College of Health Sciences Research Day

Oral Presentation

Abstract Title:	**The Effect of Pain Catastrophizing on Preoperative Pain in Patients Undergoing Hip Arthroscopy**
Author(s):	K.N. Jochimsen Department of Athletic Training, U of Kentucky C.G. Mattacola, College of Health Sciences, U of Kentucky B.W. Noehren, Department of Physical Therapy, U of Kentucky S.T. Duncan, Department of Orthopaedic Surgery & Sports Medicine, U of Kentucky C.A. Jacobs, Department of Orthopaedic Surgery & Sports Medicine, U of Kentucky

Abstract: Purpose: The purpose of this study was to determine the relationship between preoperative pain catastrophizing, pain pressure thresholds (PPT), and self-reported hip pain in paitents with femoral acetabular impingement (FAI) undergoing hip arthroscopy. Subjects: 37 consectutive patients were enrolled prospectively in this cross-sectional study (29F/8M; age=38.3±10.3 years). Procedures: Prior to surgical intervention subjects completed patient reported outcomes (PROs) including the pain catastrophizing scale (PCS) and a visual analog scale (VAS) rating their hip pain at rest and during activity. Additionally, PPTs were measured 3 cm below the iliac crest on the gluteus medius of the ipsilateral hip. The average of two trials was used for analysis. Statistical Analysis: Patients were categorized based on established values in the literature for high pain catastrophizing(?19) and low PPTs(?442kPa). VAS pain scores were compared between groups using independent t-tests, and Spearman correlations were used to analyze the relationships between preoperative pain catastrophizing, PPTs, and VAS pain. Results: 19/37(51.4%%) patients were pain catastrophizers and 16/35(45.7%) had low PPTs. Patients in the high pain catastrophizing and low PPT groups had significantly worse pain preoperatively (p=0.04, p=0.04). Preoperative pain was significantly correlated with the total PCS score(r=.44/p=0.02) and two of its' subscales; rumination(r=.47/p=0.01) and helplessness(r=.41/p=0.04). Pain and PPTs were negatively correlated(r=-.38/p=0.04). Conclusion: Both pain catastrophizing and low PPTs are associated with worse pain in patients undergoing hip arthroscopy indicating maladaptive cogitivie and neurologic adaptations to pain. Additional research is necessary to understand the effect of pain catastrophizing and low PPTs on postoperative outcomes.

Supported by:

Primary Presenter / email:	**Jochimsen, K.N.** / kate.jochimsen@uky.edu	University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Jacobs, C. A. / cale.jacobs@uky.edu	

College of Health Sciences Research Day

Oral Presentation

Abstract Title:	**Tissues and Trauma: Pain Neuroscience Education improves Pain Self-Efficacy in Veterans with Chronic Low Back Pain and Post-Traumatic Stress.**
Author(s):	T. M. Benedict, Department of Rehabilitation Sciences, College of Health Sciences, U of Kentucky A. J. Nitz, Department of Rehabilitation Sciences, College of Health Sciences, U of Kentucky J. Abt, Department of Rehabilitation Sciences, College of Health Sciences, U of Kentucky B. Noehren, Department of Rehabilitation Sciences, College of Health Sciences, U of Kentucky

Abstract: Introduction: It is common for patients with chronic low back pain (LBP) to have high levels of stress, resulting in a hypervigilant and dysregulated nervous system. The purpose of this research is to determine if pain neuroscience education (PNE) is more effective than traditional education about back pain and stress management in reducing stress, pain, maladaptive beliefs about pain, and disability in Veterans with chronic LBP. Methods: This study was a multi-site randomized controlled trial comparing PNE to traditional back and stress education. Participants were Soldiers and Veterans ages 18-65 with chronic LBP. Participants attended an education and exercise session once a week for 4-weeks. Pain, disability, stress, pain self-efficacy (PSEQ), pain catastrophizing (PCS), and pain attitudes were assessed at baseline, 4-weeks, and 8-weeks by a blinded researcher. Results: 15 participants completed the research program (PNE, n=7, traditional, n=8). Participants in the PNE group were more likely to improve their best pain level achieved; although not statistically significant (p=.175), on average the PNE group achieved clinical improvement in disability whereas the traditional group did not. The PNE group improved their PSEQ scores, which were maintained at the 8-week follow up for a large effect size (p=.001). Furthermore, the PNE group were more likely to see exercise as beneficial—as opposed to harmful—following the intervention (p=.031). Conclusion: PNE improves pain, pain self-efficacy, and positive beliefs about pain and exercise compared to traditional stress management and pain education in Veterans with chronic LBP.

Supported by:

Primary Presenter / email:	**Benedict, T. B.** / timothy.benedict@uky.edu **Rehabilitation Sciences Doctoral Program**	University of Kentucky
Mentor / e-mail:	Nitz, A. J. / arthur.nitz@uky.edu	

13th Annual CCTS Spring Conference
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College of Health Sciences Research Day

Poster Presentation #187

Abstract Title: **Increasing Verbal Output by a Child with Cerebral Palsy in the Regular Classroom Setting**

Author(s):
M. Sandmann, Div. of Communication Sciences & Disorders, College of Health Sciences, U of Kentucky
K. Markwell, Div. of Communication Sciences & Disorders, College of Health Sciences, U of Kentucky
M. Blayney, Div. of Communication Sciences & Disorders, College of Health Sciences, U of Kentucky
E. Lee, Div. of Communication Sciences & Disorders, College of Health Sciences, U of Kentucky
J. Kleinert, Div. of Communication Sciences & Disorders, College of Health Sciences, U of Kentucky

Abstract: "Cerebral Palsy (CP) is the term for several neurological conditions that affect movement and coordination" which occur in early childhood. This disorder is a primary cause of physical disability in children and is a lifelong disorder (Dean, 2017). Characteristics may include poor motor control, muscle tone disorders, impaired gait, significant speech and language delays, impaired oral-motor movements and possible vision, and hearing disorders (NINDS, 2018). This project was designed to determine the effectiveness of an evidenced-based intervention program to improve verbal output for an 11-year-old child with CP. The student had limited oral speech and decreased question-answering skills. The intervention program included the following evidenced-based strategies: delayed modeling, imitation, peer support and classroom carryover of verbal prompting techniques. The intervention strategies were embedded in an inclusive (regular education) classroom setting and delivered, under supervision, by undergraduate research students. Results will be displayed for each intervention objective in both narrative and graphic formats. Findings indicated that while the intervention package was highly successful for the question response target, there was less success for the spontaneous increase in length and complexity of verbal output. Prompted verbal output, however, did show a consistent increase of verbal outcomes. This finding seemed to reflect "prompt-dependency" of our student. Discussion and conclusions will be provided along with possible "next steps" for intervention.

Supported by:

Primary Presenter / email: **Sandmann, M.** / mnsa229@uky.edu University of Kentucky
Communication Sciences and Disorders
Division of Communication Sciences & Disorders

Mentor / e-mail: Kleinert, J. / jklei2@uky.edu

College of Health Sciences Research Day

Poster Presentation #188

Abstract Title:	**Comparing Communication Intervention Delivery Models for a Child with Cerebral Palsy: Clinic vs. Classroom**
Author(s):	M. Blayney, Division of Communication Sciences and Disorders, U of Kentucky E. Kowal, Division of Communication Sciences and Disorders, U of Kentucky A. MacMillan, Division of Communication Sciences and Disorders, U of Kentucky J. Kleinert, Division of Communication Sciences and Disorders, U of Kentucky

Abstract: Cerebral Palsy (CP) refers to a group of neurological disorders that appear in infancy or early childhood and permanently affects body movement and muscle coordination (NINDS 2017). Characteristics of CP can include impaired motor control, muscle tone disorders, feeding, speech/language disorders, and possible hearing and vision problems. Speech difficulties are present in more than a third of persons with CP (NINDS ed). Characteristics of the CP can also affect "personal (education, behavioral problems) and environmental (siblings, parental stress, social economic status) factors" (Developmental Medicine & Child Neurology 2014, 56: 951–959). This project compared the effectiveness of two intervention delivery models of a therapeutic package designed to increase the verbal output and question responses with an 11-year-old student with Cerebral Palsy and limited oral speech. The project implemented an evidenced-based intervention package of instruction including delayed modeling, imitation, and classroom carryover of verbal prompting techniques targeting increased verbal output for this student. Two delivery models, each spanning approximately 10 weeks, were used. The first model was a 1:1 weekly clinic-based speech/language session in an academic clinic with a Communication Sciences and Disorders (CSD) graduate student. The other model involved the embedding of the intervention package within the child's classroom setting implemented, under supervision, by four undergraduate students in the CSD Program from the University of Kentucky. Comparison of effectiveness data and the differences between the two delivery models will be presented in both graphic and narrative formats. Suggestions for future intervention will be discussed.

Supported by:

Primary Presenter / email:	**Blayney, M.** / madison.blayney@uky.edu University of Kentucky **Communication Sciences and Disorders** **Division of Communication Sciences & Disorders**
Mentor / e-mail:	Kleinert, J. / jklei2@uky.edu

Poster Presentation #189

Abstract Title: **Optimizing Voice Therapy with Precision Rehabilitation**

Author(s): M. H. Bane, Division of Communication Sciences and Disorders, U of Kentucky
J. C. Stemple, Division of Communication Sciences and Disorders, U of Kentucky

Abstract: In voice therapy, the active ingredients, or mechanisms underlying efficacy, are unknown, impeding the speech-language pathologist's (SLP's) ability to personalize treatments while preserving fidelity. The overarching goal was to systematically explore active ingredients of an evidence-based voice therapy, Vocal Function Exercises (VFEs). Individual components of VFEs were modified to determine their contribution to efficacy. Individuals with normal voice participated in 3 randomized trials. Each study examined the effect of VFE modification on the primary outcome measure maximum phonation time (MPT), which reflects vocal efficiency. The studies examined the following: 1. Prescribed dosage was compared to high (doubled) and low (halved) dosage. Low dosage insufficiently improved MPT. High dosage resulted in significantly greater improvement but increased attrition. 2. The semi-occluded vocal tract (SOVT) is a mouth posture that maximizes efficiency of vocal fold vibration. Prescribed SOVT was compared to a posture on the vowel /o/ and on the vowel /a/. SOVT significantly improved MPT, /o/ approached significance, and /a/ did not achieve significance. 3. The VFE protocol provides a goal to track improvement. Knowledge of goal was compared to delayed knowledge and to no knowledge of goal. Goal and delayed goal significantly improved; no goal did not significantly improve. VFEs can be modified to an extent while preserving/ enhancing efficacy. This research provides SLPs with evidence to support precision rehabilitation and enhanced therapeutic outcomes for individual patients. Identification of active ingredients within therapy protocols is essential to determining/confirming how, when, why, in what amount, and to whom treatment should be provided.

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Primary Presenter / email: **Bane, M. H.** / maria.bane@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Stemple, J. C. / jcstem2@uky.edu

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Poster Presentation #190

Abstract Title: **The Effect of Load Carriage and Recovery on Shoulder Strength**

Author(s):
M. R. Almaddah, Department of Rehabilitation Sciences, U of Kentucky
A. J. Nitz, Department of Rehabilitation Sciences, U of Kentucky
J. Abt, Sports Medicine Research Institute, U of Kentucky
B. Bazrgari, Joseph Halcomb III, M.D. Department of Biomedical Engineering, U of Kentucky
T. L. Uhl, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Objective: To determine fatigue-related changes in shoulder strength after 2 hours of loaded walking, and to determine the time needed for shoulder strength to recover. Study Design: Observational Cross-sectional study. Subjects: Thirteen healthy volunteers (3 females, 10 males) with (age 27±5.3 years; weight 82.5±11.8 kg; height 180±5.6 cm; BMI 25.5±3.5 kg/m2), all subjects were right-handed. Intervention: Dominant arm abduction strength was assessed at baseline and at (0,10, 20 and 30) minutes post-backpack walking task. Walking task was administered in lab settings, subjects carried a 25kg backpack and walked for 2 hours on a treadmill with no inclination, and speed (5.5-7 km/h). Outcome Measures: The shoulder strength was the average torque (Nm) produced by the shoulder in first 2-5 seconds of isometric abduction. The strength was assessed isometrically by the BTE dynamometer (BTE Primus, Hanover, MD, USA). Familiarization practice was done at baseline only for 6 seconds. The same tester conducted all testing for the 13 subjects, giving the same level of motivation at each test. Results: We have found a significant reduction in shoulder abduction strength measures from (57.5±16.8 Nm) at baseline, to (44.5±13.5 Nm) after two hours of backpack walking with (p=0.002). Shoulder strength needed 30 minutes to recover (45.7±15.7 Nm), with (P-value >0.05). Conclusions: Walking with a heavy backpack reduced shoulder strength and needed 30 minutes to recover full strength. Carrying heavier loads and walking for long periods of time, might affect shoulder strength and lead to shoulder injuries if 30 minutes of recovery was not allowed.

