College of Health Sciences and Professions

Student Research and Creative Activity Showcase

April 17, 2014
For the third year in a row, I am pleased to have coordinated the College of Health Sciences and Professions Student Research and Creative Activity Showcase! This year students proudly displayed and presented their work, highlighting their involvement in unique projects and learning experiences outside of the classroom. We were also proud to introduce for the first time within this event a platform for students to present their work and be judged by faculty, staff and fellow students. The Showcase has proven to be an outstanding opportunity for students to demonstrate their commitment to education outside of the classroom!

Michael Kushnick
Michael Kushnick, Ph.D.
College of Health Sciences and Professions Leadership Fellow
2014 Student Research and Creative Activity Showcase Facilitator

Document: July 14, 2014
This document can be located at: http://www.ohio.edu/chsp/research/index.cfm
# PRESENTATION AWARD WINNERS

## Undergraduate Students

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**UNDERGRADUATE**

**Kristin Abram**

Advisor: Dr. John McCarthy  
Rehabilitation and Communication Sciences  
Communication Sciences and Disorders

*Exploring the Impact of Music Therapy on Children with Complex Communication Needs and Autism Spectrum Disorders: A Focus Group Study*

**Introduction:** There have been several studies done to show that music is beneficial to the communication skills of children with autism spectrum disorders, both on verbal and non-verbal components of communication. Such studies were done by Edgerton (1994), Gattino et al. (2011), Kim et al. (2008), and Lim (2010). Although the effect has been documented, input on the mechanisms for the role of music’s effectiveness remains elusive. **Purpose:** The purpose of this study was to uncover benefits and challenges of using music to help children with ASD meet their communication goals. Also, roles that augmentative and alternative communication systems have played in music therapy were discussed. Finally, information was gathered in order to help Speech-Language Pathologists incorporate music into therapeutic sessions as well as to help make collaboration easier between Speech-Language Pathologists and Music Therapists. **Methods:** This investigation conducted an online focus group discussion. The Internet forum allowed the participants to contribute to the topic of discussion at their convenience and allowed for recruitment of top music therapists across the country. One question was posted each week for 6 weeks, and the participants were able to see the question along with the responses of the other participants in order to stimulate conversation. Participants could offer as many responses to the question and others’ responses as they liked. The questionnaire and focus group was available through a secure site format which was password protected. Only the researcher and advisor had administrative rights to access the information. **Results:** All discussions were broken down into individual thought units and then each thought unit was assigned to a set of themes that emerged through an iterative process of content analysis. There were 1,353 thought units generated through the discussion. These thought units were coded in to seventeen different themes that fell into 5 different categories. These categories included benefits, challenges, roles AAC play, advice, and other. The results of this study focused around the benefits and challenges of using music with children with complex communication needs, the roles AAC plays in therapy sessions, and advice Music Therapists have for Speech-Language Pathologists. Under these four categories, there were seventeen themes, which included: Motivation and Reinforcement, Total Improvement, Neurological, Motor, Life and Social Skills, Capturing the Benefits, Discrimination, Generalization, Dividing Attention Between AAC and Music, Serves as an Individual’s Voice, Provides Control, Provides Choices, Keep It Simple, Collaborate Effectively with a Music Therapist, Be Confident, Not Self-Conscious, Maintain Appropriate Expectations and Considerations, Use Resources, and Other. All of these themes will be discussed as well as the implications for future research. **Conclusions:** Motivation and reinforcement, along with neurology seem to have a big part in the benefits of music therapy on communication skills and non-communication skills of children with complex communication needs and ASD. This study lays foundation for future studies that need to be done in order to validate these ideas. Also, Speech-Language pathologists can use information provided by this study to help them incorporate music into their therapeutic sessions as well as to justify collaboration between themselves and Music Therapists in order to give clients the best care possible.

**Kelsey N. Ball**

Advisor: Dr. Michael Kushnick  
Applied Health Sciences and Wellness  
Exercise Physiology

*Triglyceride Levels Following Short Term High Intensity Interval Training in Sedentary Men*

**Introduction:** Postprandial Lipemia (PPL) is the rise in blood triglycerides (TG) following a meal. While PPL is expected, excessive PPL can contribute to the development of atherosclerosis, which is a pathological condition within arteries that leads to many cardiovascular diseases. The scientific literature illustrates that exercise improves fasted TG and PPL. **Purpose:** To assess the immediate (acute) and long-term (residual) TG levels and PPL response to six sessions of high intensity interval training (HIT). **Methods:** Three (3) healthy males aged 31.3 ± 3.2 yrs with below average aerobic fitness (VO\textsubscript{2} peak; 33.6 ± 5.5 ml/kg/min) and above average body composition (31.3 ± 2.8 % body fat) participated in a baseline meal challenge, six HIT sessions, and two post-training meal challenges. Each meal challenge consisted of a...
Results: As this is initial data collection and is ongoing, statistical analyses were not yet performed. In general, TG responses were similar among subjects. Post-training values for relative VO\textsubscript{2} peak, absolute VO\textsubscript{2} peak, and body fat percentage were similar to pre-training values. However, average peak performance was higher in sessions 5 (975.0 ± 40.9 watts) and 6 (1022.8 ± 77.0) compared to sessions 1 (892.4 ± 86.7) and 2 (915.6 ± 84.5). Conclusions: In this group of apparently healthy, but sedentary men, six sessions of HIT training did not attenuate fasting or postprandial TG levels, however there was a trend for the improvement of session peak power performance. From the current data it is difficult to draw a conclusion, however the protocol was well tolerated by participants. Once the target subject recruitment of n = 8 is attained, data will be analyzed for statistical significance.

Chance M. Benner

Advisor: Dr. Darlene Berryman

Applied Health Sciences and Wellness
Food and Nutrition Sciences

Investigation of Hypertension Development in Bovine Growth Hormone Transgenic Mice

Introduction: Blood pressure maintenance is crucial in meeting the metabolic demands of body tissues. It is influenced by both cardiac output and total resistance of peripheral blood vessels. Growth Hormone (GH) plays an important role in blood pressure regulation by inducing cardiac development, maintaining vascular reactivity, and decreasing systemic vascular resistance. Overproduction of GH, as exists in the pathological state of acromegaly, is associated with increased blood pressure with aging due, in part, to ventricular hypertrophy and increased vascular resistance. The human condition of acromegaly is modeled by the bovine GH transgenic (bGH) mouse. The goal of this study was to use this mouse line to better understand how GH mediates longitudinal systolic blood pressure (SBP). Purpose: The purpose of this study was to characterize differences in systolic blood pressure between bGH and control mice as they age. Further investigation of heart and kidney structural differences and differences in blood pressure related hormonal systems will help to explain differences seen in blood pressure between the two mouse models. Methods: Body composition and SBP were determined monthly, from 3 to 12 months of age, in bGH (n = 9), and littermate controls (n = 7). With the goal of identifying the natural history of this hypertension histological analysis of kidney and heart was performed. Western Blotting was performed testing for component of the Renin-Angiotensin-Aldosterone-System (RAAS). The RAAS components included ACE, ACE2, and eNOS. An enzyme linked immunosorbant assay kit was used to detect circulating BNP levels at 5 and 7 months of age in bGH and WT control mice. Real time PCR was used to determine mRNA levels at 6 and 12 months of age in the hearts of the bGH and WT mice. Results: Interestingly, results show the SBP of bGH mice was not significantly different from control littermates until 6 months of age and remained significantly elevated through 12 months of age. This is surprising given the nearly 50% increase in body mass in bGH versus WT mice. With the goal of identifying the natural history of this hypertension histological analysis of kidney and heart was performed. At 6 months of age bGH mice demonstrated significantly greater glomerular scarring and area compared to WT controls. This difference was even more pronounced at 12 months of age. bGH heart tissue histology displayed a slight reduction in fibrosis in the heart at six months of age versus WT controls. However, by 12 months of age the bGH mice showed significant collagen deposition in the heart compared to WT controls. These results parallel acromegalic patients as they develop hypertension followed by cardiac fibrosis and suggest that alterations in the kidney occur prior to changes in the heart. Upon Investigation of the Renin Angiotensin Aldosterone System in 12 month bGH kidneys we showed there is an up regulation of the pro hypertensive ACE/AngII/AT1 axis, as indicated by a large ACE/ACE2 ratio. Finally, we examined brain natriuretic peptide (BNP) levels in the bGH mice. BNP is a cardioprotective hormone secreted by cardiomyocytes and is upregulated in cases of heart failure. Our results show circulating BNP levels in the
bGH mouse are significantly suppressed at 5 and 7 months relative to wild type controls. However, at 6 months of age BNP messenger RNA (determined by real time PCR) levels were trending higher in the bGH mice and were significantly increased at 12 months of age. **Conclusions:** These data indicate that the bGH heart is stressed, but that some post transcriptional mechanism may be preventing release or production of BNP protein. These preliminary data lead us to believe that the bGH mouse develops glomerular hypertrophy and scarring resulting in a body weight independent hypertension around 6 months of age. The hypertension puts stress on the bGH heart resulting in cardiac fibrosis and elevated BNP transcript levels. Future work will focus on examining the molecular mechanisms responsible for the observed renal pathology.

