) analyses of
MC42. Austin Anderson, DPT; Blake Jones, MS; Samuel Crawford; Ryan Wedge, PhD

**Presentation Title:** “Simulated BMI Class Effects on Walking Speed, Center of Mass Mechanics, and Energy Expenditure”

**Abstract:** The purpose of our study was to observe the changes in walking speed, center of mass mechanics, and metabolic energy expenditure with simulated BMI conditions. METHODS: We have collected data on one male participant (23 years, 1.88 m, 82.54 kg). We simulated a BMI of 30 (BMI30), 35 (BMI35), and 40 (BMI40) by adding mass to the trunk with a weighted vest and to the thighs with weighted hockey pants. We matched the proportion of trunk and thigh mass distribution based on the literature. The participant walked with no external load except an unweighted vest and with the BMI30 (51 pounds added), BMI35 (90 pounds added), and BMI40 (129 pounds added) overground three times for 10 meters to determine preferred walking speed, and on an instrumented split-belt treadmill for four minutes while measuring ground reaction forces and expired gases. The first trial was no load, and the simulated BMI conditions were randomized. Metabolic cost of transport was determined by normalizing metabolic energy expenditure to walking speed, and the center of mass mechanics for five strides were calculated using the individual limbs method. RESULTS: The participant decreased walking speed with each condition (1.42 [no load], 1.08 [BMI30], 0.86 [BMI35], and 0.66 [BMI40] m·s⁻¹). The average (± SD) peak and minimum powers decreased with each condition (261.1 ± 9.2 and -344.6 ± 32.7 W [no load], 177.8 ± 12.2 and -230.8 ± 25.4 W [BMI30], 126.0 ± 14.5 and -147.8 ± 6.1 W [BMI35], and 88.6 ± 19.2 and -100.0 ± 11.7 W [BMI40]). The metabolic cost of transport (J·kg⁻¹·m⁻¹) increased across conditions (2.97 [no load], 4.40 [BMI30], 5.59 [BMI35], and 6.45 [BMI40]). DISCUSSION: Increasing BMI led to slower walking speeds, increased metabolic cost, and decreased mechanical power. People who are obese walk at the same speed as people who are not with a similar metabolic cost, contrary to our findings. The acute effects of added mass may be different than acquired increased mass over a long period of time.

MC43. Morgan Johnson; Johnanthony Cantu; Rui Wu; Brian Sylcott; Shanyu Guan; Chia-Cheng Lin, PhD

**Presentation Title:** “The Effect of Concurrent Visual and Auditory Attention Tasks on Brain Activity and Postural Control”

**Abstract:** Purpose: The purpose is to investigate the cortical control of balance during concurrent auditory and visual attention tasks. Subjects: 10 healthy older adults (mean age: 72 ± 5 y.o.; 5M/5F) Materials and Methods: Two sets of functional Near-Infrared Spectroscopy devices were used to measure oxyhemoglobin changes on the right (R) and left (L) prefrontal (PFC) and temporoparietal junction (VEST) by source-detector arrays. The auditory choice reaction time task was used as the auditory attention task. VR goggles were used to display visual attention tasks and recorded eye tracking data. Three trials were performed alongside three visual attention tasks, including a moving object in horizontal, vertical, and random directions. A block design (A-B1-A-B2-A-B3-A) was used to examine effects of auditory attention task (B1), visual attention task (B2), and auditory plus visual attention tasks (B3) on VEST and PFC activation and postural sway each trial. Each block was 30 seconds. Subjects were asked to stand with eyes open and feet together. False discovery corrected p-values were set at a significance of p<0.05. A repeated ANOVA measure was performed separately for reaction time, eye tracking, and force plate data to examine the main effect of Trial and Block, and any interactions. Results: In Block B2 or B3 with an object moving vertically, right RPFC (p<0.02) and LPFC (p<0.01) increased activation. LVEST increased activation in Block B2 (p<0.01) and B3 with a randomly moving object (p<0.01), while RVEST increased activation during Block B1 (p<0.01). The repeated measure ANOVA revealed a trend of decreasing the percentage of time focusing on the moving object in Block B3 compared with B2 (2% decreased), while a trend decreasing RT in Block B3 compared with B1 (42 ms decreased). Postural sway significantly increased in Block B2 (p=0.04) and there was a trend of increasing postural sway during Block B1 and B3 compared with baseline A. Conclusions: In healthy older adults, PFC and VEST may activate to maintain performance
MC44. Erin L. Kokinda; Andrew J. Vermiglio, AuD; Virginia D. Driscoll, PhD; Reyse Stirrett; Hannah R. Osborne; Ava Cunningham; Kathryn Fennie; Laura Hall; Abigail Ormond