Supported by:

Primary Presenter / email: **Almaddah, M. R.** / m.almaddah@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Uhl, T. L. / tim.uhl@uky.edu

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Poster Presentation #191

Abstract Title:	**Early Intervention Services Provided by Physical and Occupational Therapists for Infants with or at Risk for Cerebral Palsy**
Author(s):	A. S. Gmmash, Department of Rehabilitation Sciences, U of Kentucky S. K. Effgen, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Background/Objectives: The purpose of this study targeting pediatric physical therapists (PTs) and occupational therapists (OTs) in the US is to explore the frequency, duration, and type of practices currently used in cerebral palsy (CP) early intervention. Design: Cross-sectional. Participants and Setting:A convenience sample of PTs and OTs providing or have provided early intervention services for infants and toddlers with or at risk for developing CP throughout the US. Materials/Methods: An online 36 item survey was developed and disseminated using (Qualtrics) targeting early intervention providers. Results: 250 therapists, (30% OTs and 70% PTs) completed at least 75% of the survey items. 61% of providers begin therapy services for infants with or at high risk for CP between 0-5 months of age.90% have never used the general movement assessment to predict CP. The majority of the providers (53%) reported that infants at risk for CP receive therapy once a week. 96% consider parent education one of the most important goals followed by promoting engagement of the infant in daily routines. However, 43% of providers rarely or never provide parents with information related to sleeping, feeding, and responsive parenting. Only 28% of providers regularly used an outcome measure to identify and prioritize parents' goals and only 2% used a formal instrument to ensure enrichment of the home environment. Conclusions/Significance: The current services provided by PTs and OTs for infants with or at risk for CP do not incorporate sufficient strategies for optimum environment enrichment, comprehensive parental education, and goal oriented interventions.

Supported by:

Primary Presenter / email:	**Gmmash, A. S.** / a.gmmash@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Effgen, S. K. / seffgen@uky.edu

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Poster Presentation #192

Abstract Title:	**Families of Individuals with Developmental Disabilities Perceived Supports and Barriers to Visiting the Cincinnati Zoo & Botanical Garden**
Author(s):	V. Miller, College of Health Sciences, U of Kentucky, Cincinnati LEND, U of Cincinnati/Cincinnati Children's Hospital Medical Center, Cincinnati, OH J. Smith, Division of Developmental and Behavioral Pediatrics, Cincinnati LEND, U of Cincinnati/Cincinnati Children's Hospital Medical Center, Cincinnati, OH T. Farmer, Division of Developmental and Behavioral Pediatrics, Cincinnati LEND, U of Cincinnati/Cincinnati Children's Hospital Medical Center, Cincinnati, OH J. Richard, Cincinnati LEND, U of Cincinnati/Cincinnati Children's Hospital Medical Center, Cincinnati, OH M. Wolken, Cincinnati LEND, U of Cincinnati/Cincinnati Children's Hospital Medical Center, Cincinnati, OH

Abstract: Individuals with developmental disabilities (DD) such as autism spectrum disorder deserve to experience the same community opportunities that are available to their peers. Community inclusion and accessibility is a right and the responsibility of community organizations to be active partners in promoting inclusion and accessibility for all. However, some families of individuals with DD are reluctant to participate in community activities such as visiting zoos due to numerous barriers. Some barriers that families report include negative emotions, feelings of judgment and criticism, and a lack of understanding from the general public and staff. The first step in making community programs more inclusive is to identify the needs of the community. The current study aims to learn about the barriers families with children with developmental disabilities face when visiting the Cincinnati Zoo and Botanical Gardens (CZBG). Additionally, the study intends to identify potential supports that would make visits more successful for families of individuals with DD. Three focus groups containing five to eight caregivers of individuals with DD who have visited the CZBG were conducted. Focus group data was analyzed and themes were decided upon based on participant responses and frequency of discussion about a topic. Universal themes across groups were identified and included the following: facility improvements, programming improvements, staff training, aids and supports and safety concerns. Future direction includes working with the CZBG and a family advisory council to identify reasonable next steps to implement change with help from a grant obtained the Institute of Museum and Library Sciences.

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Primary Presenter / email: **Miller, V.** / Valerie.Miller@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Smith, J. / Jennifer.Smith4@cchmc.org

College of Health Sciences Research Day

Poster Presentation #193

Abstract Title:	**Elevated myostatin expression drives skeletal muscle fibrogenic cell expansion following ACL injury**
Author(s):	B. Peck, Department of Rehabilitation Health Sciences, U of Kentucky D. L. Johnson, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky M. L. Ireland, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky C. Fry, Department of Nutrition and Metabolism, U of Texas Medical Branch B. Noehren, Department of Rehabilitation Health Sciences, U of Kentucky

Abstract: Anterior cruciate ligament (ACL) injuries induce quadriceps skeletal muscle maladaptations. The negative morphological and cellular changes promote a pro-fibrotic muscle environment. There are many unknown initiators and contributors to fibrotic pathways and understanding the mechanisms, cell types, and factors involved in the progression of fibrosis is critical for developing treatment strategies. We sought to determine the contribution of myostatin and other factors known to regulate muscle fibrosis in skeletal muscle following ACL injury by obtaining muscle biopsies from the injured and non-injured vastus lateralis of young adults (n=14; 23±4 yr). Expression of myostatin, transforming growth factor-? and other regulatory factors were investigated. Immunohistochemical analyses were performed to verify potential fibrogenic cell expansion in the presence of elevated myostatin levels both in vivo and in vitro. Injured limb skeletal muscle demonstrated elevated myostatin gene ($p < 0.005$) and protein ($p < 0.0005$) expression, which correlated ($p < 0.05$) with fibroblast cell populations. Human fibroblasts expressed the activin type IIB receptor, underscoring the ability of myostatin-mediated regulation. Treatment with myostatin induced proliferation of primary human muscle-derived fibroblasts ($p < 0.05$). Specific components of the extracellular matrix, collagen 1 and fibronectin, were significantly higher in the injured limb ($p < 0.05$). Pro-collagen 1 producing cells as well as collagen remodeling were also elevated in the injured limb ($p < 0.05$). These findings support an integral role for myostatin in promoting fibrogenic alterations within skeletal muscle following an ACL injury.

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Primary Presenter / email: **Peck, B.** / bdpe226@uky.edu University of Kentucky
Department of Rehabilitation Sciences

Mentor / e-mail: Noehren, B. / b.noehren@uky.edu

College of Health Sciences Research Day

Poster Presentation #194

Abstract Title:	**A Holistic Approach to Admissions in a Physician Assistant Program**
Author(s):	C. Hanebuth, College of Health Sciences, U of Kentucky R. Remer, Departments of Office of Student Affairs, Clinical Leadership and Management, and Human Health Sciences, U of Kentucky M. Butina, Department of Medical Laboratory Science, U of Kentucky

Abstract: Over the past decade, the methods used to evaluate applicants for healthcare graduate degrees have shifted from a focus on cognitive components to a more holistic approach as test scores and grade point averages (GPA) do not fully reflect who a person is. Many Physician Assistant programs have adopted a holistic approach, to look at the whole person, in an effort to create future healthcare practitioners that are compassionate and competent professionals. The Physician Assistant literature has limited research regarding which holistic components contribute to student success in graduate programs. Data was collected from three of the most recent Physician Assistant (PA) graduating classes, spanning from 2014-2016 (150 students) at a research institution in the southeast. A multiple linear regression analysis will be used to determine what holistic components are the greatest predictors of student success in this program. The holistic variables include hours of patient care experience, community service, work experience, and health care shadowing. End of program GPA and national certifying exam scores will be utilized as the variables of program success. Furthermore, the cognitive components (undergraduate GPA and Graduate Record Examination scores) will be analyzed in sequence to further evaluate applicants in an effort to determine the factors that predict success. These results are expected to indicate that students who have more experience in certain categories will score higher in GPA and on national certifying exams. These results can help graduate programs to better determine which factors, holistic and/or cognitive, predict student success in these competitive programs.

Supported by:

Primary Presenter / email:	**Hanebuth, C.** / cannon.hanebuth@sbcglobal.net **Human Health Sciences** **Division of Human Health Sciences**	University of Kentucky
Mentor / e-mail:	Remer, R. & Butina, M. / randa.remer-eskridge@uky.edu	

College of Health Sciences Research Day

Poster Presentation #195

Abstract Title:	**Psychometric Properties of the Self-Efficacy for Home Exercise Programs Scale**
Author(s):	K.J. Picha, Department of Rehabilitation Sciences M.C. Hoch, Department of Rehabilitation Sciences N.R. Heebner, Department of Rehabilitation Sciences J.P. Abt, Department of Rehabilitation Sciences E.L. Usher, Department of Educational, School, and Counseling Psychology G.J. Capilouto, Department of Rehabilitation Sciences T.L. Uhl, Department of Rehabilitation Sciences

Abstract: Context: The Self-Efficacy for Home Exercise Program Scale (SEHEPS) was developed to help clinicians evaluate patients' self-efficacy for performing their prescribed home exercise program (HEP). The Self-Efficacy for Exercise (SEE) scale is a reliable measure to assess general exercise self-efficacy. Objective: To determine the reliability and validity of the SEHEPS. Participants: Eighty-one patients (32 males, 49 females, age 42±18 years) with varying musculoskeletal conditions. Interventions: Patients were given a HEP at their initial physical therapy visit. Participants completed the SEHEPS and a modified SEE scale during their initial visit. Procedures: The SEHEPS is a 12-item patient-reported questionnaire that was designed to assess self-efficacy for prescribed home exercise. Patients rated their confidence on a seven point scale ranging from "not confident" to "very confident." Total scores were calculated as percentages and scores ranged from 0% (low) to 100% (high) self-efficacy. Statistical Analysis: Internal consistency was measured using Cronbach's alpha. Convergent validity between the SEHEPS and SEE scale was evaluated with a Spearman correlation. Results: High internal consistency (? = 0.96) was demonstrated. The SEHEPS (70.6%± 20.3%) was strongly correlated with the SEE scale (36.8±11.3; r= 0.83, p<0.01) indicating strong convergent validity. Conclusions: The SEHEPS demonstrates excellent internal consistency and strong convergent validity with the SEE scale providing further support for the psychometric properties of this novel instrument. Overall, the SEHEPS is a clinically useful tool for evaluating a patient's self-efficacy for home-based musculoskeletal exercise programs. This scale should be used prior to prescribing a HEP for patients with musculoskeletal conditions.

Supported by:

Primary Presenter / email:	**Picha, K. J.** / kelsey.picha@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Uhl, T. L. / tim.uhl@uky.edu

College of Health Sciences Research Day

Poster Presentation #196

Abstract Title:	**The Effect of Dry Needling on Patient Reported Outcomes in Individuals with Chronic Ankle Instability: A Critically Appraised Topic**
Author(s):	J. F. Mullins, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Clinical Scenario: Chronic Ankle Instability (CAI) occurs in approximately 40% of individuals that suffer an ankle sprain. Reciprocal inhibition, increased neuronal latency, and decreased reflex motor neuron pool excitability have all been implicated in its genesis. Despite these known deficits, an effective treatment has yet to be established. Focused Clinical Question: Does dry needling (DN) improve patient-reported outcomes (PRO) in individuals with CAI? Summary of Key Findings: Of the two studies found that examined DN in a CAI population, one found improvements in patient reported outcomes. Each study, however, utilized different PRO measurement tools and different treatment duration and follow-up timelines. Clinical Bottom Line: Based on the current evidence, recommendation for dry needling to improve patient reported outcomes in individuals with CAI cannot be made. Strength of Recommendation: As Level B evidence was used to make this recommendation, caution should be made when interpreting these results.

Supported by:

Primary Presenter / email:	**Mullins, J. F.** / jennifer.mullins@uky.edu **Department of Rehabilitation Sciences**	University of Kentucky
Mentor / e-mail:	Nitz, A. J. / arthur.nitz@uky.edu	

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Poster Presentation #197

Abstract Title: **Understanding government influence on healthcare legislation**

Author(s): M. J. Miles

Abstract: Research Objective: Healthcare is constantly evolving and changing. One of the strongest influencers in this constant change is the government. In order to completely understand healthcare, one must also be able to understand the legislation involved. For providers, this is important to understand since they need to be aware of the resources available to their patients. Being informed about health laws allows providers to make more educated decisions, understand trends in healthcare, and stay compliant with updated standards. The vocabulary, terminology, and overall process used in legislation can be difficult to understand—especially to a lay audience. This study examines recent healthcare laws in Kentucky to better understand whether current legislation aligns with the greatest health needs of the state and to determine better ways of presenting the information in a way individuals from any educational background can understand. Methods: Laws passed in 2017 were selected for review from Kentucky's Legislative Research Commission website and compared to the priorities identified in the Foundation for a Healthy Kentucky's "Kentucky Health Issues Poll". Information from the comparison was then translated into a podcast series. Podcasts were uploaded to researcher's Facebook, Instagram, Twitter, and YouTube. Podcasts include news clips and interviews with professionals who have experience working in areas affected by these new laws. The series consists of six-episodes and was titled "What the Health is Going on?" Conclusions: The findings suggest that Kentucky has a strong healthcare presence in legislation and that many of the laws overlapped with the priority issues identified by the Foundation. Although some laws were irrelevant to the greatest issues, they may still play an important role in improving healthcare in the state. Overall, the study findings indicate that Kentucky is taking steps to improve major healthcare issues, but there is still room for priority alignment with legislation.