Kathleen J. Black

Advisor: Dr. Robert Brannan
Applied Health Sciences and Wellness
Food and Nutrition Sciences

**Comparison of the Antioxidative Effect of Extracts from Different Varieties of Pawpaw**

**Introduction:** The pawpaw (*Asimina trifolia*), is the only species of the tropical Annonacea family that grows in temperate climates like Appalachian Ohio. It has a quick ripening nature that has been detrimental to commercialization of the fruit. Continuing research on this unusual fruit indicates that it contains flavonoids like epicatechin and procyanidin dimers and trimers, which are similar to the antioxidants found in chocolate and red wine. This indicates that the pawpaw may have promise as a natural preservative in foods, providing an excellent path to commercialization of the fruit. However, the antioxidative effect of the pawpaw as a food additive has not been determined. **Purpose:** The purpose of this research was to compare the strength of inhibition of lipid oxidation between nine different varieties of pawpaw in order to better understand their potential as food additives. **Methods:** Thiobarbituric acid reactive substances (TBARS) were measured overtime in turkey homogenates after they were treated with an antioxidant extract and then challenged with an oxidant (H₂O₂). The experimental design evaluated ten antioxidant extracts; nine pawpaw varieties and grape seed extract (GSE), which served as a positive control. A negative control did not contain any antioxidant. **Results:** Previous research has shown that 0.1% GSE is an effective antioxidant in meat systems. Across all varieties, pawpaw extracts were as effective as GSE at inhibiting TBARS formation (data not shown). Further analysis revealed that different pawpaw varieties exhibited varying antioxidative effectiveness. Five varieties of pawpaw (QD, OL, RG, ATW, and NC-1) were equally as effective at inhibiting the formation of TBARS as GSE. These varieties inhibited the formation of TBARS for the entire duration of the experiment (240 minutes). Four varieties of pawpaw (GRB, LF, T2, and SAAZ) were less effective than GSE at inhibiting the formation of TBARS. These varieties did not inhibit the formation of TBARS for the entire duration of the experiment. **Conclusions:** There are three major conclusions that can be drawn from this data: (a) across all varieties, pawpaw is as effective an antioxidant as GSE; (b) QD, OL, RG, ATW and NC-1 prevented oxidation throughout the incubation period equally as well as the positive control (GSE) and therefore exhibit potential for commercialization as natural preservatives in foods; and (c) GRB, LF, T2 and SAAZ were less effective at inhibiting oxidation than the positive control (GSE) and therefore may exhibit less potential for commercialization as natural preservatives in foods.

Kathleen J. Black

Advisor: Dr. Darlene Berryman
Applied Health Sciences and Wellness
Food and Nutrition Sciences

**Evaluation of Adiponectin Protein Expression in the Blood of Mice with Decreased Growth Hormone Action**

**Introduction:** Growth hormone antagonist (GHA) mice have reduced GH action. As a result they are dwarf, however, they deviate from the well documented trend that decreased GH action extends lifespan as they experience a lifespan similar to wild type (WT) controls. In addition, GHA mice are obese throughout life. Uniquely, they appear to store the majority of their excess fat as subcutaneous fat (beneath the skin), which is typically associated with improved health. If this is the case, then why do GHA mice not have extended longevity? This research will look to adiponectin levels in GHA mice in hopes of answering that question. Adiponectin is a hormone secreted by adipose (fat) cells that serves as a messenger for different cellular signals. Adiponectin is usually negatively associated with obesity and positively associated with insulin sensitivity and longevity. Serum levels of adiponectin are elevated in GHA mice. However, the GHA mice defy normal trends associated with increased adiponectin as they are obese and do
not demonstrate increased insulin sensitivity or longevity. In previous studies, the levels of adiponectin were recorded for the GHA mice until they were 16.5 months of age; however, body composition was monitored until 18 months of age. Surprisingly, around the same time that these levels stopped being monitored, the GHA mice began showing a drastic increase in visceral fat and insulin resistance. By the trend was recognized, the mice had already been sacrificed, and therefore, no further readings could be done to investigate the effects that this unexpected trend had on adiponectin levels. **Purpose:** The specific aim for this research was to continue recording the adiponectin levels in blood beyond 16.5 months of age and in a separate cohort of mice to see the impact on adiponectin levels as the mice aged. In doing so, we hope to gain further insight on the impact adiponectin has on the longevity of GHA mice. **Methods:** Model: A GHA mouse model was used for this research. The four age groups of mice tested were 6 months (n = 33), 12 months (n = 46), 18 months (n = 38) and 24 months (n = 21) of age. Animal protocols for these mice have been approved by Ohio University’s Institutional Animal Care and Use Committee. Sample Collection: The mice were fasted for 12 hours overnight prior to whole blood collection from the tail tip using heparinized capillary tubes. Plasma was collected after centrifugation. Adiponectin Measurements: An Adiponectin (Mouse) HMW and Total. Adiponectin Enzyme-Linked Immunosorbent Assay (ELISA) was used to measure total and high molecular weight (HMW) adiponectin levels in adipose tissue, according to the manufacturer’s suggested protocol (Alpco Immunoassays, Salem, NH). Body Composition: Body composition measurements on live, unanesthetized mice were recorded using a Minispec mq benchtop nuclear magnetic resonance analyzer (Bruker Instruments, Billerica, MA). This equipment is well validated to assess whole body fat and lean mass. Statistical Analysis: All measurement data were presented as the mean ± standard error of the mean (SEM). Three-way ANOVA was used to compare adiponectin levels between all groups to determine differences due to age, sex, and genotype. Independent t-tests were used to compare genotype differences between each age- and sex-matched groups. A Pearson’s correlational analysis was used to show the relationship between % body fat and adiponectin levels. Differences were considered significant at p < 0.05. **Results:** A three-way ANOVA showed a significant effect of genotype (p < 0.001), sex (p < 0.001), genotype x sex interaction (p = 0.014) and genotype x age interaction (p = 0.016) for serum adiponectin concentrations. There was no significant effect of age (p = 0.189) or sex x age interaction (p = 0.871) for serum adiponectin concentrations. Independent t-tests were done on each age- and sex-matched group and considered significant at p < 0.05. A correlational analysis of % body fat vs. adiponectin concentration in male mice indicates that % body fat is positively correlated with serum adiponectin concentrations in WT mice (m = 568.29). In male GHA mice there is almost no correlation between % body fat and serum adiponectin concentrations (m = 0.9893). A correlational analysis of % body fat vs. adiponectin concentration in female mice indicates that % body fat is positively correlated with serum adiponectin concentrations in WT mice (m = 473.9). In female GHA mice, % body fat is negatively correlated with serum adiponectin concentrations (m = -310.14). **Conclusions:** Adiponectin levels were significantly greater in GHA mice than WT mice when all ages were grouped together. However, when each age- and sex-matched group was analyzed, significance was only seen at some ages. Adiponectin levels were significantly greater in female mice than in male mice at all ages. In male WT mice, increases in % body fat were associated with increased serum adiponectin concentrations. In male GHA mice, % body fat has no effect on serum adiponectin concentrations. In female WT mice, increases in % body fat were associated with increased serum adiponectin concentrations. In female GHA mice, increases in % body fat were associated with decreased serum adiponectin concentration.