Presentation Title: "The Effect of Self-Reported Dialect on Speech Recognition in Noise Performances"

Abstract: The purpose of this study was to investigate the effect of dialect and masker condition on speech recognition in noise performances. The subjects were divided into Southern or non-Southern dialect groups. Speech recognition in noise ability was evaluated using the adult AzBio sentences in four different maskers. No main effect for dialect group was found. A statistically significant main effect was found for masker condition.

MC45. Allie Wilson; Julia Scott; Saryu Sharma; Erika Johnson; Natalia Jaworska; Sneha Mantri; Kathrin Rothermich, PhD

Presentation Title: "Changes in Anxiety and Depression Due to COVID-19 in Patients with Parkinson’s Disease"

Abstract: Parkinson’s Disease (PD) is a neurodegenerative disorder leading to motor and non-motor symptoms. Non-motor symptoms include disturbances in sleep, sensory processes, cognition, and mental health. As a result, stress, anxiety, and depression are common in individuals with PD. These mental health issues have been further impacted by the global COVID-19 pandemic, making those with underlying neurodegenerative conditions such as PD especially vulnerable. Existing evidence reveals health declines in individuals with PD due to the pandemic, however there is a lack of data available on the impact of COVID-19 restrictions on mental health. In the current study, participants diagnosed with PD (N=32) completed an online questionnaire regarding their mental health and coping abilities. The survey was sent out to participants in March 2021. For example, we asked “Has the pandemic increased your subjective anxiety levels?”. We also used standardized tests such as the Generalized Anxiety Scale, the Brief-COPE test, and the Patient Health Questionnaire to describe individual mental health profiles. Results of these tests indicate a wide range of severities within our group of participants. One sample Chi-square tests were used to assess if there were changes in anxiety, depression, stress, and coping strategies compared to before the pandemic. We found that anxiety and stress significantly increased due to the pandemic, and that specific PD symptoms worsened. However, we did not find significant changes in depression or coping strategies (food intake, exercise etc.). Our findings shed light on the impact of the COVID-19 pandemic on patients with PD and reveal the need to provide counseling and support to those individuals, specifically in rural regions of the US such as Eastern North Carolina.

MC46. Rachel Parker, SPT; Elizabeth Proctor, SPT; Christine R. Lysaught, DPT

Presentation Title: "Evaluation of the Perceived Benefit of Participation in a Pro-bono Physical Therapy Student Run Clinic on Student and New Graduate Communication Skills"