Supported by:

Primary Presenter / email: **Miles, M. J.** / mjmi235@uky.edu University of Kentucky
Human Health Sciences
Division of Human Health Sciences

Mentor / e-mail: Kercsmar, S. / sarah.kercsmar@uky.edu

Poster Presentation #198

Abstract Title:	**Are Serum Cartilage Degeneration Biomarker Concentrations Accurate Representations of the Intra-Articular Environment of the Knee?**
Author(s):	E. R. Hunt, College of Health Sciences, U of Kentucky C. A. Jacobs, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky J. L. Huebner, Molecular Physiology Institute, Duke University, Durham, NC V. B. Kraus, Molecular Physiology Institute, Duke University, Durham, NC C. Lattermann, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky

Abstract: PURPOSE: The purpose of this study was to determine the agreement between serum and synovial fluid (SF) CTX-II and COMP. We hypothesized that COMP serum levels would not represent SF levels, but that serum CTX-II would correlate well with SF concentrations. METHODS: 36 patients (mean age=19.9 y, BMI=24, 15 F/22 M) with acute ACL tears were consented to participate in this IRB-approved protocol. Arthrocentesis was performed at mean 4 days post-injury, mean 11 days post-injury, and the time of ACL reconstruction. A repeated measures ANOVA was used to compare the change in COMP or CTX-II between serum and SF samples. Generalized estimating equations (GEE) were used to determine agreement between serum and SF concentrations of COMP, CTX-II and to allow for an adjustment for multiple time points. An ?-level of p ? 0.05 was considered statistically significant. RESULTS: Both COMP (p=.001) and CTX-II (p=.001) concentrations were significantly greater in the SF than serum. Serum and SF CTX-II followed a similar time course after injury whereas the time course significantly differed between serum and SF COMP (p=.001). Serum and SF CTX-II were weakly correlated (r=.17, p>.05) as was serum and SF COMP (r=0.03, p>.05). CONCLUSIONS: Serum concentrations of COMP and CTX-II are not representative of the intra-articular environment. While more difficult to obtain, synovial fluid provides a more accurate picture of cartilage degradation after acute ACL injury, and further research is needed to determine if other serum markers of cartilage cleavage may more accurately describe the condition of the articular cartilage.

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Primary Presenter / email: **Hunt, E. R.** / emily.hunt@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Lattermann, C. / christian.lattermann@uky.edu

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Poster Presentation #199

Abstract Title:	**Athletes are More Likely to Sustain Secondary ACL Injury in Low Socioeconomic Communities**
Author(s):	C. Roe, Department of Rehabilitation Sciences, U of Kentucky C. Jacobs, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky M.L Ireland, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky D. Johnson, Department of Orthopedic Surgery and Sports Medicine, U of Kentucky B. Noehren, Division of Physical Therapy, U of Kentucky

Abstract: Return to sport (RTS) testing after an anterior cruciate ligament reconstruction (ACLR) allows healthcare providers to make informed decisions about safely resuming higher level sports. However, what functional data is typically used in clinical practice and when the athletes are cleared by the surgeon are not well established. Athletes living in economically distressed areas may have additional barriers to RTS. Purpose: Determine the percentage of athletes who provide functional data to the physician and how socioeconomic status affects return to sport. Methods: A retrospective review of athletes (n=145, age <25 years) with an ACLR and participate in level 1 or 2 sports. The Economic Innovation Group's 2016 Distressed Communities Index (DCI) was recorded for each patient's zip code. The functional data the athlete presented to the surgeon were recorded. Patient demographics and RTS data was compared with chi-square and Fisher Exact tests as appropriate. Results: Documentation of functional data was only available for 27% (36 of 145). Athletes living in economically distressed areas were 4.6 times less likely to provide the surgeon with objective functional data (Odds Ratio = 4.6, p= 0.004, 95% CI: 1.5-14.3). The rate of secondary injury was slightly higher in the economically distressed group. Conclusion: While making the decision to RTS only a small percentage of athletes had functional data. Those who live in economically distressed communities are at a higher risk for a secondary injury. These results indicate there is a need for better methods to improve upon return to play testing and reporting.

Supported by:

Primary Presenter / email:	**Roe, C.** / c.roe@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Noehren, B. / b.noehren@uky.edu

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Friday, April 13, 2018 Lexington Convention Center

College of Health Sciences Research Day

Poster Presentation #200

Abstract Title:	**A Qualitative Evaluation of Usability and Relevance for an App-Based Treatment in Persons with TBI**
Author(s):	P. Meulenbroek, Department of Rehabilitation Sciences, College of Health Sciences, U of Kentucky E. Edgar, College of Health Sciences, U of Kentucky
Abstract: [document]	
Supported by:	National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR): Advanced Rehabilitation Research Training Grant # H133P120013/90AR5015, and Mary E. Switzer Merit Research Fellowship #90SF0006-01-00
Primary Presenter / email:	**Edgar, E.** / emma.edgar@uky.edu University of Kentucky **Communication Sciences and Disorders** **Division of Communication Sciences & Disorders**
Mentor / e-mail:	Meulenbroek, P. / meulenbroek@uky.edu

College of Health Sciences Research Day

Poster Presentation #201

Abstract Title:	**Sex and Speed Differences in Running Mechanics of Collegiate Cross Country Athletes**
Author(s):	L. N. Erickson, Department of Rehabilitation Sciences, U of Kentucky M. R. Stiffler, Department of Orthopedics and Rehabilitation, U of Wisconsin - Madison B. Heiderscheit, Department of Orthopedics and Rehabilitation, U of Wisconsin - Madison

Abstract: Purpose: Females runners are twice as likely to sustain patellofemoral pain (PFP) compared to males. Sex differences in lower extremity mechanics that contribute to injury risk have been typically studied in recreational runners and at a single speed. The study's purpose was to compare lower extremity mechanics between competitive cross country runners across various speeds. Subjects: Twenty-six competitive cross country runners (10 males, 16 females). Methods: Three-dimensional whole body motion and ground reaction forces were collected during running trials at 3.35, 3.80, and 4.47 m/s. Joint kinematics and kinetics were calculated using inverse kinematics and dynamics approaches. Discrete variables were compared between sex and across speeds using 2-way repeated measure ANOVAs. Results: Across all speeds, females showed greater time in stance phase (p=0.038), greater maximum knee flexion (p=0.002), and greater center of mass to heel distance (p=0.016) compared to males. A significant interaction was present for hip adduction excursion (p=0.032), as values increased for females while remaining constant for males across speeds. Conclusions: Our findings indicated sex differences in sagittal knee kinematics and non-sagittal hip kinematics with females demonstrating greater values compared to males. Sex differences extended across speeds with values increasing with increasing speed. Clinical Relevance: Patellofemoral pain is associated with altered knee and hip kinematics and with increased patellofemoral joint stress (PFJS). Previous studies show a direct relationship between greater knee flexion angles and longer step lengths leading to greater PFJS. The sex differences in this study may contribute to the increased incidence of PFP in females.

Supported by:	No sources of funding for this abstract; however, I would like to thank Badger Athletic Performance and UW Neuromuscular Biomechanics Lab for their facility and access to athletes.

Primary Presenter / email:	**Erickson, L. N.** / Lauren.Erickson@uky.edu University of Kentucky **Department of Rehabilitation Sciences**
Mentor / e-mail:	Noehren, B. / b.noehren@uky.edu

13th Annual CCTS Spring Conference
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Poster Presentation #202

Abstract Title: **Voicemail Elicitation Task Social Validity Pilot**

Author(s): M. Stephens, Communication Sciences and Disorders, U of Kentucky
P. Meulenbroek, Division of Communication Sciences and Disorders, U of Kentucky
R. Tomilson, Communication Sciences and Disorders, U of Kentucky

Abstract: The voicemail elicitation task (VET) measures workplace social communication by analyzing transcripts from voicemail role-plays. Analysis measures the rate of sociolinguistic markers called politeness markers per minute (PMpM). The PMpM measurement of the VET is a significant predictor of employment outcomes after traumatic brain injury (TBI) but has not been validated as a pragmatic measure using social validity methods. This pilot study examines the social validity of the VET's PMpM measure using survey research methods. Forty-seven undergraduate students completed a Linkert scale survey by rating the voicemails of persons with TBI with and without employment problems as well as controls without injury. Despite being predictive of employment outcomes, there was no statistical correlation between PMpM rate and survey responses. We will discuss a variety of ways to interpret this null finding, including the populations sampled (college students with little professional work experience), and survey design.

Supported by:

Primary Presenter / email: **Tomilson, R.** / rkto224@g.uky.edu University of Kentucky
Communication Sciences and Disorders
Division of Communication Sciences & Disorders

Mentor / e-mail: Meulenbroek, P. / meulenbroek@uky.edu

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Poster Presentation #203

Abstract Title: **Scapular Kinematics During Functional Movements After a Reverse Shoulder Arthroplasty**

Author(s): N. G. Cascia, Department of Rehabilitation Sciences, U of Kentucky
T. L. Uhl, Department of Rehabilitation Sciences, Division of Athletic Training, U of Kentucky
C. M. Hettrich, Orthopedics Surgery and Sports Medicine, U of Kentucky

Abstract: Context: Understanding scapular movement in patients who have and are undergoing a shoulder replacement may help lead to improvements in treatment and postoperative outcomes. Limited quality of evidence exists on kinematic assessment of scapular motion in patients who have undergone a reverse shoulder arthroplasty (RSA). Objective: A review of the literature was conducted to determine how scapular motion presents after RSA. Methods: Databases (CINAHL, Health Source, Academic Search Complete, and Pubmed) were searched for articles that included patients who have undergone RSA, an assessment of scapular motion, and objective outcome measures of scapular movement during a functional task. A total of 11 articles from 2005 to 2016 fulfilled the criteria previously mentioned. Findings: Common instrumentations used for scapular assessment were 3-dimensional computer model systems, X-ray imaging, computer topography scans, electromagnetic tracking systems, and fluoroscopic imaging. Functional tasks assessed included activities of daily living (combing hair, hand to back pocket, etc.), box lifting with two hands, elevation in the sagittal, scapular, and frontal planes. Consensus between articles during scapular measurements were decreases in scapulohumeral rhythm and increases in lateral rotation and upward rotation during arm elevation in RSA shoulders when compared to either the contralateral side or a healthy group. It is suggested that the increase in motion is due to the loss of motion at the glenohumeral joint. Future Research: High level studies such as prospective designs are needed to continue to investigate scapular kinematics in this population. This will help determine if changes are pathologically related or result from surgery.

Supported by:

Primary Presenter / email: **Cascia, N. C.** / Nicole.Cascia@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Uhl, T. L. / Tim.Uhl@uky.edu

College of Health Sciences Research Day

Poster Presentation #204

Abstract Title:	**A Pilot Study of Concentrated Beet Root Juice in Participants Being Treated for Locally Advanced Squamous Cell Cancer of the Head and Neck**
Author(s):	R. O. Basaqr, Department of Pharmacology and Nutritional Sciences, U of Kentucky M. Kudrimoti, Department of Radiation Medicine, U of Kentucky B. Shelton, Department of Biostatistics, U of Kentucky E. Dressler, Department of Biostatistics, Wake Forest School of Medicine R. Jayswal, Department of Biostatistics, U of Kentucky D. Yan, Department of Biostatistics, U of Kentucky D. T. Thomas, Department of Pharmacology and Nutritional Sciences, U of Kentucky

Abstract: Introduction: Dietary nitrate from beetroot juice (BRJ) has been shown to improve endurance and strength in healthy populations. Thereby, it is plausible that BRJ may help preserve lean tissue and physical function in head and neck cancer patients undergoing multimodal therapy. Objectives: Obtain preliminary data estimates of BRJ supplement feasibility during intensity-modulated radiotherapy (IMRT) compared to placebo (PL). Quantify changes in physical function and body composition in both arms. Hypothesis: BRJ supplementation will be feasible and minimize the loss of muscle mass, strength, and endurance compared to PL. Methods: This was a double blinded, placebo controlled pilot study. Before, during, and after IMRT, patients consumed 10g of BEETELITE™ powder mixed in 4-6 oz of water daily by mouth or a feeding tube for 14 weeks. Adherence was assessed weekly. Plasma and saliva nitrate-nitrite concentrations were collected and body composition, strength and endurance measures were completed at baseline, midpoint, and endpoint. Results: Of the thirteen patients enrolled, eight withdrew, and five completed all measures (n=4 BRJ; n=1 PL). Hypothesis testing was not conducted due to small sample size. We observed an increase in nitrate-nitrite concentrations in BRJ participants only. BRJ adherence was higher in patients receiving BRJ via enteral feeding. BRJ resulted in greater retention of lean body mass in the trunk (-830g) compared to PL (-3114g) from baseline to endpoint. Conclusion: Poor BRJ adherence and high dropout contributed to our limited sample size and study feasibility. Changes in nitrate-nitrite ratio in BRJ may have contributed to modest preservation of trunk LBM.