**Tyler J. Bloniak**

Advisor: Dr. Cheryl Howe  
Applied Health Sciences and Wellness  
Exercise Physiology

**Lower-Limb Impact Forces of Active Video Games in Health Weight and Over Weight College Students**

**Introduction:** Today, approximately one in three American children is classified as overweight (OW) or obese overall, with even higher prevalence in disadvantaged, rural areas such as Southeastern Ohio. Due to its pervasiveness, childhood obesity is now the number one health concern among parents and physicians in rural Appalachia. Physical activity (PA) has been proven effective in the treatment and the prevention of chronic diseases, including obesity. According to the latest recommendations by the US Department of Health and Human Services (2008), all children should accumulate at least 60 min of daily moderate-to-vigorous physical activity (MVPA).
However, studies have shown that weight-bearing PA in children who are already OW can pose an increased risk for musculoskeletal injuries. The question of this study now becomes: does the risk of musculoskeletal injury in overweight youth outweigh the potential benefits of increasing their PA level? A previous study by Janis (1990) compared the injury rates of professional dancers and instructors (n = 275) doing low-impact vs. high-impact aerobic exercises and found that high-impact exercises pose a higher injury rate compared to low-impact exercises (35 vs. 24%). Further studies have found that the PA or sport-related injuries are more common in children and teens with higher body mass index (BMI). Data from the Canadian Community Health Survey (n = 12,170; 12-17 yrs) indicated a relationship between BMI and acute musculoskeletal injury (MSI) rate. Even after adjusting for age, health status and PA level, adolescents with higher BMI (n = 3,104) were at greater risk for joint pain and ankle injury compared to those of healthy weight (HW). Because of this risk of injury and an increase in the difficulty of moving a heavier body through space, OW adolescents may participate in low-impact activities, such as walking. The most recent PA guidelines for youth suggest age-appropriate and enjoyable activities that could count towards the recommended MVPA dose. There is a need to find suitable, enjoyable, and low-impact activities that will contribute to this daily dose, especially in OW individuals, that will also not pose an increased risk for MSI. The latest versions of active video games (AVG) claim to require sufficient movement or activity to elicit MVPA. A recent study by Howe et al. (in review) found that AVG for the XBOX 360 Kinect system elicited an energy cost of at least MVPA (6.1 ± 0.2 METs) in college-aged adults. In a practical application, Ni Mhurchu (2008) found that youth (10-14 yrs) randomly selected to receive an AVG package to add to their existing gaming consoles demonstrated a reduction in body weight and waist circumference over a 12-week period. Although these gaming systems hold promise in contributing to the MVPA recommendations and combating the growing problem of childhood obesity, it was uncertain whether the unique movement patterns observed while playing these AVG are safe, low-risk alternatives for OW individuals. Purpose: The purpose of this study was to determine if AVG elicited lower impact compared to over-ground walking or running. In addition to interpreting AVG impact forces, this study also determined the energy intensity of specific AVG. Concluding the impact forces and energy intensity of AVG was aimed to answer the question, how much does AVG contribute to the recommended dose of MVPA, and does the unique movement of AVG elicit lower impact forces thus reducing the risk of developing and MSI during activity. Methods: Flyers were distributed to recruit HW and OW college students of both genders (n = 15; 18-35 yrs) to participate in the study. Recruitment was stratified in an attempt to include an even sample of HW and OW students. The study excluded potential participants with any physical impairments or chronic disease that placed them at higher risk of injury if performing PA. Investigators collected health history questionnaires and measured resting blood pressure for all participants prior to their participation in the study to confirm a healthy status. All eligible participants signed the IRB approved informed consent prior to participation in any aspect of the study. All data was collected the day of signing the consent form during a one time visit at Grover Hall, Ohio University. Anthropometric Measurements: After signing the IRB approved informed consent form, when the participant arrived on the day of testing, measurements of height to the nearest 0.1 cm using a portable stadiometer (Seca Road Rod 214, Snoqualmie, WA, USA) and weight to the nearest 0.1 kg was used to calculate BMI (kg/m2). Each participant was classified as either HW (BMI <25 kg/m2) or OW (BMI >25 kg/m2) by the standards of the Centers for Disease Control and Prevention. To assess waist to hip ratio, the circumference was obtained to the nearest 0.1 cm using a Glaick tape measurer at the level of the suprailiac crest (waist) and the greater trochanters (hip). To directly assess the body composition of each participant, a seven-site skinfold measurement was performed using the American College of Sports Medicine standardized procedure (Thompson, 2013). Measurements were obtained at the chest, medially, triceps, subscapular, abdomen, suprailiac, and thigh using Lange Skinfold Calipers (Beta Technology, Santa Cruz, CA, USA). All measurements were repeated at least twice and found to be within +/- 2 mm at each skinfold site. Physical Activity Measurements: Before performing the AVG and self-paced activity, each participant was fitted with an activity and heart rate monitor. The GT3X+ activity monitor (ActiGraph LLC, Pensacola, FL) was fitted on the right hip with an elastic strap and initialized to record counts/min in all three planes of human movement in 1-sec epochs. The activity monitor detected accelerations/decelerations during each activity and was downloaded to ActiLife (Actigraph, LLC., Pensacola, FL) to be interpreted as numerical values (counts). A heart rate monitor (Polar RS400, POLAR USA, Lake Success, NY) was secured around the chest at the level of the zyphoid process, and averaged the heart rate in beats/min. This monitor
stored the data in 1-sec epochs and when downloaded do the computer after each testing session, gave us readable numerical heart rate numbers. Impact Force Measurements: Lower-limb impact was measured with a force transducer that was placed at the base of 2nd metatarsal-phalangeal joint on the underside of the bare foot inside the shoe. The FlexiForce® pressure sensor (model B201-M, Tekscan®, South Boston, MA) is an ultra-thin (0.008 x 0.55 x 9.0 in) sensor that allows for comfort and minimal disturbance during measurement. FlexiForce sensors are laminated by an adhesive layer that sustains durability during high impact use up to 1,000 lbs. Though the temperature of a shoe can warm significantly, the sensor readings are unaffected within a temperature range of 15-140°F. The sensor was be connected to Tekscan’s economical load and force measurement (ELF) system that is designed to interpret the forces detected by the sensor. The ELF allowed the measurement of lower-extremity joint impact on participants while they played AVG and performed self-paced activities (walking and jogging). The ELF single-handled system is a small box (2.75 x 1.25 x 0.5 in) that was fitted to participants’ mid-calf with elastic athletic tape. The wired ELF system was also connected to a 10-foot USB cable that connected to windows-compatible software that converted the impact detected by the ELF into readable force outputs (lbs). The participant feed the USB cable up the lateral side of their leg and through the back of their waist band. The cable connected to a PC laptop computer, and was monitored at all times by trained research assistants. The subjects first wore the ELF sensor barefoot when playing their first two AVG. After completion of the first to AVG, they performed the same two AVGs with their shoes on. After playing the video games, they performed two self-paced activities in the hallway with their shoes on. The participants were instructed to “walk as they would normally walk in the mall or at the playground”* and to “jog as they would normally jog while playing their favorite sport.” These activities simulated the typical movement patterns of walking and jogging during free-play PA in a field or grassy setting. The data collected from these activities by the ELF will allow the determination of which activities elicit higher and lower joint impact. Results: Fifteen college students completed the study (18-24 yrs; 8 boys; 9 HW). All activities were classified as MVPA according to accelerometer (4099 ± 330 counts/min) and heart rate (117 ± 2.2 b/min). The Average Impact Forces were lower while playing shod AVG (0.12 ± 0.01 lb) compared to barefoot AVG (0.46 ± 0.06 lb) and self-paced running (0.49 ± 0.08 lb). There was no significant difference between the peak force (Peak = 10 highest readings for each game) across any of the activities. Conclusions: Playing AVG, with shoes on, can be promoted as an interactive, fun, low-risk activity that contributes to the daily recommendations of MVPA for college-aged adults. Future research is needed to determine if these results are similar in HW and OW children and adolescents when growth plates are more vulnerable to high impact.