Abstract: Introduction/Purpose: 80% of Doctor of Physical Therapy (DPT) programs in North Carolina participate in pro-bono student run clinics (SRCs) to serve their local communities and enhance students’ clinical skills, as well as promote the American Physical Therapy Association (APTA) core values for future physical therapists’ quality practice. Effective communication with others including patients, caregivers, and other professionals is part of the APTA values and vision, which students directly practice in SRCs. A few studies report that students perceive that participation in SRCs positively affects their overall education and preparation to communicate with patients and other professionals. However, there is a lack of research investigating if positive perception persists or changes as students become novice licensed physical therapists. This study aims to evaluate if participation in SRCs during DPT programs results in perceived overall benefit or improved communication skills for novice physical therapists upon graduation. Methods: An anonymous survey was distributed via Qualtrics to 32 students in the ECU DPT class of 2020 and repeated over a three-year period as well as 6 months following the students’ graduation. Two questions associated with students’ perceptions of their ability to communicate with patients and healthcare professionals (HCPs) were utilized to perform analysis tracking change during their time as students and as novice PTs. A 5-point Likert scale was utilized, with -2 representing strongly disagree, 0 representing neutral, and 2 representing strongly agree. Data analysis: Responses were described using percentages and frequencies. Chi Square test, using Fisher’s Exact with a significance level of .05 was used to assess for differences between student versus novice PT status. Results/Conclusions: 14 alumni from one DPT cohort completed the survey all three years. Overall, participant perceptions of communication skills with patients and health care providers remained positive with nonsignificant differences over time, and they perceived significantly higher benefit on communication skills with patients versus HCPs. Positive perception of
communication skills afforded by involvement in the SRC is maintained into clinical practice, which may indicate that experiential learning within didactic courses promotes communication competency.

**MC47. Brooke Capps; Taylor Cotellese; Anne Dickerson, PhD**

**Presentation Title:** “Significance of Virtual Driving Simulation for Individuals with Autism Spectrum Disorder”

**Abstract:** As a valued IADL, driving and community mobility (D&CM) is critical to the enactment of other important daily life tasks such as social participation, education, employment, and shopping. With the number of persons with ASD increasing, the potential number of drivers may also increase. Unfortunately, drivers with ASD have more crashes/citations and make more driving errors overall than non-ASD drivers. This poster will describe the standardized occupational therapy outcome used to measure changes in driving performance. Objective data will be presented regarding significant changes between pre and post scores on the interactive driving simulator. While we will focus on the driving simulator, the diverse interventions from the Bootcamp were integrated through a driving simulator. The Performance Analysis of Driving Ability (P-Drive) was used to measure the pre and post scores on the interactive driving simulator. The P-Drive is a standardized observational assessment tool used by occupational therapists to score driving performance on road. Two different drives, although similar, were used for pre and post assessment and were scored by two occupational therapy students. In addition to the other activities, each participant participated in 30-minute sessions per day on the driving simulator. This poster will review the results and discuss the implications.

**MC48. Michela Vitagliano; Leah Whitehurst; Young Kim, PhD**

**Presentation Title:** “The Differences Among Instrumental Activities of Daily Living and Physical Activity”

**Abstract:** Background: Studies have shown that many young adults are not achieving recommended activity level due to various barriers to participation. There are currently few studies that incorporated instrumental activities of daily living (IADLs) as physical activity. Objective: The purpose of this study was to determine the differences in objective activity levels among physical activity (walking) and IADLs (vacuuming, bed-making, and dishwashing) in healthy young adults between the ages of 18-39. Method: We recruited 38 adults (15 male, 23 female) who completed 40 minutes of moderate-intensity physical activity in 10-minute intervals. Data was collected using the ActiGraph™ GT9X Link to determine total activity count and MET levels. Results: We found significant differences in highest total activity counts and highest MET levels among bed-making, dishwashing, vacuuming, and walking in both male and female participants. Bed-making was shown to be the most active task based on the highest total activity count and walking had the highest MET levels for males and females. All of the activities showed MET levels higher than 3.0. Conclusion: The findings may be related to the three-dimensional movements required of the task and may indicate health benefits of IADLs. Our findings may contribute to alternative ways to increase physical activity, thus creating new channels for populations that are less physically active to achieve their health goals.