Supported by: Markey Cancer Center Buck Pilot Award

Primary Presenter / email:	**Basaqr, R. O.** / reem.basaqr@uky.edu	University of Kentucky **Division of Clinical Nutrition**
Mentor / e-mail:	Thomas, D. T. / david.t.thomas@uky.edu	

College of Health Sciences Research Day

Poster Presentation #205

Abstract Title: **The Relationship Between Side Hop Test Endurance and Energy Absorption**

Author(s):
S. Price, College of Heath Sciences, U of Kentucky
C. Roe, Rehabilitation Sciences, U of Kentucky
H. Reed, College of Heath Sciences, U of Kentucky
G. Athanaze, College of Education, U of Kentucky
J. Schilling, College of Agriculture and School of Human Environmental Sciences, U of Kentucky
K. Davis, Rehabilitation Sciences, U of Kentucky
B. Noehren, Rehabilitation Sciences, U of Kentucky

Abstract: The ability to absorb energy while fatigued is critical to help dissipate forces and minimize injury risk. Current return to sport guidelines do not evaluate fatigue and power absorption. A new 30-second endurance side hop test could clinically evaluate this ability. Purpose: Compare the change in energy absorption over a 30-second side hop test in healthy subjects. Methods: 17 healthy subjects (11 M, ages 22.4 ± 3.14, BMI 22.96 ± 3.06) with no prior lower extremity injuries performed single limb lateral hops between two force plates in 30 seconds. Errors, landing between the force plates or putting the non-stance limb down, were subtracted from total hops. Pearson product moment correlation evaluated the relationship between average hops and the change in energy absorption. An independent samples t test found the difference in hops between maintaining versus a reduction in power absorption. Results: Subjects performed an average of 29.4± 6.6 lateral hops. There was a strong, significant correlation between the number of hops to energy absorption (r=0.68, p= 0.003). There was a significant difference (p=0.04) in the number of hops between those who maintained energy absorption (32.3± 4.4 J) versus those who did not (26.1± 7.3 J). Conclusion: This endurance test significantly correlated to energy absorption. Those who performed the best were able to maintain energy absorption throughout the testing protocol. Potentially, the ability to maintain energy absorption while fatigued may reduce injury, as these athletes are better able to attenuate loads. Future studies should evaluate the test's relevance to injury prediction.

Supported by: Biomotion Lab

Primary Presenter / email: **Price, S.** / samantha.price15@uky.edu University of Kentucky
Human Health Sciences
Division of Human Health Sciences

Mentor / e-mail: Noehren, B. / b.noehren@uky.edu

College of Health Sciences Research Day

Poster Presentation #206

Abstract Title:	**Impairments in Dynamic Gait stability are Related to The Deficits in Somatosensory and Cerebellar Involvement in People with Multiple Sclerosis**
Author(s):	G. Gera, Department of Rehabilitation Sciences, University of Kentucky P. C. Fino, Department of Neurology, School of Medicine, Oregon Health & Science University B. W. Fling, Department of Health and Exercise Science, Colorado State University, Fort Collins, CO F. B. Horak, VA Portland Health Care System, Portland, OR

Abstract: Dynamic stability of gait reflects ability of the system to flexibly adapt to perturbations during walking. For neurologically impaired individuals, changes in gait stability indicate presence of abnormal motor control strategies. PwMS have impaired local dynamic stability as compared to control individuals for a steady state walking. However, we do not know how deficits in somatosensory conduction and white matter tract integrity of the cerebellar peduncles affect the local dynamic stability. We hypothesized that deficits in the local dynamic stability will be related to 1) the postural response latency and 2) reduced white matter tract integrity of the middle and inferior cerebellar peduncles. Local dynamic stability was measured during a steady state two-minute walk using the nonlinear measure (Lyapunov Exponent; LyE) for the acceleration time series of a body-worn inertial sensor on trunk for 16 PwMS. Onset of postural response latency of medial-gastrocnemius muscle was assessed. Radial diffusivity (RD), an indirect neural marker of myelination, of cerebellar peduncles was calculated for each participant. Lower RD is interpreted as being indicative of better white matter tract microstructure. We found that local dynamic stability was related to 1) the postural response latency ($r=0.6$, $p<.05$) and white matter tract integrity of both middle ($r=0.5$, $p<0.05$) and inferior ($r=0.52$, $p<0.05$) cerebellar peduncles. Findings of this study suggest that the dynamic stability is impaired in PwMS and is related to the impaired somatosensory conduction and reduced integrity of the cerebellar white matter tract. This reduced stability can make patients with MS more susceptible to falls.

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Primary Presenter / email: **Gera, G.** / geetanjaligera@uky.edu University of Kentucky **Department of Rehabilitation Sciences**

Mentor / e-mail: Horak, F.B. / horak@ohsu.edu

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Poster Presentation #207

Abstract Title:	**The Development of a Single Leg Hurdle Test to Assess Return to Sport Readiness**
Author(s):	H. Reed, Division of Human Health Sciences, College of Health Sciences, U of Kentucky C. Roe, Department of Rehabilitation Sciences, College of Health Sciences S. Price, Division of Human Health Sciences, College of Health Sciences, U of Kentucky G. Athanaze, College of Education, U of Kentucky J. Schilling, College of Agriculture and School of Human Environmental Sciences, U of Kentucky B. Noehren, Division Of Physical Therapy, U Of Kentucky

Abstract: Few functional assessments of dynamic quadriceps strength exist for return to sport testing. Quadriceps asymmetries are more associated with activity limitations after injury than gluteal strength. Hopping over a hurdle may require increased demands of the quadriceps and thus be a good return-to-sport test. PURPOSE: The objective of this study was to assess the between and within session reliability of a new single leg hurdle test. METHODS: 20 healthy subjects (11 M, ages 22.4 ± 3.1, BMI 22.9 ± 3.0) completed two trials of a single leg hop over four 30.5 cm hurdles. The distance between the hurdles was equal to the subject's leg length. Performance was measured as the time it took to complete the hurdle series and how many attempts it took them to complete successfully. An error occurred if the subject knocked over a hurdle, hopped to the side of the hurdle or did not stick the landing on the final hop. Inter and intra-rater reliability was assessed using an Intraclass Correlation Coefficient (ICC). RESULTS: The average time to complete the hurdle test was 3.63 ±1.59 seconds. Between rater reliability (ICC>0.99), between day reliability (ICC=0.90), and within rater same day reliability (ICC=0.98) were all excellent. CONCLUSION: The single leg hurdle test shows excellent within and between day reliability. The greater vertical component associated with this test may bias the hop towards greater quadriceps activation and help screen individuals for asymmetries. Subsequent studies should assess its use for determining return to sport for patients following an injury.

Supported by:

Primary Presenter / email:	**Reed, H.** / here222@g.uky.edu University of Kentucky **Human Health Sciences** **Division of Human Health Sciences**
Mentor / e-mail:	Noehren, B. / b.noehren@uky.edu

College of Health Sciences Research Day

Poster Presentation #208

Abstract Title:	**The Relationship Between 2D and 3D Biomechanics Data in a Single Leg Hurdle Task**
Author(s):	G. Athanaze, College of Education, U of Kentucky S. Price, College of Health Sciences, U of Kentucky H. Reed, College of Health Sciences, U of Kentucky C Roe, Department of Rehabilitation Sciences, U of Kentucky J. Schilling, College of Agriculture, Food & Environment, U of Kentucky B. Noehren, Division of Physical Therapy, U of Kentucky

Abstract: Three-dimensional (3D) motion analysis is the gold standard for measuring landing mechanics, but its clinical use is limited. Due to time and expertise requirements, few studies have compared simple two dimensional (2D) measures to 3D measurements, which may provide more accessible tools for clinicians to use. Purpose: To compare 2D and 3D knee flexion angles during a single leg hurdle task. Methods: 20 healthy subjects (11 M, Age 22.4± 3.2 years) performed single leg jumps over a series of 30.5 cm hurdles. The landing over the final hurdle was recorded with both a video camera and 3D motion capture equipment. Knee angles were measured using National Institute of Health image J program at initial contact (IC) and peak knee flexion (PKF). Flexion angles were determined by bisecting the knee along the mid shaft of the femur and tibia for the 2D motion. Knee flexion angles were compared in the 2D and 3D data using a Pearson product moment correlation coefficient. Results: 2D and 3D angles were significantly correlated for both knee flexion at IC (2D: 28.0±6.8°, 3D: 24.8±9.0°, r=-0.717 (p=.001)) and PKF (2D: 66.0±8.9°, 3D: 59.8±9.2°, (r=-0.617, p=.006)). Conclusion: At both initial contact and peak knee flexion, there is a strong relationship between 3D and 2D data which was similar in trend but different in magnitude of the values. This suggests a simple 2D technique may be applicable in the clinical setting providing similar precision but different accuracy to the 3D data.

Supported by:

Primary Presenter / email:	**Athanaze, G.** / gbat222@g.uky.edu University of Kentucky **Kinesiology** **Department of Rehabilitation Sciences**
Mentor / e-mail:	Noehren, B. / b.noehren@uky.edu

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Poster Presentation #209

Abstract Title:	**Vitamin D may promote a PLIN2-dependent increase in lipid flux of C2C12 myotubes**
Author(s):	D.M. Schnell, Department of Pharmacology & Nutritional Sciences, U of Kentucky L. Bollinger, Department of Kinesiology & Health Promotion, U of Kentucky C. Peterson, Department of Rehabilitation Sciences, U of Kentucky D.T. Thomas, Department of Clinical Nutrition, U of Kentucky

Abstract: Introduction: Vitamin D (VitD) has been connected with increased intramyocellular lipid (IMCL) and has also been shown to improve mitochondrial function and insulin sensitivity. Evidence suggests that PLIN2, a perilipin protein upregulated with VitD treatment, may be integral to managing increased IMCL capacity and lipid oxidation in skeletal muscle. Therefore, we hypothesize that VitD increases lipid accumulation and turnover in C2C12 myotubes through a PLIN2 mediated mechanism. Objectives: Delineate the connection between VitD and PLIN2 involvement in IMCL accumulation and skeletal muscle mitochondrial metabolism. Methods: C2C12 myotubes treated with 100 nM calcitriol (bioactive vitamin D) and/or PLIN2 siRNA in a four group design were analyzed using qRT-PCR, ORO, immunofluorescent imaging, SDH activity stain, and Seahorse oxygen consumption assay. Results: VitD increased the expression of both VDR mRNA and protein. Expression of PLIN2, but not PLIN3 or PLIN5 mRNA was increased with VitD, and PLIN2 induction was prevented with siPLIN2 without compensation by other perilipins. VitD increased positive ORO staining and mRNA expression of lipid-filling genes DGAT1 and DGAT2. VitD also increased SDH activity, OCR, and mRNA expression of lipolytic genes ATGL, CGI-58, and CPT-1. PLIN2 knockdown prevented increased SDH activity and the induction of DGAT2, CGI58, and CPT1, but did not dramatically decrease ORO staining. Conclusion: ORO, qRT-PCR, and OCR data support the hypothesis that VitD increases lipid flux in C2C12 myotubes. Although qRT-PCR and SDH staining suggest that PLIN2 mediates increased mitochondrial function, conclusive analysis of PLIN2 knockdown on OCR was incomplete at the time of abstract submission.

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Primary Presenter / email: **Schnell, D. M.** / dave.schnell@uky.edu University of Kentucky
Division of Clinical Nutrition

Mentor / e-mail: Thomas, D. T. / david.t.thomas@uky.edu

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Poster Presentation #210

Abstract Title:	**Influence of Adherence to In-Clinic and Home-Based Physical Therapy Rehabilitation on Patient-Reported Outcome Measures**
Author(s):	M. Lester, Sports Rehabilitation, U of Kentucky K. Picha, College of Health Sciences, U of Kentucky J. Jurjans, Sports Rehabilitation, U of Kentucky R. McGuire, Sports Rehabilitation, U of Kentucky T. Uhl, Department of Rehabilitation Sciences, U of Kentucky

Abstract: In musculoskeletal rehabilitation, adherences to in-clinic and home exercise programs (HEPs) have been shown to be as low as 14.3% and 76%, respectively. In populations with musculoskeletal conditions like low back pain, it has been demonstrated that patient success is influenced by adherence to rehabilitation. Objective: To examine the relationship between adherence and patient-reported outcome measures in patients with knee injury. Design: Cohort. Setting: Clinic. Participants: Thirty patients (33.8 ± 15.2 years). Procedures: Patients were recruited at initial physical therapy visit. Per standard of care, the Lower Extremity Functional Scale (LEFS) was administered. Patients were instructed by their physical therapist on their HEP. Researchers provided an exercise log to record daily completion of their HEP over a 2-4 week time period. At end of study, patients were asked to return their exercise log, and patients were again administered the LEFS; a change score was calculated between the initial time point and follow-up. The percentage of visits attended divided by visits scheduled represented in-clinic adherence, and percentage of adherent days to HEP was also calculated. Statistical analysis: Pearson correlations were used to determine the relationship between in-clinic adherence and home exercise program compliance and LEFS change scores. Results: There was no relationship between in-clinic adherence and LEFS change score (n=20, r= -0.29, p=0.22). There was a positive relationship between HEP adherence and LEFS change score (n=9, r= 0.72, p=0.03). Conclusions: Those limited patients returning HEP logs had good patient-reported outcomes suggesting a relationship but due to poor response needs to be interpreted cautiously. We did not expect such a low relationship with outcomes and in-clinic compliance, this requires further research.