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Optimization of an Immunohistochemistry Protocol to Assess Adipose Tissue Angiogenesis in Mice with Modified Growth Hormone

Introduction: Angiogenesis is the formation of new blood vessels from pre-existing vessels within a tissue. For adipose tissue (AT) to expand, it is necessary for the vasculature of the tissue to expand as well. Normal growth and repair of AT depends on a balance between pro- and anti-angiogenic factors that stimulate and inhibit the division and migration of endothelial cells to form blood vessels. Growth hormone (GH) promotes lipolysis and inhibits lipogenesis. Because angiogenesis is necessary for normal growth and development, GH most likely regulates angiogenesis, either directly or indirectly. While GH has usually been found to be a pro-angiogenic factor, some studies have implicated it as an anti-angiogenic factor. AT has been shown to have depot-specific differences with the presence of GH, so AT depots may have different angiogenic capacities in our GH modified mice and their WT littermates. Purpose: There is no published research relating GH to AT angiogenesis. We will be comparing the capillary density (amount of vasculature per adipocyte) of AT in bGH mice and their WT littermate controls in the subcutaneous and epididymal depots. Through immunohistochemistry, capillary density can be determined to study the effect of GH on AT angiogenesis. The understanding of AT angiogenesis may have clinical implications, as treatment through angiogenic modulation could possibly be used to counter obesity and obesity related disorders. This project will help to elucidate the effect of GH on angiogenesis, while also being novel research on the effect of GH on angiogenesis in AT specifically. Methods: Before this research can be completed, a protocol for immunohistochemistry had to be created. The development of this protocol is described here. Tissue Collection: AT was flash frozen
in OCT compound at the time of dissection from 6-month-old bGH and WT mice and stored at -80°C until cryosectioning. Cryosectioning: At -30°C, AT sections of 8 microns were cut and transferred to slides using the CryoJane Tape Transfer Method and cryostat. Other thicknesses (6, 9, 10, 12, 14, 16 microns) were also tested to optimize tissue adhesion to the slides. Fixation: The slides and samples were fixed in cold acetone for 20 minutes immediately after cryosectioning. This optimization best preserves the tissue adhesion to the slide. Fixation times of 10 and 30 minutes were tested at room temperature. Fixing after drying the slides for 30 minutes was also tested. Immunohistochemistry: Samples were blocked with 9% goat serum in 1x PBS for 1 hour at room temperature. Other blocking mixtures (4%, 6%, 8%, 10%) were also tested. Samples were stained with rat anti-mouse CD31 monoclonal antibody (MEC13.3; BD Pharmingen 553370; 1:700) overnight at 4°C, Alexa Fluor 555 goat anti-rat IgG (H+L) antibody (Invitrogen A-21434; 1:600) for 45 minutes at room temperature, and DAPI (Invitrogen D3571; 1:1000) for 1 minute at room temperature. Various primary antibody (1:400, 1:600, 1:800) and secondary antibody (1:600, 1:800) concentrations were tested to optimize background. Imaging: Samples were imaged using a Nikon fluorescence microscope. Each sample completed thus far was taken in 200x magnification. Mouse Models Used: Bovine growth hormone (bGH) mice have high GH signaling, lean body composition, increased body size, high insulin levels (insulin resistant), and shortened lifespan compared to their wild type (WT) littermate controls. Optimization of Protocol: Before this project, there was no current protocol for immunohistochemistry in our lab. Once a general protocol was created for this project, it proved to be a difficult task to optimize it for use with AT. Due to the lipid that makes up most of AT, the tissue must be very cold so that it is solid enough to cryosection properly. The OCT compound that the AT is frozen in becomes much harder than the AT and the tissue strips away from the OCT frame, making collection of the sample impossible. After troubleshooting extensively, we discovered the CryoJane Tape Transfer System, which uses tape to collect the tissue, which is then transferred onto polymerized slides. Ultraviolet light is used to liquefy the polymer on the slide, which captures the tissue. The tape is removed and the slides are ready for fixation, with the morphological structure of the tissue still intact. The fixation time was optimized to prevent loss of tissue throughout the immunohistochemical staining process. The concentrations and incubation times of the blocking agent and three antibodies that were used then had to be optimized to minimize background on the fluorescent images (discussed in Methods). Results: After optimization of the protocol, we began performing immunohistochemistry on the samples being used in the study. All samples are not finished and no quantification of capillary density has been performed yet. Images take so far confirm that the optimized protocol was successful in visualizing the vasculature in AT sections. Successful cryosectioning of AT requires use of the CryoJane Tape Transfer System for proper capture of tissues that are morphologically intact. Tissue adhesion to slides was optimized through tissue thickness and fixation methods. Blocking and immunohistochemical staining were optimized to minimize background of CD31 staining to mark endothelial cells of vasculature. Quantifying capillary density will require a measurement of vasculature per adipocyte. We have used CD31 to mark the vasculature. DAPI stains nuclei of cells other than adipocytes present in AT. We will add a perlipin antibody that will encircle individual adipocytes and allow us to count the number of adipocytes in the field of view. We will then be able to calculate capillary density. We will take 20 non-overlapping pictures of each sample at 200x magnification to quantify amount of vasculature using the CD31 fluorescence in each sample. Capillary density will be calculated and compared between genotypes and AT depots.

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Household Adult Food Insecurity is Associated with Smoking in Women Attending an OB-Gyn Clinic in Rural Appalachian Ohio

Introduction: Appalachian Ohio is characterized by low household food security and high cervical cancer rates. Smoking may be linked to cervical cancer and has been associated with household food insecurity (HFI). Purpose: This study examined Human Papillomavirus (HPV) status, household adult food security (HAFS), and smoking habits of adult women living in rural Appalachian Ohio and attending an OB-Gyn clinic. Methods: Survey of females >21 years (USDA HFS module, smoking behaviors). HAFS was calculated using standardized methods. In addition, a dichotomous variable was calculated for HAFS (food secure [high HAFS]; any indication of food insecurity [marginal, low, or very low HAFS]). Clinical HPV results were obtained. Pearson Chi-square test was used to
assess for differences in HAFS groups. **Results:** Participants (n = 153; HPV negative, n = 139, 91.4%; HPV positive, n = 13, 8.6%) were 29 ± 8 years. Regarding HAFS, 113 (75.3%) participants lived in households characterized by high HAFS, and 37 (24.7%) lived in those characterized by marginal, low, or very low HAFS. Of 146 participants, 25 were smokers (17.1%). A greater proportion of smokers lived in food insecure homes (30.6%), compared to those living in food secure homes (13.0%; p = 0.016). HPV status did not differ by HAFS group (n = 149, p = 0.207). **Conclusions:** Female smokers living in rural Appalachian Ohio and attending an OB-Gyn clinic are characterized by food insecurity. Further exploration in a larger sample is warranted to better clarify the relationship of smoking to food insecurity.

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**Vegetable Gardening is Associated with Greater Produce Intake in Women Attending an OB-Gyn Clinic in Rural Appalachian Ohio**

**Introduction:** Prevalence of cervical cancer is higher in Appalachian Ohio, compared to other regions, and adequate produce intake may decrease risk of both HPV infection and cervical dysplasia. Yet, studies are limited. **Purpose:** This study examined household adult food security (HAFS), gardening habits, and produce intake of women living in rural Appalachian Ohio and attending an OB-Gyn clinic. **Methods:** Survey of females >21 years (USDA HFS module, gardening behaviors). HAFS was calculated using standardized methods. A dichotomous variable was also calculated for HAFS (food secure [high HAFS]; any indication of food insecurity [marginal, low, or very low HAFS]). Pearson Chi-square test was used to assess for differences in gardening between HAFS groups. Independent samples t-test was used to assess for differences in produce intake between gardeners/non-gardeners. **Results:** Participants (n = 153) were 29 ± 8 years. They (n = 150) primarily lived in food secure homes (n = 113, 75.3%), although 37 (24.7%) lived in homes characterized by marginal, low, or very low HAFS. Fifty-seven (57) out of 151 (37.7%) gardened vegetables, and 46 out of 150 (30.7%) gardened fruit. Vegetable gardeners, compared to non-vegetable gardeners, consumed more vegetable (2.5 ± 1.2 vs. 1.9 ± 1.0; p = 0.003) and total produce (4.8 ± 2.1 vs. 3.8 ± 1.8; p = 0.003) servings daily, but fruit intake did not differ (p = 0.074). Gardening fruit had no impact on produce intake between groups (p>0.05). Gardening habits did not differ by HAFS status (p>0.05). **Conclusions:** Female vegetable gardeners living in rural Appalachian Ohio and attending an OB-Gyn clinic consume more vegetable and total produce daily, compared to non-vegetable gardeners. Teaching
gardening principles may encourage improved produce intake among women. Further exploration of gardening interventions to improve dietary habits is needed in rural Appalachia.