**MC49. Michaela Milan; Katie Gray; Breanna Wisseman; Jamie Bloss; Linda May; Amy Gross McMillan, PhD**

**Presentation Title:** “Environmental Influences on Gross Motor Development in Typically Developing Infants in the First Year of Life: A Rapid Review”

**Abstract:** Introduction/Purpose: Maternal exposures during pregnancy, including physical activity, have been shown to affect motor development in infants during the first year of life; however, these effects seem to lessen as the infant ages, suggesting there are environmental influences affecting infant motor development after birth. The purpose of this rapid review is to evaluate what environmental factors, such as the family’s/parents’ socioeconomic status, educational level, home environment, and daily routine, might influence infant gross motor development from birth to 12 months. Methods: A search strategy was iteratively developed and tested by a health sciences librarian (JB) in consultation with the other team members. For this rapid review, MEDLINE via PubMed was the only database searched. The three concept groups of the search were infants, neuromotor development, and factors that would contribute to neuromotor development. Results were filtered to the past ten years and English language only. The initial search was run on April 22, 2021 and retrieved 580 results. Based on inclusion and exclusion criteria, results were screened by title and abstract by four blinded screeners (LM, KG, MM, BW) and conflicts were resolved by a fifth screener (AGM). Full text screening is being performed by four blinded screeners (LM, KG, MM, BW) and conflicts will be resolved by a fifth screener (AGM). The resulting articles will be read by the review team for full review. Results: The initial search resulted in 580 articles to screen by title/abstract. Screening of title/abstract resulted in 136 full text articles to be reviewed. Conclusion: This rapid review is currently ongoing, with reviewers screening full text articles.
Clinical Relevance: There are many factors that can affect infant motor development, and these factors are important to consider when performing physical therapy evaluations and providing caregiver education. Physical therapists can potentially use the findings of this rapid review to educate parents on environmental changes that can facilitate gross motor development in their children.

MC50. Ashley Kendrot, SPT; Ethan Holland, SPT; Alexander Durland, DPT

Presentation Title: “Conservative Management of a Common Peroneal Nerve Injury Following an Acute Ankle Sprain”

Abstract: Background and Purpose: The ankle is the most commonly injured joint of the lower extremity.2 The predominant mechanism of ankle injuries consist of the combination of inversion and plantar flexion.2 These types of sprains can be accompanied by common peroneal nerve (CPN) damage, however it is an uncommon pathology.1 Damage of the CPN is associated with peroneal muscle weakness and foot drop.1,2,5 This study highlights the importance of appropriate referrals to adequately diagnose and the significant time frame required for nerve healing. Case Description: A 16 y/o female presented to a physical therapy clinic with right lateral ankle pain after attempting to reach for a bug while standing on tiptoes. The patient’s mechanism of injury was a right inverted ankle sprain. The patient presented with reduced dorsiflexion/eversion activation, decreased sensation to light touch on the right lateral lower leg and report of tripping during ambulation. Prior to the initial physical therapy evaluation, the patient was referred by the MD to receive an EMG and MRI due to signs and symptoms of nerve damage and possible tendon involvement. The electrodiagnostic test revealed an acute on chronic peroneal mononeuropathy in the area of the fibular head with evidence of recovery and preserved innervation of the peroneal nerve. Outcomes: Over a span of approximately 15 weeks, foot slap and pain in the right lower extremity was successfully resolved with conservative PT management. Patient reported significantly improved outcome measures with the Lower Extremity Functional Scale (LEFS) and the Foot and Ankle Ability Measure (FAAM) sports section. Patient continued to report difficulty with running; however, she elected to transition to independent management of symptoms during her last visit. Patient was educated to follow up with physical therapy if there is any regression. Discussion: This case illustrates the effectiveness of conservative physical therapy management of acute ankle instability with common peroneal nerve injuries. The outcomes of this case study suggest that early conservative management can resolve impairments and improve overall function.