Supported by:

Primary Presenter / email:	**Lester, M.** / morganlester@uky.edu	University of Kentucky
Mentor / e-mail:	Jurjans, J. & McGuire, R. / john.jurjans@uky.edu	

College of Health Sciences Research Day

Poster Presentation #211

Abstract Title:	**Parent Perspectives in the Development of Augmentative and Alternative Communication Systems for Children with Complex Communication Needs**
Author(s):	K. Goldey, Department of Rehabilitation Sciences, U of Kentucky D. Howell, Department of Occupational Science and Occupational Therapy, Eastern Kentucky U

Abstract: There are an estimated 4 million individuals in the United States who are unable to rely on traditional oral speech for communication. These individuals may benefit from the use of Augmentative and Alternative Communication (AAC) such as low tech communication systems or high tech speech generating devices. For children who require the use of AAC, research has demonstrated that a comprehensive team approach is ideal for improving communicative competency. Specifically, inclusion of the family is necessary to promote generalization of the child's communication across settings. Failure to include family can have dire consequences, including abandonment of AAC devices. While inclusion of parents as intervention team members is critical, knowledge about parent perspective in developing communication systems is limited. This qualitative, phenomenological study sought to gain insight into the development of children's AAC systems from a parent perspective. Semi-structured, one on one interviews covered a variety of topics, including navigation between school and outpatient speech services, communication priorities from a family/parent perspective, and communication needs across settings. The semi-structured nature of the interviews allowed parents to speak about what was important to them, and carry the conversation in the direction of their choosing. Throughout the conducted interviews, common themes emerged, including attitudes about service delivery models, struggles finding competent professionals who are familiar with AAC, isseus in coordinating communication services between settings, impact of AAC on daily life, and parents as advocates.

Supported by:

Primary Presenter / email:	**Goldey, K.** / kpgold2@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Howell, D. / dana.howell@eku.edu

College of Health Sciences Research Day

Poster Presentation #212

Abstract Title:	**Defining Crisis for Adults with Intellectuals and Developmental Disabilities: A Pilot Project and Conceptual Model**
Author(s):	K.M. Sutton, Rehabilitation Sciences, U of Kentucky R. Brandenburg, Lee Specialty Clinic J.O. Kleinert, Communication Sciences and Disorders, U of Kentucky

Abstract: As persons with intellectual and developmental disabilities (IDD) are more integrated into community settings, there is a need for greater understanding of their needs in order to provide adequate care coordination. Without this, they can experience episodes of crisis that may interfere with health and quality of life. However, “crisis” is highly subjective, making it difficult to study given current definitions. The purpose of this study was to describe a comprehensive definition of crisis for adults with IDD using multidisciplinary expert opinion. An anonymous online questionnaire was distributed at a specialty care clinic. A proposed definition was developed with 4 outcomes believed to be related crisis for the IDD population: (1) unplanned hospitalization/emergency department visit; (2) involvement with the criminal justice system; (3) unstable living environment; (4) abuse/victimization. Eighteen participants (40% response rate) completed surveys. A 7-point Likert scale was used and median rank and interquartile ranges (IQR) were calculated to determine agreeableness to the proposed definition. Median rank for the overall definition was 6.5. Median ranks of individual components ranged from 6 to 7. The overall definition and individual components each had an IQR of 1. An open-ended question asked for additional components that should also be considered, with 5 themes emerging. A final definition and model was proposed. By further operationalizing crisis, tracking and assessment may be done in a more systematic and comprehensive manner. This may lead to a better understanding of its scope and impact, leading to the development of effective strategies to address it.

Supported by:

Primary Presenter / email:	**Sutton, K. S.** / kathleen.sutton@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Kleinert, J. O. / jklei2@uky.edu

College of Health Sciences Research Day

Poster Presentation #213

Abstract Title:	**Self-Efficacy and Depression in Acute Lower Extremity Fracture Patients**
Author(s):	J. Van Wyngaarden, Rehabilitation Sciences Doctoral Program, U of Kentucky B. Noehren, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Background: There are approximately 730,000 lower extremity fractures (LEFx) in the United States each year, with 28-93% of these patients continuing to have pain up to 5 years after injury. These outcomes demonstrate a poor understanding of the modifiable factors influencing chronic pain development following LEFx. Purpose: Prospectively identify the key modifiable characteristics that place LEFx patients at risk for chronic pain development. Methods: Twenty LEFx subjects (11M, age 44 ± 12.7 yrs; mass 88.6 kg ± 29.5 kg; height 170.2 cm ± 10.4 cm) were recruited from the University of Kentucky Level I Trauma Center. Consenting subjects completed a survey consisting of the Pain Catastrophizing Scale, Pain Self-Efficacy Scale, Tampa Scale of Kinesiophobia, PROMIS Depression, and demographic information. Differences in mean score for each scale were compared between those with and without an articular injury via independent two-tailed t-tests (?=0.05). Results: Self-efficacy scores in individuals with articular injury were significantly worse compared to those without articular injury (mean ± SD; articular: 20.6 ± 11.5, non-articular: 37.8 ± 17.1; [p=0.019]). Additionally, PROMIS Depression scores were significantly worse in individuals with articular injury compared to those without articular injury (mean ± SD; articular: 57.6 ± 7.0, non-articular: 47.4 ± 8.6; [p=0.010]). Conclusion: Low self-efficacy and higher depressive symptoms may increase the risk of chronic pain development. Continued research evaluating how these preliminary results impact 12-month outcomes is indicated. Future studies offering early targeted psychosocial education and cognitive behavioral training to individuals with articular fracture may improve self-efficacy, depression, and long-term outcomes.

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Primary Presenter / email: **Van Wyngaarden, J.** / jjva225@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Noehren, B. / b.noehren@uky.edu

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Poster Presentation #214

Abstract Title: **The Effect of Acute Sleep Restriction on Lower Limb Running Load**

Author(s):
R. Bergin, Department of Rehabilitation Sciences, U of Kentucky
N. Heebner, Department of Rehabilitation Sciences, U of Kentucky
A. Glueck, Department of Rehabilitation Sciences, U of Kentucky
C. DeRaymond, Department of Rehabilitation Sciences, U of Kentucky
J. Abt, Department of Rehabilitation Sciences, U of Kentucky
S. Best, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Purpose: Inadequate sleep is a risk factor for musculoskeletal injury. However, the effects of sleep restriction on injury risk factors such as running load remains unknown. We hypothesize that following acute sleep restriction average running load per minute will increase. Proposed Methods: 25 healthy adults between 18-40 will be recruited to participate in the study. Each subject will attend the laboratory following either 8 hours sleep (well-rested) or 3 hours sleep (sleep-restricted) in a randomized crossover design, separated by at least two weeks. During each visit, subjects will perform an exhaustive treadmill run at an intensity equal to their ventilatory threshold, until volitional fatigue. During the exhaustive run, four wireless inertial measurement units (IMUs) will be placed in the following locations; right tibia, left tibia, chest, and head. Average running load per minute will be calculated for each IMU as the square root of the sum of the squared instantaneous rate of change in acceleration in each of the three vectors divided by total duration. Statistical Analysis/Expected Results: A paired t-test will be used to examine the differences in average running load per minute between well-rested and sleep-restricted conditions. The expected result is that the sleep-restricted condition will have significantly greater running load per minute compared to the well-rested condition. Acquired Skills: This study provides the opportunity to develop my skills utilizing IMUs and accelerometer data to analyze running load.

Supported by: Internal funding from SMRI

Primary Presenter / email: **Bergin, R.** / Reiley.Bergin@uky.edu University of Kentucky
Rehabilitation Sciences Doctoral Program

Mentor / e-mail: Best, S. / stuart.best@uky.edu

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Poster Presentation #215

Abstract Title:	**Music Training as a Neuro-cognitive Protector for Brain Aging: Cognitive and Neuropsychological Profiles in Professional Musicians**
Author(s):	C.E. Schneider, Graduate Center for Gerontology, U of Kentucky A. Hoskins, College of Human Health Science, U of Kentucky J. Carr, College of Human Health Science, U of Kentucky S. Hoffmann, College of Human Health Science, U of Kentucky Y. Jiang, Department of Medicine, U of Kentucky

Abstract: Background: The aging US population encompasses an increasing proportion of older adults living with cognitive impairment, which will likely increase mortality rates, reduce perceived quality of life, and cause economic burden to patients and health care systems. Currently little evidence of highly effective interventions preventing or slowing onset of cognitive impairment exists. This study aims to better understand what drives cognitive aging variability among musicians versus nonmusicians. Music playing has been shown to influence brain and cognitive function by activating multiple brain areas; music playing simultaneously involves cognitive, motor functions and multiple sensory systems. Literature suggests strong correlations between cognition and music ability. Studies in the past have not concretely operationalized music involvement; therefore a controlled interaction between cognition and music cannot be drawn. Methods: The current study was designed to control level of music involvement and genre by examining professional, classically trained, orchestral musicians. Cognitive and neuropsychological profiles were collected in an effort to better understand the potential for music training to protect older adults from cognitive decline. Twenty-nine professional musicians completed five neuropsychological exams. EEG scalp recordings were taken to identify neuro-cognitive signatures. Musicians completed a music and life span questionnaire. Results: Current musicians performed significantly faster and more accurately on four of five neuropsychological measures when compared with normative scores of participants at similar ages in previous studies using the same measures. Strong correlations were found between EEG signatures and neuropsychological testing scores and between EEG signatures and predictor variables derived form the music life span questionnaire.

Supported by:

Primary Presenter / email:	**Schneider, C. E.** / catherine.schneider@uky.edu	University of Kentucky **Division of Human Health Sciences**
Mentor / e-mail:	Jiang, Y. / yjiang@uky.edu	

13th Annual CCTS Spring Conference
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College of Health Sciences Research Day

Poster Presentation #216

Abstract Title: **Can Music be a Preventative Mechanism for Cognitive Decline**

Author(s):
S. Hoffmann, Human Health Sciences, U of Kentucky
A. Hoskins, Human Health Sciences, U of Kentucky
J. Carr, Human Health Sciences, U of Kentucky
C. E. Schneider, College of Public Health, U of Kentucky
Y. Jiang, College of Medicine, U of Kentucky

Abstract: Context: The US population is experiencing a significant amount of its older population experiencing cognitive impairment which can cause increase of mortality rates, a decrease of quality of life, a strain on the economy, and a stress on the healthcare system. Technology that prevents or slows the onset of cognitive impairment is currently nonexistent. This study aims to better understand what drives cognitive aging variability in particular among musicians versus nonmusicians. It has been discovered that music playing can influence the brain and cognitive function by stimulating many brain areas. Music also involves the activation of cognitive, motor systems, and multiple sensory systems in the brain. According to literature, there is a strong correlation between cognition and music ability. In this study, a control cannot be drawn between cognition and music because studies in the past have not concretely operationalized this data. Methods: This study examines professional, classically trained orchestral musicians through five neuropsychological exams. This cognitive profile attempts to evaluate the potential for music to be a protective mechanism of cognitive decline. Differences in neuropsychological exam scores were evaluated for within musician comparison based on eight predictor variables based on music experience. Results: No significant differences were found for predictor variables with the exception of type of instrument. This research merits further investigation of music based on instrument.

Supported by:

Primary Presenter / email: **Hoffmann, S.** / smho237@uky.edu University of Kentucky
Human Health Science
Division of Human Health Sciences

Mentor / e-mail: Schneider, C. / cesc233@g.uky.edu

College of Health Sciences Research Day

Poster Presentation #217

Abstract Title:	**The Test-Retest Reliability of the Unilateral Stance Test using the Bertec Balance Advantage-Computerized Dynamic Posturography in a Healthy Population**
Author(s):	M. Andrews, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky C. Quintana, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky K. J. Picha, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky A. C. Glueck, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky N. R. Heebner, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky J. P. Abt, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky

Abstract: Context: Unilateral postural stability is essential to avoiding falls and injury in both static and dynamic daily movements. Currently, evidence is lacking that assesses the reliability of the Unilateral Stance Test (ULS) using the Bertec Balance Advantage-Computerized Dynamic Posturography (CDP) in a healthy population. The lack of reliable metrics limits the ability to confidently interpret or detect impairments or changes in ULS of pathological patients using CDP. Objective: To evaluate the test-retest reliability of the ULS protocol in healthy individuals. Design: Test-retest. Setting: Sports Medicine Laboratory. Participants: A total of 31 healthy, physically active individuals (age: 26.5 ± 4.4 years, height: 169.9 ± 14.0 cm, mass: 76.4 ± 21.1 kg) participated. Methods: The ULS battery consists of 3-20 second trials per condition (left foot eyes open and eyes closed and right foot eyes open and eyes closed). Testing was separated by seven days. Intraclass correlation coefficients (ICC 2,k) were calculated to evaluate the test-retest reliability of the ULS scores with 95% confidence intervals. Results: All four conditions were reported to have excellent test-retest reliability (0.81-0.91). Conclusions: The reliable assessment of ULS on CDP suggests clinicians and researchers may confidently diagnose and treat conditions that may impair unilateral balance.