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Exercise Physiology

Substrate Utilization at Rest and Following a Meal After Acute Caloric Restriction

Introduction: Carbohydrates (CHO) and fat are the predominant substrates oxidized for energy by humans. At rest, when energy demands are low, there is typically a small preference given to fat over CHO oxidation. However, following a meal or during exercise, both times of increased energy demand, many factors can influence the types of fuels utilized. A non-invasive, validated, and commonly utilized technique for estimating substrate utilization is to determine the ratio of the volume of carbon dioxide expelled in ventilatory gases to the volume of oxygen consumed (RER). Purpose: To determine substrate utilization/RER at rest and to a standardized meal following 24 hours of controlled diet and exercise in college-aged men. Methods: Ten (10) apparently healthy men (22.8 ± 2.7 yrs) participated in three experimental trials in random order, each trial consisting of two sessions. The first session was a caloric control/exercise session, consisting of 24hr control of caloric intake—moderate and mild caloric restriction (25 and 35 kcal/kg FFM) and an energy balance trial (45 kcal/kg FFM)—including a treadmill run to expend 10 kcal/kgFFM (684.6 ± 43.3 kcals) at approximately 60% of the participant’s pre-determined VO2max. The next morning the participants returned to the lab for a baseline measurements, consumption of a mixed meal challenge on an approximate 12hr fast, and subsequent measurement over three hours. The measurements included collection of expelled and consumed ventilatory gases in 5 minute increments through a non-rebreathing mouthpiece and one-way valve interspersed by 10 minutes of no data collection. Data are reported as mean ± stdev; repeated measures ANOVAs were utilized with significance accepted as p<0.05. Results: While there were no significant interactions among trials and across the metabolic testing sessions, the collapsed data revealed a main effect for time where RER was higher (CHO oxidation higher) at 120-125, 135-140 and 165-170 minutes after the meal challenge compared to fasting RER. Moreover, the unique finding gleaned from this investigation was that in the collapsed data among trials, the RER was significantly lower (fat oxidation higher) for the 25 kcals/kg/ffm trial (moderate caloric restriction) compared to the mild caloric restriction and energy balance trials (0.84 ± 0.02 vs. 0.86 ± 0.03 and 0.87 ± 0.03, respectively). Conclusions: The contribution of CHO and fat oxidation for energy demands is influenced by many factors. In this group of men, a novel finding was that moderate caloric restriction has an effect of substrate utilization. Research was funded in part by the MWACSM Student Research Grant, the Joseph Allen Butts Award, and the College of Health Sciences and Professions Student Research Grant.

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Homophobia in Nursing

No abstract provided

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DPPH and FRAP Antioxidant Capacity Assays

Introduction: Pawpaw is a much underutilized fruit and is native to eastern North America. This is a type of fruit which many people still are unaware of its nutritional content. It has a high nutritional content because is rich in vitamins, and amino acids. Recently, new research has shown that pawpaw is a rich source of antioxidants. These bioactive compounds may be beneficial in the human diet. Purpose: The objective of this research is to determine the antioxidant capacity of different varieties of pawpaw. Methods: The DPPH (diphenyl pricyl hydrazyli) assay and the FRAP (ferric reducing antioxidant power) are common antioxidant capacity assays. DPPH is an assay that measures the ability of antioxidants to quench harmful free radicals, which can be used to measure the effectiveness of antioxidants. FRAP is used to assess the ability of an antioxidant to keep iron in the reduced state. By
Applying the pawpaw, the fruit over the option may be the proper tools and knowledge to or -; and (c) the proper tools and knowledge to or -; board 4th counseling monitor and therapy for CD to be effective in promoting weight gain in underweight individuals. These nutrition interventions have been shown the type strength training athletes. However, this depends on CD are often combined with recommendations for individual's important that nutrition therapy is tailored to fit the Since weight gain is of guarantee sufficient maintenance of nutritional status. Deficiencies, reduce the inflammatory response, and this condition. MNT is implemented to correct weight due to the different symptoms associated with this condition. MNT is implemented to correct deficiencies, reduce the inflammatory response, and guarantee sufficient maintenance of nutritional status. Since weight gain is often difficult for CD patients, it is important that nutrition therapy is tailored to fit the individual's lifestyle. Weight gain recommendations for CD are often combined with recommendations for strength training athletes. However, this depends on the type and intensity level of the individual's physical activity. These nutrition interventions have been shown to be effective in promoting weight gain in underweight CD patients. Purpose: The specific aims of this project include the following: (a) apply the Nutrition Care Process as it relates to CD and weight gain; (b) administer Medical Nutrition Therapy for CD management and weight gain; and (c) monitor and evaluate participant's progress. Methods: Over the course of one semester, the primary investigator (Jennifer M. Yoder) and the co-investigator (Jessica L. Kilbarger) counseled the client in 4 different sessions. The first nutrition counseling session focused on gathering the participant's food/nutrition related history, anthropometrics, biochemical and medical data, nutritionally focused physical findings, and client history. After the first session, a meal plan was formulated based on the Exchange Meal Pattern that met the clients caloric needs for weight gain and the participant's personal goals. Over the following two sessions the client's weight gain was monitored and evaluated and any issues or knowledge gaps were addressed through counseling along the way. The final nutrition counseling session focused on reviewing the participant's progress and provided them with the resources needed for future success. Results: This case study presents a 21-year-old Caucasian male with CD who is clinically underweight based on his calculated body mass index (BMI). After the implementation of medical nutrition therapy over the course of one semester, the client was able to apply knowledge of nutrition and recommendations for weight gain and CD and successfully gained weight. The client had an overall weight gain of 2.2 lbs, he gained 8.8 lbs over the course of the first 3 counseling sessions, but, due to external environmental factors, lost weight between the 3rd and 4th counseling session. Conclusions: Through the proper implementation of Medical Nutrition Therapy an underweight client with CD will be able to successfully gain weight with the hope of healthy weight maintenance throughout their life. If given the chance to continue the counseling sessions with this client I would have like to get a better idea of his body composition, as that is something that we did not do during the nutrition intervention. I feel this would have given us a better understanding of the client's needs and whether or not the client was gaining muscle weight versus fat. However, I am confident that this client now has the proper tools and knowledge to continue on his journey towards a healthy weight on his own.
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Effects of 24 Hour Energy Status on Postprandial Lipemia and Substrate Utilization Following Exercise

Introduction: Excessive postprandial lipemia (PPL), the rise in triglycerides (TG) after eating, is a contributor to the development of atherosclerosis and cardiovascular disease. A single bout of exercise performed 12-48 hours prior to a meal has a positive impact on the reduction of PPL. However, limited literature has directly investigated the impact of 24-hour energy status on the effect of exercise on PPL. Respiratory Exchange Ratio (RER) is an indirect assessment of the types of fuel being metabolized by active tissues, and serves as a viable tool to elucidate changes in fuel metabolism. **Purpose:** to determine the impact that 24-hour energy status has on the PPL response following exercise. **Methods:** Four (4) participants qualified—were below average body composition (14.1 ± 2.3 % body fat), above average aerobic fitness (60.3 ± 5.5 ml/kg/min), and had routine activity levels, and dietary habits. Participants completed three separate randomized trials (a) underfeeding (consuming 25 kcal/kg/FFM); (b) energy balance (energy intake is equal to energy output; defined as consuming 45 kcal/kg/FFM); and (c) overfeeding (consuming 65 kcal/kg/FFM). Each of these varied energy states lasted 24 hours and included an exercise bout, expending 10 kcal/kg/FFM. The following morning participants came to the lab fasted for a meal challenge. A standardized meal (10 kcal/kg/FFM, 58% carbohydrate, 35% fat, 7% protein) was consumed and serial blood samples were taken over 3 hours. RER measurements were made for 5 minutes every 15 minutes before and throughout the 3 hours. **Results:** RER increased beyond rest in all participants and all trials over the course of 180 minutes after the meal challenge. Triglycerides were higher in the 65 kcal/kg/FFM trial compared to the other two at baseline and in all samples after the meal. **Conclusions:** RER, an indication of the type of fuel utilized, increased after the consumption of the standard meal—suggesting a shift towards greater carbohydrate and less fat metabolism—in all trials. While triglycerides were higher in the 65 kcal/kg/FFM, they responded similarly across 180 min in all trials. As this is initial data, and collection is ongoing, statistical analyses were not performed and interpretation of the means limited. However, the increase in blood triglycerides above the other trials would be an important finding, one that may be explained, in part, by a reduced fat metabolism.