MC51. Abigail Andrews; John Willson, PhD; Frank DiLiberto; Stacey Meardon, PhD

Presentation Title: “Chronic Ankle Instability Biomechanics and Load Distribution during Training Activities”

Abstract: Purpose/Hypothesis: Chronic Ankle Instability (CAI) is associated with altered ankle and hip motor strategies, cartilage damage and increased risk of post-traumatic arthritis. Internal loads are a determinant of cartilage damage, but little research has examined internal loads during athletic activities in persons with CAI. The aims of this study were to compare ankle JCF across routine training activities in people with CAI and to compare ankle and hip joint contact force (JCF) and load distribution between persons with CAI and controls. Materials and Methods: Group enrollment (20 CAI and 20 matched controls) was based on the CAI International Ankle Consortium position statement. The Cumberland Ankle Instability Tool, Foot and Ankle Outcome Score, and International Physical Activity Questionnaire were completed. Following warmup, performance measures were recorded: gastroc and soleus length, heel-rise work, max vertical jump height, and triple hop distance. In-vivo 3D kinematics and kinetics were recorded for 5 trials in 8 randomized conditions (walk, run, sprint, cut, double leg (DL) and single leg (SL) jump and land). A musculoskeletal model was used to estimate ankle and hip JCF in each condition from the in-vivo data. Peak resultant ankle JCF across activities were compared using repeated measures ANOVA (α=.05). Peak resultant ankle and hip JCF as well as ankle to hip JCF ratios were compared using t-tests and Cohen’s effect sizes (d). Results: The CAI group reported 14-45% greater disability than controls. Groups did not differ in performance measures. Ankle JCF in CAI increased when progressing from walking to DL land and jump, SL land, SL jump, cut, run and sprint. During walking, CAI ankle JCF was 4% lower than controls. In sprinting, hip JCF was 7% lower in CAI than controls. Apart from walking, ankle to hip ratios were higher in the CAI group across all tasks compared to controls with greatest differences seen in sprinting. Conclusions: Ankle JCF increased from low-impact DL activities to high-speed SL activities. Individuals with CAI loaded their ankle less than controls in walking, but differences were not present in higher demand tasks. CAI loaded their ankle more than their hip in high demand tasks.

MC52. Tyler Ricks, SPT; Alexander Durland, DPT; Zac Womack; Chris Urbanek

Presentation Title: “Venous Abnormality with Suprascapular Nerve Entrapment in a Collegiate Baseball Pitcher”
Abstract: Background: Suprascapular nerve palsy accounts for 1-2% of all shoulder pathologies. Early diagnosis is critical to prevent the development of infraspinatus wasting/syndrome. Traction or compression of the nerve, as well as rotator cuff diseases, can result in damage and subsequent neuropathy. Other causes include bone tumors and cysts after capsular injury or labral tears. There is limited literature on suprascapular vein malformation and suprascapular nerve injury. In the overhead athlete, damage to the suprascapular nerve is often due to repetitive tightening of the spinoglenoid ligament while the shoulder is in the overhead throwing position. Following a suprascapular nerve palsy diagnosis, conservative treatment is often used initially with arthroscopic decompression, the gold standard, being used secondarily. Case Description: A 20-year-old male right-handed collegiate baseball pitcher was used for this case study with clinical presentation of right anterior shoulder pain, external rotation weakness (4-/5), positive O'Brien’s test, and infraspinatus syndrome. A MRA was ordered and showed evidence of a mild subchondral cyst on the posterolateral surface of the humeral head and fatty infiltration of the infraspinatus. An EMG was completed and revealed suprascapular nerve injury with denervation and impaired recruitment of the infraspinatus. An ultrasound of the shoulder revealed venous malformation of the suprascapular vein as compared to the uninvolved limb, which was believed to be contributing to the suprascapular nerve injury. Outcomes: After 2 months of physical therapy focused on rotator cuff and periscapular strengthening as well as neuromuscular reeducation, the patient presented with continued shoulder pain while throwing. The patient elected to undergo an arthroscopic SARS procedure for suprascapular nerve decompression by release of the spinoglenoid. The patient developed recurrent anterior shoulder pain with crepitus while throwing along with increased pain with ADLs, and continued external rotation weakness preventing him from return to sport. Discussion: Despite months of intensive rehabilitation and arthroscopic decompression surgery, the patient was unable to return to in-game competition at his prior level of performance without continued shoulder pain and weakness. The involvement of venous malformation on suprascapular nerve entrapment is a unique anatomical abnormality and should be considered as part of a comprehensive treatment plan.