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Primary Presenter / email:	**Andrews, M.** / morgan.andrews@uky.edu **Human Health Sciences** **Division of Human Health Sciences**	University of Kentucky
Mentor / e-mail:	Abt, J. P. / john.abt@uky.edu	

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College of Health Sciences Research Day

Poster Presentation #218

Abstract Title:	**Skeletal Muscle Disuse Alters Exosome miRNA Predicted to Target Various Signaling Pathways Related to Muscle Atrophy**
Author(s):	D. W. Van Pelt, Department of Rehabilitation Sciences, U of Kentucky E. R. Hunt, Department of Rehabilitation Sciences, U of Kentucky T. A. Butterfield, Department of Rehabilitation Sciences, U of Kentucky B. F. Miller, Health and Exercise Science, Colorado State U K. L. Hamilton, Health and Exercise Science, Colorado State U E. E. Dupont-Versteegden, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Skeletal muscle atrophy that occurs during disuse is linked to poor functional and metabolic health outcomes. Small noncoding microRNAs (miRNAs) are now appreciated as important components in the regulation of muscle growth and atrophy and can be carried through systemic circulation in exosomes to potentially mediate systemic adaptations. However, little is known about how atrophic conditions influence the miRNA content of exosomes. The purpose of this study was to determine changes in exosome miRNA in response to atrophic conditions. Adult (10 months old) Brown Norway/F344 male rats were subjected to either normal, weight-bearing conditions (WB: n=7) or a 7-day hindlimb suspension (HS: n=6) protocol that is known to induce significant skeletal muscle atrophy in select hindlimb muscles. Rats received deuterium oxide (D2O) over 10 days to label newly synthesized proteins for determination of fractional synthesis rate (FSR, %/day). Rat serum was collected and filtered through a 0.22µm filter for removal of larger extracellular vesicles. Exosomes were isolated using the ExoQuickTM Precipitation solution before isolation of the exosome miRNA. As expected, HS had lower myofibrillar skeletal muscle FSR compared with WB rats (0.72 ± 0.09%/day vs 1.64 ± 0.27%/day; $p<0.05$). MiRNA microarray analysis of exosome miRNA revealed 73 differentially expressed ($p<0.05$) miRNA between WB and HS conditions. The list of differentially expressed exosome miRNAs was uploaded to DIANA-miRPath for pathway analysis and prediction of regulatory pathways potentially impacted by the altered exosome miRNAs during atrophy. Various pathways related to muscle protein homeostasis were significantly predicted ($p<0.01$) to be targeted by the differentially expressed exosome miRNA, including MAPK signaling, focal adhesion, Rap1 signaling, FOXO signaling, ubiquitin mediate proteolysis, TGF-beta, and mTOR signaling. These data suggest that alterations in systemic exosome miRNA reflect changes in the major pathways dictating muscle atrophy during muscle disuse. In addition, selective packaging and release of exosomes containing miRNA important for regulation of muscle atrophy may be a major contributor to determining skeletal muscle homeostasis during muscle disuse.

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Primary Presenter / email: **Van Pelt, D. W.** / dva238@uky.edu University of Kentucky
Department of Rehabilitation Sciences

Mentor / e-mail: Dupont-Versteegden, E. E. / eedupo2@email.uky.edu

College of Health Sciences Research Day

Poster Presentation #219

Abstract Title:	**Improving functional and self-reported outcomes in patients with a history of musculoskeletal knee injury: Research description**
Author(s):	J. M. Hoch, Rehabilitation Sciences Department, U of Kentucky D. T. Thomas, Clinical Nutrition Department, U of Kentucky H. M. Bush, Department of Biostatistics, U of Kentucky S. Best, Rehabilitation Sciences Department, U of Kentucky M. L. Ireland, Department of Orthopaedics and Sports Medicine, U of Kentucky J. P. Abt, Rehabilitation Sciences Department, U of Kentucky

Abstract: Negative outcomes including impairments, activity limitations, and participation restrictions continue to impact individuals with a history of ACL reconstruction (ACLR) despite completion of formal rehabilitation and clearance to return to physical activity (PA). Focused exercises and targeted health education may improve these negative outcomes and increase quality of life. The purpose of this study is determine the effects of an 8-week rehabilitation program on strength, sensorimotor function, functional performance and patient-reported outcomes in patients with a history of ACLR. A secondary aim will be to identify baseline PA levels and dietary intake patterns in these individuals. Participants will complete standard knee radiographs and all baseline measures, and resume normal activities of daily living for one-week while wearing an accelerometer to quantify PA levels and complete two, 24-hour dietary recalls to examine dietary patterns. After one-week, participants will come back to the laboratory and complete the pre-intervention assessments prior to randomization to the exercise or control group. After 8-weeks, participants will complete all outcome assessments 24-48 hours, 1-month and 3-months post exercise completion. We hypothesize the intervention group will have significantly better outcomes post-intervention compared to the control group. In addition, we hypothesize we will identify areas of educational and behavioral intervention need related to PA engagement and dietary strategies to support weight management. These data will further inform a larger trial that will incorporate exercise and health education to improve outcomes in this population. The trainee will develop skills related to objective PA measures, dietary recall, and clinical trial management.

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Primary Presenter / email: **Hoch, J. M.** / johanna.hoch@uky.edu University of Kentucky
Division of Athletic Training

Mentor / e-mail: Abt, J. P. / john.abt@uky.edu

College of Health Sciences Research Day

Poster Presentation #220

Abstract Title:	**Test-Retest Reliability and Minimal Detectable Change of the Head Injury Scale**
Author(s):	C. Quintana, Sports Medicine Research Institute, College of Health Sciences, U of Kentucky A. E. Cripps, College of Education and Human Development, Bowling Green State University, Bowling Green, OH

Abstract: Context: Concussion diagnosis and management rely heavily on clinician experience to interpret an individual's self-report of signs and symptoms. The Head Injury Scale (HIS) is a 16-item, self-report scale of post-concussive symptoms and may be used as a symptom inventory for baseline or post-injury evaluation. The reliability of the clinical tool has yet to be tested. Objective: To evaluate the test-retest reliability (?), standard error of measurement (SEM), and minimal detectable change (MDC) of the HIS among a sample of healthy individuals. Design: Test-retest design. Setting: Clinical laboratory. Patients or Participants: A total of 25 healthy individuals (age 21.8 ± 1.9 years, mass, height) participated. Interventions: The HIS was administered twice separated by ten days. Participants were instructed to address each symptom, on a scale of 0-6, based on how they had felt over a 24-hour period. Main Outcome Measure: Cronbach's Alpha (?), SEM, and MDC values were calculated for individual symptoms, symptom cluster and total composite scores. Results: Of the 16 symptoms, 11 were reported to have good to excellent reliability (? = 0.76-0.98), four were reported to have moderate to good reliability (? = 0.53-0.74) and one was reported to have poor reliability (? = 0.34). SEM ranged from 0.06 to 0.63 and MDC ranged from 0.09 to 0.89. Conclusions: The HIS demonstrated excellent test-retest reliability when evaluated among healthy individuals. Our findings provide justification for the use of this scale to assess symptoms, and any change in score post-concussion should be a true measurement of impairment or improvement.

Supported by:

Primary Presenter / email:	**Quintana, C.** / cquintana@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Cripps, A. E. / acripss@bgsu.edu

College of Health Sciences Research Day

Poster Presentation #221

Abstract Title:	**Vocal Function Exercises for the Treatment of Presbyphonia**
Author(s):	J.E.Sloggy, Rehabilitation Sciences, U of Kentucky J.C. Stemple, Rehabilitation Sciences, U of Kentucky

Abstract: Voice changes in the elderly (presbyphonia) are common with aging of the subsystems of voice production, respiration, phonation, and resonance. This deterioration of voice is recognized as part of the normal aging process but may significantly affect quality of life. Vocal Function Exercises (VFEs) comprise a series of exercises designed to strengthen and balance the laryngeal muscles, thus improving vocal fold vibration and voice quality. Several studies have focused on the efficacy of VFEs as a treatment modality for presbyphonia, however these studies are limited by the lack of an experimental control and limited outcome measures. The current study is the first to use a randomized, placebo-controlled design while comparing pre and post-treatment measures involving all five domains of voice assessment (audio-perceptual, acoustic, aerodynamic, self-assessment, visual-perceptual). The treatment group receives six weeks of VFEs and the control group receives six weeks of placebo therapy with both pre and post-treatment assessments and a one-month follow-up assessment. It is hypothesized that the experimental group will show significant improvement in all five domains of voice assessment post-treatment while there will be no significant difference in the pre and post-treatment measures for the control group. This poster will present the results from the participants of this study in both the exercises (VFE) and control group.

Supported by:

Primary Presenter / email:	**Sloggy, J.E.** / joanna.sloggy@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Stemple, J. C. / joseph.stemple@uky.edu

College of Health Sciences Research Day

Poster Presentation #222

Abstract Title:	**An Individualized Movement Approach in Management of Chronic Shoulder Pain: A Case Study**
Author(s):	K.A. Matsel, Department of Physical Therapy, U of Evansville A.R. Englert, ProRehab, PC, Evansville, IN T.L. Uhl, Department of Rehabilitation Sciences PhD Program, U of Kentucky

Abstract: Background: Shoulder pain is a common dysfunction encountered in physical therapy practice. Limitations to the thoracic spine has shown to have profound effects on shoulder mechanics and can alter breathing patterns resulting in pain/dysfunction. We aimed to explore the effectiveness of an individualized treatment approach targeting thoracic spine function and breathing in order to reduce shoulder pain and improve upper extremity function. Case Description: A global systematic movement assessment was performed on a 25-year-old female with a 10-year history of right shoulder pain. The assessment exposed a significant thorax mobility impairment and a positive breathing screen suggesting associated dysfunctional mechanical breathing. Manual therapy to the thorax and breathing corrections were initiated for a total of four sessions over a four-week period. Outcomes: Primary outcome measures included number of painful movement patterns, breath hold time, and QuickDash scores. Following treatment, the number of painful movement patterns decreased from 4/15 to 0/15, breath hold time improved from 7 seconds to 22 seconds, and QuickDash scores improved from 20 to 7 after four treatment sessions. Discussion: The results of this case report suggest that a link between breathing dysfunction and thoracic/shoulder mechanics exists. An individualized treatment approach based on specific meaningful impairments resulted in effective and efficient outcomes. The subject experienced clinically meaningful improvements in upper extremity function measured by QuickDash (MCID = 15.9), number of painful movement patterns, and breath hold time (MDC = 6.5). Further research is needed to establish conclusions on clinical effectiveness of breathing interventions in larger sample sizes.

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Primary Presenter / email:	**Matsel, K. A.** / kylematsel@gmail.com University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Uhl, T. L. / tluhl2@uky.edu

College of Health Sciences Research Day

Poster Presentation #223

Abstract Title:	**Vitamin D Repletion Coupled with Aerobic Training Improves Skeletal Muscle Oxygen Extraction During Fatiguing Exercise in Healthy Older Adults**
Author(s):	D. Jones, College of Health Sciences, U of Kentucky M. Zhao, Department of Biomedical Engineering, U of Kentucky G. Yu, Department of Biomedical Engineering, U of Kentucky D.T Thomas, Department of Health Sciences, U of Kentucky

Abstract: INTRODUCTION: Vitamin D (vitD) and exercise have positive effects on muscle health. Emerging data suggest that combining these treatments can alter muscle lipid distribution and mitochondrial capacity. This combination may preserve skeletal muscle function in aging. OBJECTIVE: Determine the effects of vitD repletion and aerobic training on local skeletal muscle hemodynamic response to fatiguing exercise in healthy older adults. Hypothesis: VitD repletion + aerobic training (DAT) will ameliorate muscle O2 utilization by decreasing oxygen debt compared to subjects receiving aerobic training (AT), vitD alone (D), or control (CTL) conditions. METHODS: This was a 13-week double blinded placebo, controlled study. Before and after the intervention, subjects completed a gastrocnemius fatigue protocol on a BTE dynamometer (35% of MVIC). Oxygen saturation (StO2), oxygen consumption rate (rVO2) and half recovery time (T50) were calculated from blood flow data collected from Near-Infrared Spectroscopy/Diffuse Correlation Spectroscopy (NIRS/DCS) sensors during 15 minutes of recovery. RESULTS: Forty-six subjects (mean age: 67 ± 6) completed the intervention. Only DAT experienced a group change (-5.85 ± 2.06 percent) in StO2 (p=0.03). There were no group or within group differences in StO2 T50 (p>0.05). While there were no differences between groups in rVO2 (p>0.05); there was a significant decrease in rVO2 T50 for DAT (-28.71 ± 31.28 seconds; p=0.03). CONCLUSION: These data show increased O2 extraction and delivery to active muscles and faster exercise recovery in subjects receiving DAT. This suggests that combining exercise with vitD repletion may help improve muscle metabolic function and therefore preserve muscle function in aging.