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The Effects of Nursing Staff Strategies on Patient Outcomes and the Explanation of Policy Solution

No abstract provided

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Effect of Whey Protein Isolate Dip on Sensory Analysis and Objective Characteristics of Deep Fried Chicken

Introduction: School lunch is extremely important to all children who eat it; it sets the foundation for each child’s health and their outlook on nutrition. Many children, especially those who come from low-income families, rely on their school cafeterias to provide them with their daily nutritional needs. These children, whose families may suffer from food insecurity, also have a higher prevalence of obesity than children from food-secure families. Breaded and deep-fat fried chicken, which is a popular lunch item in schools, does not meet the school lunch guidelines of less than 35% calories from fat. Previous research done at Ohio University claims that coating chicken with a whey protein isolate (WPI) solution at a pH of 2.0 before frying reduced the oil absorption up to 37% in comparison to those fried without the WPI coating. These conditions may create a barrier around the chicken, which stops oil from being absorbed through the breading during the cooling process. **Purpose:** This information can be useful in creating a new chicken product that meets school lunch standards and is enjoyable to children. **Methods:** This research was replicated using 10-gram pieces of chicken tender, which were treated in two separate groups: WPI and control. The final pieces were tested for both lipid and moisture content to make sure they meet these regulations. A panel of 8 trained sensory analysts
tasted these samples to determine detectable differences. This research aims to discover how consumers will respond to the sensory attributes of this reduced-fat chicken product. **Results:** There was a significant reduction in percent lipid in the dipped versus undipped samples. The dipped samples had a lower percentage of lipid than the undipped samples ($p = 0.003$), but did not have a significant change in moisture content compared to the undipped samples ($p = 0.082$). The dip pickup during preparation of chicken samples is responsible for a 67.7% increase in pickup weight as well as a decrease in total yield during cooking. Differences in these characteristics led to differences in sensory characteristics of the fried chicken samples as well. In regards to sensory analysis characteristics, there was no difference between replications of the data for all dipped and all undipped samples for all attributes tested except color. Of the sensory attributes tested, hardness ($p<0.0001$) and sourness ($p = 0.017$) exhibit a significant difference between the undipped control samples and the dipped samples. Dipped samples were shown to be more hard than the control samples, as well as more sour. The sensory panel found a difference in color per treatment, but also per replication as well. The difference in color per treatment was also shown with a lower $L^*$ value as tested with the colorimeter; dipped samples were significantly darker than the control samples. When analyzed on the TA-XT2i texture analyzer, there was no significant difference between the dipped and undipped samples for both replication and treatment. Although texture data collected from the texture analyzer did not directly reflect differences in hardness detected during sensory analysis, this could be due in part to the effect of packaging as well as re-thermalization of product at time of consumption. **Conclusions:** Future research studies should be done in order to determine implementation in the commercial setting and nutritional value. Nutrition analysis should be done on this product to determine the full breakdown of macronutrients and usability in the school lunch program. Storage and re-thermalization of the product may contribute to changes in texture and flavor as well as moisture content. In this study, all objective analysis was done before storage and re-thermalization and sensory was done after. It may be beneficial for future research to focus on objective and sensory analysis both before and after storage and re-thermalization. In my opinion, this production process is very implementable at a large scale, however, more research must be done before the next step is taken.

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**Childhood Obesity in Appalachia: Policy Solutions for Elementary School-Aged Children**

No abstract provided

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**The Velocity of Hyolaryngeal Excursion in Normal Swallowing**

**Introduction:** Swallowing is a necessary bodily function that moves a bolus, which is anything you intend to ingest, from the mouth to the esophagus. One of the necessary physiological events that occur is the movement of both the hyoid bone and the larynx, also known as hyolaryngeal excursion. If individuals do not complete this physiological sequence, they put themselves at risk of multiple negative health outcomes, particularly aspiration. Aspiration is material passing below the true vocal folds. Adequate hyolaryngeal excursion is necessary during swallowing to ensure a safe swallow without an increased risk of aspirating. The knowledge of hyolaryngeal excursion is important in order for clinicians to recommend the correct treatment to their patients. **Purpose:** To examine the velocity of hyolaryngeal excursion in different age and gender groups with different bolus volumes. **Methods:** Velocity of hyolaryngeal excursion was calculated using videofluoroscopic swallowing examinations (VFSEs) of 37 individuals. Statistical comparisons were made by two-way repeated analysis of variance (ANOVA) with between subject variables being age and gender, and within subject variable being bolus volume (5 ml and 10 ml). Significance level was set as $p<0.025$. **Results:** The velocity of hyolaryngeal excursion in older individuals was significantly slower than in younger individuals. There was no gender and bolus volume difference in the velocity of hyolaryngeal excursion. **Conclusion:** Slower velocity of hyolaryngeal excursion may put older populations at higher risk for aspiration in case of
illness or accident. The preventive approach is essential.

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Teaching HENRY

Introduction: It is recommended that children obtain at least 60 minutes a day of moderate-to-vigorous physical activity (MVPA) for proper growth, development, and weight management. This is especially important in depressed regions, such as Southeast Ohio where childhood obesity rates are high. A recent survey of 10 to 15 year olds in 34 countries found that less than half of the participants met this goal at least 5 days a week. Given this information, increasing PA in children has become a main focus of obesity prevention. However, PA is only half of the energy equation. According to the dietary guidelines for Americans, a healthy diet is one that (a) limits saturated fats, sugars and salt; (b) is within the energy requirements for the individual; and (c) contains nutritionally dense foods from all food groups. However, 60-80% of children across the United States do not meet these guidelines. In fact, Appalachian children acquire the bulk of their daily caloric intake from the fats and sugars group; recording more than 23 servings per day. This data greatly stresses the need to modify this behavior in order to help combat the obesity problem in this population. Increased knowledge of the recommended food intake and amount of PA has proven to have a positive impact on healthy lifestyle behaviors. When children have a better understanding of what food choices and activities improve their health, they will be more likely to make these healthier choices both consciously and subconsciously. The objective of the children’s book, Henry Gets Moving!, is to educate children on healthy PA and nutrition choices to promote a healthy, active lifestyle. Purpose: The purpose of this lifestyle intervention is to assess the impact of Teaching HENRY on PA and nutrition knowledge and habits in 1st-4th grade children in Rural Appalachia. We hypothesize that children will gain knowledge and understanding of the definitions and benefits of PA and nutrition recommendations necessary for healthy, active living. We also hypothesize that this increase in knowledge will lead to an increase in daily PA, particularly minutes of MVPA, and a positive change in dietary behaviors, including increased intake of fruits and vegetables and reduced intake of fats and sugars.

Methods: Study Design and Recruitment: Upon IRB approval, a flyer announcing the study will be sent home with all children, 1st-4th grade, who are participating in the Kids on Campus (KoC) after-school program. The flyer will inform the parents and children about the inclusion of Teaching HENRY curriculum in the enrichment portion of KoC. All children will complete a series of questionnaires on nutrition and PA knowledge, such as the Health Food Knowledge Activity and the CATCH After-School Student Questionnaire prior to program implementation. These questionnaires will be administered orally to all 1st-4th grade children who attend the KoC program and only grade, age, and gender will be recorded as identifiers (group level assessment). Measurements: A subset of children from the larger group will be recruited to participate in the measurement portion of this study (individual level assessment). The parents of this subset will sign the parental consent and the child will be read the child assent and asked to write their name on the paper if they wish to participate. All parents of this subset will complete questionnaires on their PA and nutrition knowledge, as well as age, gender, race, socioeconomic status, and highest level of education. Prior to implementing Teaching HENRY, the children’s height (cm), weight (kg), and waist circumference (cm) will be measured. Body mass index (kg/m²) will be calculated to determine weight status according to the CDC’s age- and gender-specific growth charts (healthy weigh <85th percentile; overweight >85th percentile). To assess dietary behaviors prior to the intervention, 2 schools meals will be monitored be direct observation in the cafeteria to record their food selections and intake. To assess baseline PA behaviors, the children will be asked to wear an activity monitor for 7 days to determine their average PA levels. The ActiGraph GT3X+ (ActiGraph LLC, Pensacola, FL) accelerometer will be fitted on their right hip and they will be asked to wear it at all times except for bathing or swimming. These measurements of PA and nutrition behaviors will be conducted at baseline and again at follow-up, once Teaching HENRY is completed. The children will receive a monetary award for completing the measurements and their parents will also receive an award for completing the questionnaires. Teaching HENRY: During the spring of 2013, the 6-week (1 lesson/week) healthy lifestyle intervention, Teaching HENRY, will be implemented during the enrichment component of KoC. Outside of the weekly lessons, Henry will also be integrated into other components of the KoC program to remind children of the healthy choices Henry would make. The intervention curriculum is based on the children’s book, Henry Gets
Moving! The book tells the story of an unhealthy hamster that learns to be active and eat healthy. Each child will receive a copy of the book at the beginning of the intervention. There will be 6 lessons on healthy nutrition and PA behaviors to teach the children about food groups, recommended dietary intake, portion control, healthy snack choices, types of PA, and the recommended amount of PA. Take-home activities will supplement the lessons and encourage the parents and families to get involved. The children will receive small prizes for completing these homework assignments. **Results:** Our baseline data showed no relationship existed between MVPA min and knowledge of PA recommendations ($R^2 = 0.09$). All children achieved the recommended 60 min of MVPA when reported as a weekly average, but MVPA min varied greatly from day-to-day. A weak relationship existed between nutrition knowledge and fat consumption ($R^2 = 0.43$), no relationship between nutrition knowledge and CHO and PRO intake ($R^2 = 0.02$ and 0.04, respectively). Compared to USDA recommendations, 12.5% of children fell within range for kilocalorie intake during school lunch (550-650 kcal); 75% percent fell below and 12.5% fell above. **Conclusions:** There was no relationship between knowledge and behavior for PA and diet. In fact, when we did find a relationship between dietary knowledge and intake, it was in the wrong direction. The take home message is we have a poor baseline were the children do not have the appropriate baseline knowledge to promote a healthy lifestyle it is our hope that the teaching Henry will have apposite impact on knowledge and behavior.

**Callie L. Wood**

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**Effects of Adult-Onset Growth Hormone Receptor Knockout on Body Composition and Circulating Adiponectin Levels in Mice**

**Introduction:** Because disrupted growth hormone activity has been found to delay aging and extend longevity, growth hormone receptor knockout (GHRKO) mice are of interest in research. These mice, modeled after a human condition called Laron’s Syndrome, are dwarf and obese, but tend to live longer, be less prone to diabetes, and have fewer instances of cancer. In order to investigate whether GHR disruption occurring later in life can achieve the same improvements in health span and longevity as GHRKO occurring from birth, the Adult-Onset Growth Hormone Receptor Knockout (AOGHRKO) mouse has been developed. Body composition measurements were collected to determine whether AOGHRKO mice display the same phenotypic effects of GHR disruption as the mice that experienced GHRKO from birth. Additionally, serum levels of adiponectin (a hormone secreted from adipose tissue, shown to affect insulin sensitivity, and upregulated in GHRKO) were quantified in order to further investigate the metabolic consequences of AOGHRKO. **Purpose:** To determine whether GHRKO activated at 6 weeks of age has the same effects on body composition and circulating adiponectin levels as GHRKO that occurs from birth. **Methods:** Mice were bred for a knockout-inducible GHR that was activated at 6 weeks of age. Body composition measurements were collected every four weeks for 81 weeks. Adiponectin levels were quantified at 40 weeks of age. **Results:** Prior to the activation of the GHR disruption, there was no significant difference in body mass, fat mass, or lean mass between the control and experimental groups. However, in the weeks following the activation of the GHR disruption, the AOGHRKO mice developed significantly decreased body mass, increased fat mass, and decreased lean mass compared to the controls (P<0.05). The AOGHRKO mice also had an increased level of circulating adiponectin at 40 weeks of age compared to controls (P<0.05). **Conclusion:** Induction of GHR disruption in adult life (AOGHRKO) produces the same effects on body composition and circulating adiponectin levels as GHRKO occurring from birth.

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**Quantification of Circulating Irisin in Mice with Altered Growth Hormone Action**

**Introduction:** A membrane protein called fibronectin type III domain-containing protein 5 (FNDC5) is expressed in skeletal muscle and is proteolytically cleaved to form the newly characterized hormone called irisin. Irisin is linked to the “browning” of adipocytes in white adipose tissue (WAT), which means that brown adipocyte-like cells develop within WAT depots. Brown adipocytes, normally found in brown adipose tissue (BAT), are physiologically different from white adipocytes in that, they aid in thermoregulation and thermogenesis, instead of primarily storing lipid. Also, brown adipocytes are the
only cell type that expresses uncoupling-protein 1 (UCP-1), which allows for the production of heat instead of ATP. Preliminary data showed that UCP-1 expression is altered in WAT of GH modified mice. However, the cause of this variation is unknown. Also, the effect of modified GH levels on the levels of circulating irisin is unknown. **Purpose:** The purpose of this study was to determine the correlation between GH action and irisin secretion in GH modified mice, including bGH, GHA, GHR-/-, and MuGHRKO mice and respective WT controls. **Methods:** Animals: bGH, GHA, GHR-/-, MuGHRKO, and WT mouse lines were bred at an Ohio University animal facility with a 12-hour light and 12-hour dark cycle. Mice were fed standard or high fat chow and the age of the mice was recorded. Sample collection - Whole blood from bGH (2 mo), GHA (18 mo), GHR-/- (12 mo), and MuGHRKO (6 mo), as well as the WT controls, all fed a standard-chow diet, were collected. Also, whole blood from 6 mo HF fed bGH, GHR-/-, and the WT control were collected. All sample collection occurred via the tail tip using heparnized capillary tubes following a 12-hour fast. All blood samples were centrifuged to isolate the plasma, which was then stored at -80°C until the sample was analyzed. Irisin levels: Irisin levels in plasma were quantified using Irisin ELISA kits distributed by Aviscera Bioscience Inc. (Santa Clara, CA; Catalog No. SK00170-01). Samples were diluted in order to accurately quantify irisin concentrations in the plasma. **Results:** Data and figures are available upon request. At 2 mo, bGH mice fed on standard chow diet had significantly higher circulating irisin concentrations when compared to the WT control, whereas, the 12 mo GHR-/- and 18 mo GHA mice did not significantly change when compared to the WT controls. At 6 mo, bGH mice fed on a HF diet had significantly higher circulating irisin and GHR-/- mice fed on a HF diet did not have significantly changed circulating irisin when compared to the WT control. Also, at 6 mo, standard chow fed MuGHRKO mice did not have significantly changed irisin concentrations when compared to WT controls. **Conclusions:** Overall, irisin is found in significantly higher concentrations in bGH mice that have decreased adiposity and a lean body composition compared to their WT control. Thus, as ↑ % fat mass = ↓ Irisin and ↑ Lean Mass = ↑ Irisin. In conclusion, irisin concentrations are not significantly changed in MuGHRKO mice that lack GH signaling in skeletal muscle when compared to WT controls; thus, a factor besides GH is influencing the secretion of irisin from skeletal muscle. Further research needs to be conducted to determine the factor that causes irisin secretion from skeletal muscle.
GRADUATE