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Primary Presenter / email: **Jones, D. N.** / dnjo227@uky.edu University of Kentucky
Division of Human Health Sciences

Mentor / e-mail: Jones, D. N. / dnjo227@uky.edu

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Poster Presentation #224

Abstract Title:	**Differences in the Modified Disablement in the Physically Active Scale in those with and without Chronic Ankle Instability**
Author(s):	S.E. Baez, Division of Athletic Training, Department of Rehabilitation Sciences, U of Kentucky J.M Hoch, Division of Athletic Training, Department of Rehabilitation Sciences, U of Kentucky R.J. Cramer, School of Community and Environmental Health, Old Dominion U, Norfolk, VA C.P. Powden, Department of Applied Medicine and Rehabilitation, Indiana State U, Terre Haute, IN M.N. Houston, Keller Army Community Hospital, West Point, NY K.K. Hogan, School of Physical Therapy and Athletic Training, Old Dominion U, Norfolk, VA M.C. Hoch, Division of Athletic Training, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Background: The modified Disablement in the Physically Active Scale (mDPA) has become a common patient-reported outcome measure for physically active patients. However, the factor structure of this instrument has not been verified. Additionally, there is limited evidence that has examined the mDPA in chronic ankle instability (CAI) patients. Objectives: Verify the factor structure of the mDPA and compare the physical summary component (PSC) and mental summary component (MSC) in those with and without CAI. Procedures: One hundred and eighteen people with CAI (females=79; age:23.56±4.88y, height:169.80±10.09cm, weight:73.38±15.45kg) and 81 healthy controls (females=56; age:22.91±2.79y, height:167.52±11.82cm, weight:67.05±10.64kg) participated. All subjects completed the two subscales of the 16-item mDPA. On both subscales, higher scores represented greater disablement. To examine the model fit of the mDPA, single-factor and two-factor structures (i.e. PSC and MSC) were tested. Group differences were examined using independent t-tests with corresponding effect sizes (ES) (p?0.05). Results: Inspection of model fit indices for both models showed the two-factor structure to possess adequate fit to the data, ?2(101)=275.58, p<0.001, CFI=0.91, RMSEA=0.09 (95%CI=0.08, 0.11), SRMR=0.06. All items loaded significantly and in expected directions on respective subscales (?-range=0.59-0.87, all ps<0.001). The CAI group reported greater PSC (CAI:11.45±8.30, Healthy:0.62±1.80, p<0.001, ES=1.67(95%CI=1.33, 1.99)) and MSC (CAI:1.75±2.58, Healthy:0.58±1.46, p<0.001, ES=0.53(95%CI=0.24, 0.82)) scores. Conclusion: The two-factor structure of the mDPA was verified which confirms the use of the PSC and MSC. Individuals with CAI reported greater disablement; particularly on the PSC. Overall, these results suggest that the mDPA can be utilized in evaluation and rehabilitation of patients with CAI.

Supported by:

Primary Presenter / email:	**Baez, S. E.** / shelby.baez@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Hoch, J. M. / johanna.hoch@uky.edu

College of Health Sciences Research Day

Poster Presentation #225

Abstract Title:	**Mantra Meditation to Improve Chronically Impaired Attention after Stroke: An Ongoing Trial Using Single-Case Research Design**
Author(s):	C. Carrico, Department of Rehabilitation Sciences, U of Kentucky; Department of Occupational Science and Occupational Therapy, Eastern Kentucky U D. Howell, Department of Occupational Science and Occupational Therapy, Eastern Kentucky U; Department of Rehabilitation Sciences, U of Kentucky J. Patterson, College of Public Health, Graduate Center for Gerontology, U of Kentucky R. Andreatta, Department of Rehabilitation Sciences, U of Kentucky L. Sawaki, Departments of Rehabilitation Sciences and Physical Medicine and Rehabilitation, U of Kentucky

Abstract: Attention is a cognitive function that is often persistently impaired after stroke. Unfortunately, there is a lack of high-quality evidence on whether cognitive rehabilitation effectively addresses this problem. Thus, more research is needed to establish interventions to improve attention after stroke. Meditation may have potential in this regard, as it has been defined as an attentional training technique. Mantra meditation has been shown to modulate activation of attentional substrates, as well as improve performance on neuropsychological tests of attention, in healthy volunteers. The present single-case trial is the first to investigate the central hypothesis that 9 sessions of mantra meditation (i.e., repetitive intonation of the syllable “um”) will improve attention after stroke (primary outcome: Sustained Attention to Response Task). Attention is repeatedly tested prior to introduction of the independent variable (i.e., 3 baseline sessions) as well as during the intervention period (9 intervention sessions). Sessions take place 3 times per week for 4 weeks in an outpatient occupational therapy lab. In keeping with single-case design standards, visual analysis of graphical results must show replication of effects across at least 3 subjects in order to establish evidence for a functional relationship between variables. Three subjects have completed the present trial, with a maximum possible n=4. Final data analysis is pending, and effects of a functional relationship appear evident in at least 1 subject. Findings from this study will help to lay groundwork for design of future studies of meditation to improve pathologically impaired attention.

Supported by:

Primary Presenter / email:	**Carrico, C.** / cheryl.carrico@uky.edu University of Kentucky **Department of Rehabilitation Sciences**
Mentor / e-mail:	Sawaki, L. / lumy.sawaki@uky.edu

College of Health Sciences Research Day

Poster Presentation #226

Abstract Title:	**Total Lower Extremity Work Differs in Individuals with Low Back Pain Compared to Healthy Controls**
Author(s):	A. K. Johnson, Department of Rehabilitation Sciences, U of Kentucky J. D. Winters, Department of Rehabilitation Sciences, U of Kentucky N. R. Heebner, Department of Rehabilitation Sciences, U of Kentucky J. P. Abt, Department of Rehabilitation Sciences, U of Kentucky

Abstract: In the general population, more than 80% of individuals experience an episode of low back pain (LBP), where military populations report 70% higher prevalence than the general population. Individuals who suffer from LBP may reduce their performance during functional tasks to reduce pain. Therefore, the purpose of this project was to determine how individuals with chronic LBP may alter lower extremity joint mechanics during a functional task, compared to healthy control subjects. Twenty-eight subjects suffering from chronic LBP (age: 21.8±4.1yrs; height: 1.78±0.06m; mass: 85.4±9.0kg; duration of pain: 3.8±3.3yrs), and 15 control subjects (age:25.5±4.1yrs; height:1.81±0.05m; mass:84.9±8.8kg) completed a three-dimensional biomechanical analysis of a stop jump task. Subjects jumped forward onto force platforms from 40% of the subject's total body height and immediately jumped vertically as high as possible. Joint work in the ankle, knee, and hip were calculated by taking the integral of the individual joint power curves from the power generation phase of the jump. Total work was calculated by summing ankle, knee, and hip work. Independent sample t-tests were used to compare differences in dominant and non-dominant, ankle, knee, hip, and total lower extremity joint work, between the LBP group and control group. There was a statistically significant difference in total lower extremity work in the dominant (LBP:2.80±0.35J Control:3.14±0.50J; p=0.014) and non-dominant (LBP:2.78±0.33J, Control:3.06±0.45J; p=0.049) limbs, between the LBP and control group. This may indicate that those with LBP may have reduced performance due to their inability to create the negative work necessary to jump as high as possible.

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Primary Presenter / email:	**Johnson, A. K.** / johnson.alexa@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Abt, J. P. / john.abt@uky.edu

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Poster Presentation #227

Abstract Title:	**Trends in the Therapeutic use of Central Nervous System Medication for an Ankle Sprain**
Author(s):	K. B. Kosik, Department of Rehabilitation, U of Kentucky M. C. Hoch, Department of Rehabilitation, U of Kentucky P. A. Gribble, Department of Rehabilitation, U of Kentucky

Abstract: Contents: An acute ankle sprain causes severe pain, swelling and loss of function. The current standard of care involves rest, ice, compression and elevation (RICE). However, some patients may require central nervous system (CNS) medication to help manage the symptoms associated with an ankle sprain. Objective: Describe the trend in therapeutic use of central nervous system medication for an ankle sprain. Participants: A local healthcare database from a regional medical center was queried using ICD-9 & ICD-10 codes for patients with a primary diagnosis of an ankle sprain from 2009 to 2017. Outcome: The percentage of patients that did or did not receive a therapeutic CNS medication along with patient demographic information and visit details was identified. Results: The search identified 5,892 cases with a primary diagnosis of an ankle sprain. Approximately 50.1% of patients received a CNS medication with an annual prevalence rate of 51.7%. Hydro/Oxy-codone (42.8%) and Ibuprofen (28.2%) were the most common CNS medications provided. Patients between the 20-59 years of age were more likely to receive a CNS with Hydro/Oxy-codone the primary CNS medication provided. Fewer patients under the age of 19 received CNS medication; however, Ibuprofen was the most common CNS medication provided. Conclusion: Although often viewed as a minor injury, half of patients with an ankle sprain were are provided a CNS medication. Patients older than 20 years of age were more likely to receive a prescription medication while those under 19 years of age were more likely to receive over the counter medication.

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Primary Presenter / email:	**Kosik, K. B.** / kyle.kosik@uky.edu University of Kentucky **Division of Athletic Training**
Mentor / e-mail:	Gribble, P. A. / phillip.gribble@uky.edu

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Poster Presentation #228

Abstract Title: **Vocal Function Exercises for Normal Voice: The Effects of Varying Duration**

Author(s):
M. Morton, Division of Communication Science & Disorders, U of Kentucky
M. Bane, Division of Communication Sciences & Disorders, U of Kentucky
J. Stemple, Division of Communication Sciences & Disorders, U of Kentucky
A. Vrushali, Division of Communication Sciences & Disorders, U of Kentucky
R. Andreatta, Division of Communication Sciences & Disorders, U of Kentucky

Abstract: Background: The Vocal Function Exercise (VFE) program is a voice therapy approach that seeks to strengthen and coordinate the laryngeal musculature and restore balance among the three subsystems of voice production: respiration, phonation, and resonance. VFEs consist of four tasks: maximally sustain a nasal vowel, ascending glide, descending glide, and maximally sustain five musical pitches. Although VFEs are efficacious, the mechanism(s) responsible for treatment efficacy have yet to be identified. Failure to identify treatment mechanisms prevents the clinician from optimally matching patients and treatments. This study is the fourth in a series of research designed to identify mechanisms of change within VFEs. This study systematically examined the effect of varying duration of sustained tones on VFE efficacy by manipulating required length of the first and fourth VFE tasks. Methods: Participants with normal voice were randomized to one of three groups and completed VFEs twice daily for six weeks. The traditional group sustained tasks one and four for as long as possible. A second group sustained the first and fourth tasks for as long as was achieved during the initial session. The third group sustained both tasks for as long as possible for three weeks and then to their calculated average for the remaining three weeks. At the end of six weeks each group was then tested for maximum performance using maximum phonation time (MPT) in seconds, as the primary outcome measure, to determine vocal efficiency. Results: Data is in the final collection phase. Preliminary results will be reported.

Supported by:

Primary Presenter / email: **Beirl, S.** / sdbe227@g.uky.edu University of Kentucky
Communication Sciences & Disorders
Division of Communication Sciences & Disorders

Mentor / e-mail: Stemple, J. / jcstem2@uky.edu

College of Health Sciences Research Day

Poster Presentation #229

Abstract Title: **Success of a multi-disciplinary approach to improve patient client interaction: a case study**

Author(s): J.C. Lockwich, Department of Rehabilitation Sciences, U of Kentucky

Abstract: Purpose: Healthcare is emerging into a patient client interaction system that stresses the need for a multi-disciplinary approach at all levels of care. A team approach to healthcare allows for a detailed synopsis of impairments, a list of specific activity restrictions that need to be addressed as well as overall goals stated to improve participation of the patient after suffering an injury. This idea of gaining knowledge from each discipline and applying it to interventions can improve functional outcome measures. Suffering from a severe stroke can cause impairments across the healthcare continuum and requires a detailed workup from a team to match appropriate interventions in order achieve outlined goals. Methods: This case study is an example of a healthy individual who suffered a severe stroke that left him in a coma state. The road to recovery is presented including treatment strategies, progressions in therapy, as well as interaction from the healthcare team to achieve a common goal of improving function. Progress and assistance level was tracked by the functional independence measure. Range of motion measurements were also obtained pre and post an intense serial casting intervention that was determined and aided by a team approach. Results: Both Functional Independence Measure scores and range of motion measurements were improved after a 10-week inpatient rehabilitation program that focused on physical therapy, occupational therapy, speech therapy, neuro psychological sessions, nursing care and overall medical doctor guidance. This patient was initially admitted at a total assist level as was discharged home with only moderate assistance provided from caregivers after participating in an intense rehabilitation program administered from a healthcare team. Conclusion: A multi-disciplinary approach is warranted to improve patient outcomes, enhance quality of life and combat complexity of life changing diagnoses. It is important to recognize that recovery for individuals with severe stroke will require lifelong planning at different stages of recovery. Healthcare providers need to identify proper treatment strategies to minimize complications and emphasize improvement in overall quality of life. A multi-disciplinary approach at all levels of care is needed to improve patient client interaction so that all needs are addressed to achieve goals linked to prior level of function.

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Primary Presenter / email: **Lockwich, J. L.** / jl305@evansville.edu University of Kentucky

Mentor / e-mail: Kitzman, P. / phkitz1@uky.edu

College of Health Sciences Research Day

Poster Presentation #230

Abstract Title:	**Sex Differences in Serum Concentrations of Vitamin D Binding Protein in Vitamin D Insufficient Aged Adults**
Author(s):	H. Brim III, Department of Pharmacology and Nutritional Sciences, U of Kentucky D. T. Thomas, Department of Clinical Nutrition, U of Kentucky

Abstract: INTRODUCTION: The majority of vitamin D (VitD) is bound to vitamin D binding protein (VDBP), which serves various purposes, including the modulation of bioavailable VitD. It has been reported that individual VDBP concentrations remain stable throughout the year, however there is no research examining sex differences in VDBP concentration in VitD insufficient adults. PURPOSE: Describe sex differences in VDBP concentration and determine if any differences affect response to VitD supplementation in older adults with VitD insufficiency. METHODS: Forty-six healthy VitD insufficient subjects (67 ± 6 yrs) were randomly assigned to either 13 weeks of placebo or VitD supplementation at 50000 IU/ week. Eleven males and twelve females were randomized to receive VitD repletion. Serum samples were collected to measure 25(OH)D and VDBP before and after the 13-week intervention. RESULTS: While there was no significant effect of time on VDBP for males or females, males had lower VDBP concentrations than females before (108.4 ± 3.5 vs 116.6 ± 2.2 ug/mL; $p < 0.05$) and after (104.4 ± 2.7 vs 116.2 ± 3.5 ug/mL; $p = 0.01$) the intervention. Males had lower 25(OH)D than females (23.7 ± 1.1 vs 27.8 ± 0.9 ng/mL; $p < .05$) before the intervention. 25(OH)D increased (25.6 ± 4.9 ng/mL males; 23.0 ± 4.3 ng/mL females) after supplementation over time ($p < .01$), with no difference between sex. CONCLUSION: VitD insufficient males had lower concentrations of VDBP compared to females, but their ability to respond to VitD supplementation was not compromised.

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Primary Presenter / email: **Brim III, H.** / howard.brim3@uky.edu University of Kentucky
Division of Clinical Nutrition

Mentor / e-mail: Thomas, D. T. / david.t.thomas@uky.edu

College of Health Sciences Research Day

Poster Presentation #231

Abstract Title:	**Quadriceps Force Steadiness following Anterior Cruciate Ligament Reconstruction during a Maximum Voluntary Isometric Contraction**
Author(s):	A. Spencer, U of Kentucky C. Jacobs, Department of Orthopedic Surgery & Sports Medicine, U of Kentucky K. Davis, Department of Rehabilitation Sciences, U of Kentucky D. Johnson, Department of Orthopedic Surgery & Sports Medicine, U of Kentucky M. L. Ireland, Department of Orthopedic Surgery & Sports Medicine, U of Kentucky B. Noehren, Department of Rehabilitation Sciences, U of Kentucky

Abstract: One of the repercussions of an ACL tear and subsequent reconstruction (ACLR) is a period of protracted quadriceps muscle weakness. While total force output is an important measure, the quality of this force, represented by quadriceps force steadiness (QFS), has been rarely investigated. Purpose: To quantify the degree of asymmetrical QFS and strength between healthy and ACLR limbs during maximum voluntary isometric contractions (MVIC). Methods: Seventy?two subjects who had an ACLR (38F, 20.2 ± 5.9 years old) underwent isometric strength testing six months post?surgery. Each subject completed five quadriceps MVIC's on both legs. The torque?time curves were analyzed using MATLAB code. A 2nd order polynomial was fit onto the plateau region of the curve to represent an "ideal" force output response. The outcome variable (error from the "ideal" curve) was normalized to the force magnitude at each point and expressed as a percentage. A paired two sample t?test was used to assess differences between limbs ($p<0.05$). Results: There was a significant difference in both QFS and mean strength between the ACLR and nonreconstructed limb respectively at 2.39 ± 0.82% and 2.01 ± 0.66% ($p<0.001$), as well as mean torque of 84.41 ± 30.84 Nm and 143.4 ± 41.5 Nm (41% deficit), respectively ($p<0.001$). Conclusion The significant disparity in ACLR knee steadiness is a result of more frequent and/or higher magnitude force fluctuations during the contraction. We speculate that these fluctuations result in a hindered ability to control the quadriceps which may lead to an increased injury risk and decreased performance.

Supported by: Biomotion Lab

Primary Presenter / email: **Spencer, A.** / spence38@uky.edu University of Kentucky
Department of Rehabilitation Sciences

Mentor / e-mail: Noehren, B. / b.noehren@uky.edu

College of Health Sciences Research Day

Poster Presentation #232

Abstract Title:	**Quadriceps Strength Asymmetry & Landing Biomechanics Asymmetry at Return to Sport after ACLR**
Author(s):	A. Alameer, Department of Rehabilitation Sciences N. Heebner, Department of Athletic Training M. Hoch, Department of Athletic Training

Abstract: Clinical Scenario: Quadriceps strength asymmetry and asymmetric landing biomechanics is commonly present at return to sport in athletes after anterior cruciate ligament reconstruction and has been related to secondary ACL injury and possibly early onset of posttraumatic osteoarthritis. Asymmetric biomechanics have been identified as a risk factor for a second ACL injury after primary ACLR and RTS. Another deficit at return to sport after ACLR is asymmetric quadriceps strength. Asymmetry in landing biomechanics and quadriceps strength may make a person more likely to tear their ACL. Investigating the relationship between quadriceps strength asymmetry and single leg landing asymmetry may assist in enhancing the rehabilitation outcomes after anterior cruciate ligament reconstruction by enhancing quadriceps-strengthening protocols. Focused Clinical Question: Do athletes with low quadriceps femoris strength asymmetry at return to sport after anterior cruciate ligament reconstruction exhibit less single leg landing biomechanics asymmetry compared to individuals with high quadriceps strength asymmetry? Methods: we searched for the studies that investigated the relationship between quadriceps strength asymmetry and single leg landing biomechanics in athletes at return to sport after ACLR, level 2 evidence or higher, peer reviewed, limited to English language, limited to humans and limited to (2000-2018 Two studies were included. Conclusion: There is limited evidence supporting the relationship between quadriceps strength asymmetry and single leg landing biomechanics at return to sport in athletes after ACLR.

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Primary Presenter / email:	**Alameer, A. H.** / a.alameer@uky.edu	University of Kentucky
Mentor / e-mail:	Heebner, N. / nick.heebner@uky.edu	

College of Health Sciences Research Day

Poster Presentation #233

Abstract Title:	**Loading in an upright tilting hospital bed elicits minimal muscle activation in healthy adults**
Author(s):	K. P. Mayer, College of Health Sciences, Department of Rehabilitation Sciences, U of Kentucky T.L. Uhl, College of Health Sciences, Department of Rehabilitation Sciences, U of Kentucky P. E. Morris, College of Medicine, Division of Pulmonary and Critical Care, U of Kentukcy E. E. Dupont-Versteegden, College of Health Sciences, Department of Rehabilitation Sciences, Center for Muscle Biology, U of Kentucky

Abstract: Objectives: Upright tilting hospital beds (THB) are utilized during early rehabilitation of critically ill patients. Tilting patients in a THB to achieve weight-bearing or loading is purported to mitigate the response of prolonged immobility associated with critical illness. The primary aim of this study is to determine the level of muscle activation during loading in a THB, and secondarily to assess if safety straps influence the level of muscle activation. Design: Cohort experimental design Setting: Musculoskeletal Laboratory Participants: Healthy, community-dwelling adults Interventions: Two groups, 10 subjects with straps-on and 9 subjects with straps-off, were tilted in a THB through 9 intervals of 10 degrees (0-80 degrees). Main Outcome Measures: Muscle activation was recorded using surface electromyography (EMG) in tibialis anterior, rectus femoris, gluteus medius, and lumbar erectors spinae muscles. Raw and EMG normalized data were analyzed across angles and conditions. Loading (weight-bearing) was recorded using the THB foot-plate scale. Results: EMG activity in the tibialis anterior, rectus femoris, gluteus medius, and lumbar erector spinae muscles was minimal as the angle of tilt and loading increased. No statistically significant increases compared to supine rest were observed, except rectus femoris muscle activation at 60 degrees in the groups without straps ($p = 0.023$). Similarly, only muscle activation in the rectus femoris was higher in the group without straps from angles 40-80 degrees compared to the group with straps. Conclusion: Relaxed, gravity-facilitated loading in a THB elicits minimal muscle activation in healthy subjects, and therefore their usefulness for enhancing muscle growth is questioned.

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Primary Presenter / email:	**Mayer, K. P.** / kirby.mayer@uky.edu University of Kentucky **Rehabilitation Sciences Doctoral Program**
Mentor / e-mail:	Dupont-Versteegden, E. E. / eedupo2@uky.edu

College of Health Sciences Research Day

Poster Presentation #234

Abstract Title:	**Blood Flow Restricted Training Following an Anterior Cruciate Ligament Injury**
Author(s):	K. Lucas, Department of Rehabilitation Sciences, U of Kentucky D. L. Johnson, Department of Orthopaedic Surgery, U of Kentucky M. L. Ireland, Department of Orthopaedic Surgery, U of Kentucky B. Noehren, Division of Physical Therapy, U of Kentucky

Abstract: PURPOSE: Anterior cruciate ligament (ACL) injuries result in quadriceps weakness, causing pain and compensations in gait. High resistance strengthening is not well tolerated after an ACL injury. Blood flow restricted training (BFRT), partially occluding blood flow through applied cuffs, maybe an effective technique to maximize strength at low intensities. We hypothesized that a 4-week BFRT protocol will significantly improve quadriceps strength. NUMBER OF SUBJECTS: 9 METHODS: After determining the subjects' preoperative isometric quadriceps strength and their 1 repetition maximum, they then performed a 4-week BFRT protocol. Training was performed at 30% of the subject's 1 rep maximum with BFRT optimal pressure determined per manufacturer instructions. Four quadriceps strengthening exercises were performed at each session. Three sets of 10-30 repetitions were performed for each exercise. At the end of 4 weeks, quadriceps strength was reassessed. A paired t-test was used to compare pre and post intervention quadriceps strength normalized to body weight, and limb symmetry indexes were calculated. RESULTS: Quadriceps strength of the involved side significantly increased ($p<0.000$) from 2.24 ± 0.67 Nm/kg to 2.82 ± 0.71 Nm/kg. The limb symmetry index improved from 0.70 pre-BFRT to 0.88 post-BFRT. CONCLUSION: A four-week BFRT protocol significantly increases quadriceps strength in a preoperative ACL reconstruction population. By training at 30% of the individual's 1RM, the risk of further injury or pain is minimized. Restoring quadriceps strength before surgery may result in a faster recovery and better long term outcomes.

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Primary Presenter / email:	**Lucas, K.** / kathryn.lucas@uky.edu University of Kentucky **Department of Rehabilitation Sciences**
Mentor / e-mail:	Noehren, B. / b.noehren@uky.edu

13th Annual CCTS Spring Conference
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Poster Presentation #235

Abstract Title: **Development of a Lateral Hop Endurance Test**

Author(s):
J. Schilling, Department of Physical Therapy, U of Kentucky
C. Roe, Department of Physical Therapy, U of Kentucky
S. Price, Department of Physical Therapy, U of Kentucky
G. Athanaze, Department of Physical Therapy, U of Kentucky
H. Reed, Department of Physical Therapy, U of Kentucky
B. Noehren, Department of Physical Therapy, U of Kentucky

Abstract: Functional tests for patients attempting to return to sports, typically focus on sagittal plane movement such as a hop test and do not have an endurance component to them. Many injuries involve aberrant frontal plane control and occur later in game situations. The development of a lateral endurance hop may prove useful to identify at risk athletes. First though, we sought to determine the reliability of a newly developed lateral hop test. PURPOSE: The purpose of this study was to evaluate the reliability of a new lateral hop endurance test. METHOD: 19 healthy subjects (11 M, ages 22.4 ± 3.1, BMI 22.9 ± 3.0) with no prior lower extremity injuries completed 30 second intervals of single legged lateral hopping with the targets 15.24 centimeters apart. Performance was measured by counting the number of times the subject hopped completely over and back. An error was classified as putting a foot down or landing on the target and not counted. Reliability between raters as well as within and between days was assessed using an Intraclass Correlation Coefficient (ICC) and Pearson Product Moment Correlation. RESULTS: The average number of successful hops was (29.20 ±6.35 hops). Between rater reliability (ICC>0.99), between day reliability (ICC=0.94), and correlation between days (r=0.89, p=<0.001) were all excellent. CONCLUSION: The 30 second lateral hop endurance test had excellent reliability between raters and days as well as strong correlation between days. Having established the reliability of this test between days and rater, subsequent studies will evaluate differences within injured athletes.

Supported by: Biomotion Lab

Primary Presenter / email: **Schilling, J.** / jmsc255@g.uky.edu University of Kentucky

Mentor / e-mail: Noehren, B. / b.noehren@uky.edu

College of Health Sciences Research Day

Poster Presentation #236

Abstract Title:	**Is there evidence to suggest that visual perceptual and visual motor interventions improve handwriting outcomes with children who have handwriting difficulties?**
Author(s):	L.P. Bray, Department of Rehabilitation Science, U of Kentucky

Abstract: Clinical Scenario: Children frequently struggle with handwriting. Accordingly, it is a common referral for pediatric occupational therapists. This outcome is traditionally addressed through sensorimotor techniques. It would be beneficial to determine if visual perceptual and visual motor interventions are successful in treating handwriting to provide clinicians with more evidence-based options. Clinical Question: Is there evidence to suggest that visual perceptual and visual motor interventions improve handwriting outcomes with children who have handwriting difficulties? Summary of Key Findings: A comprehensive literature search was completed and yielded two articles that met the inclusion and exclusion criteria: a non-randomized cohort study and a randomized cohort study. Both articles supported the use of this intervention method, but with results of moderate to limited clinical significance due to wide confidence intervals associated with the effect sizes. Clinical Bottom Line: There is moderate evidence to support the use of visual perceptual and visual motor interventions with students who have handwriting difficulties. There is a need for further investigation of the use of these treatments through higher quality research that utilizes more reliable handwriting assessments. Strength of Recommendation: The Strength of Recommendation Taxonomy recommends a grade B for limited quality evidence with patient-oriented outcomes.

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Primary Presenter / email: **Bray, L. P.** / lauramparrish@yahoo.com University of Kentucky

Mentor / e-mail: Skubick-Peplaski, C. / camille.skubik-peplaski@eku.edu