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Athletic Training

Development and Validation of an Athletic Training Knowledge Assessment Tool

Introduction: Athletic training educational programs must provide the Commission on Accreditation of Athletic Training Education (CAATE) with outcomes measures of performance. CAATE also requires professional athletic training programs to include the Athletic Training Education Competencies 5th edition (Competencies) within their curricula. The Competencies set forth the knowledge, skills, and clinical abilities that should be mastered by students. Currently, there is no standardized assessment tool based on the 5th ed. Competencies. Purpose: Develop and validate a knowledge assessment tool that effectively measures the material included in the Competencies to be used to assess students enrolled in professional programs. Methods: We used a multi-phase developmental design process to develop test items and perform item analysis. Items were developed based on educational resources and clinical practice and aligned with specific Competency content areas. An expert panel evaluated the initial pool of 113 items for proper alignment. Four pairs of experts each evaluated a group of 25-30 items. To be retained, both experts had to agree on an item's alignment. The 98 retained items were distributed to participants via an online survey housed by Qualtrics. Participants were students currently enrolled in CAATE-accredited professional athletic training programs. Participants were recruited via email; this recruitment email was sent to current program directors who were asked to forward it to their students. Of the 142 individuals who chose to participate, 116 submitted completed assessments. Item analysis was performed. Item discrimination was determined using a discrimination index based on upper and lower quartiles with a threshold of 0.1. Acceptable item difficulty was between 0.32 and 0.92. Results: Participants had a mean age of 21.31 ± 3.1 years and had completed an average of 4.6 ± 1.9 terms of athletic training education. Participants represented 45 different professional athletic training programs. The distribution between baccalaureate and post-baccalaureate programs was 97.7% and 2.3% respectively. Participants' scores were an average of 62.23% and between a range of 8% and 92%. Based on the return of test items that were deemed acceptable for both difficulty and discrimination, a test bank of 36 items was established. Conclusions: Developing and validating a standardized tool for assessing knowledge included in the Competencies could be helpful for programmatic outcome measures. In order for this tool to be useful, a larger item pool would need to be developed as only 36 items from this study demonstrated appropriateness through expert panel review, acceptable discrimination, and difficulty within the established standards. While these 36 items provide a helpful starting point, more items are needed to accurately represent the material contained within the Competencies. Additionally, the item pool's reliability would need to be established through an administration of all items to participants.

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Athletic Training

An Independent Cross Validation of a Clinical Test of Reaction Time

Introduction: Concussion is a transient injury that affects multiple domains of cognition including, memory, orientation, and reaction time (RT). Currently, there is a clinical tool and procedure that can evaluate RT. However, there is no additional validity evidence to support its use clinically. Purpose: To cross validate a clinical test of RT. Baseline RTs from the clinical test were compared to a previously validated computer based RT task. Methods: A volunteer sample of 84 males and females aged 18-25 participated in the study. Participants completed the Diery-Liewald RT task (DLRTT), a computer based reaction time task that measures simple RT. Immediately following, participants also completed a clinical RT test, a novel field measure to assess reaction time. Correlations were used to determine the validity of the clinical task to a previously validated computer RT test. Results: The clinical RT test was found to be positively correlated with the DLRTT. Conclusions: The clinical RT task maybe beneficial to use as part of a concussion testing battery. Inclusion of this tool in concussions screens can improve clinical practice by allowing athletic trainers to conduct more comprehensive concussion evaluations as well as
improving diagnoses, management and outcomes resulting from concussions.

Megan E. Applegate
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Exercise Physiology

Glycemic Control Following Short Term High Intensity Interval Training in Sedentary

Introduction: Glycemic control (regulation of blood glucose) in the unfed state, as well as after the ingestion of a glucose-containing meal is a tightly regulated process. Excessive glycemic responses can be detrimental to metabolic health. Sedentary behavior and obesity have been associated with the development of reduced glycemic control. The hallmark of initial treatment to improve glycemic control is diet and exercise. While moderate intensity continuous exercise is often implemented, high intensity interval training (HIT) has also been shown to improve aerobic fitness, body composition, and glycemic control in healthy, active, and diabetic populations over as little as a few weeks; however, limited data exists pertaining to the efficacy of HIT on glycemic control in healthy, but sedentary men. Purpose: The purpose of this investigation was to assess the effect of six HIT sessions on glycemic control. Hypotheses: (a) six sessions of HIT would reduce the unfed blood glucose concentrations, as well as attenuate the glucose responses to a meal; (b) responses would be sustained a week after training; (c) aerobic fitness and body composition would improve. Methods: Three (3) non-smoking men with below average aerobic fitness and above average body fat percentage participated in six exercise sessions, separated by 2-4 days of rest, and three meal challenges. Exercise Sessions: The exercise sessions included six 20-second cycling sprints against a resistance equivalent to 7.5% of their body weight, separated by four minutes of active recovery. Meal Challenge Sessions: Subjects participated in three meal challenge sessions: pre-training (baseline), immediately post-training (acute), and extended post-training (residual). After fasting for 12 hours, a baseline blood sample and a standard meal (15 kcal/kg FFM) were provided. Blood was sampled at 15, 30, 45, 60, 90, 120, 150, and 180 minutes post meal ingestion to evaluate glycemic control. All data was reported as mean ± SD. Repeated measures ANOVAs will be used to analyze variables among trials and across time. Results: In general, glycemic responses were similar among subjects. Post-training values for aerobic fitness and body composition were similar to pre-training values. Session average peak performance tended to improve. Conclusion: In this pilot data, it is difficult to draw a conclusion; however, the protocol was well tolerated by participants. Once the target subject recruitment of n = 8 is attained, data will be analyzed for statistical significance.

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Athletic Training

Mental Toughness of High School Track Athletes

Introduction: The number of adolescent athletes is increasing every year. There was a 919% increase in participation for high school athletes from 1971 to 2006. A 2011 survey by the National Federation of High School Athletics revealed 55% of all high school students participated in at least one school sport. With the increase in high school students playing sports year after year, there are a great number of athletes who participate in multiple sports in a season or year. These training habits can increase the likelihood of overtraining illness and injury, including Overtraining Syndrome (OTS) and Athlete Burnout. Mental Toughness is the capacity to perform in the upper range of one's ability regardless of the situation. In prior research, mental toughness has been associated with OTS and Athlete Burnout. This indicates that mental toughness may be a key psychological variable that could be targeted to mediate negative psychological variables, such as physical symptoms, perceived stress, and stress response. Purpose: The purpose of this study was to provide evidence of construct validity for the MeBTough mental toughness assessment tool by examining cross-sectional relationships between mental toughness and other psychological (stress response, perceived stress, coping ability, and athlete burnout) and physical (physical symptoms) variables that are associated with injury and illness in adolescent athletes. Methods: This study is using a case series design. The setting of the study is a Rural High School in Northwest West Virginia. Participants in this study are six male High School athletes (age = 17.3 ± 0.1 years; 1 sophomore, 2 juniors, and 3 seniors; 1 Hispanic) on a varsity track team. Athletes were long distance runners (n = 2), short distance runners (n = 2), or ran both distances (n = 2). Participants completed a demographic question and seven other questionnaires, including the Mental, Emotional, and
Bodily Toughness Inventory (MeBTough), Athlete Burnout Questionnaire (ABQ), Stress Response Scale for Adolescents (SRSA), Cohen-Hoberman Inventory of Physical Symptoms (CHIPS), Brief Cope Inventory (BriefCOPE), and Perceived Stress Scale (PSS). All questionnaires were completed in a classroom in the participant’s high school. **Results:** Correlation coefficient revealed cross-sectional relationships between PSS and SRSA ($r = 0.70$), and SRSA and CHIPS ($r = 0.66$). It also revealed that participants with higher mental toughness scores reported lower scores on the ABQ, CHIPS, and SRSA. “Acting tough” was reported the biggest strength in four of the six participants. Four out of six participants reported a biggest weakness of an emotional component. The three highest scores were reported from participants with the three wealthiest families. The only non-multisport athlete reported the lowest mental toughness score. **Conclusions:** Participants with higher MeBTough scores reported lower scores on CHIPS and the ABQ, displaying that participants with greater mental toughness show less signs of OTS and Athlete Burnout. “Acting tough” may be a mental attribute that Track athletes use during overall training as compared to other athletes. Track athletes use less emotional toughness as compared to other components of mental toughness. Higher mental toughness scores can be attributed to participating in multiple sports, being that all multi-sport athletes scored significantly higher on the MeBTough compared to the participant competing in a single sport.

**Kimberly E. Barry**

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Athletic Training

**Investigating Neck Muscle Size and Neck Muscle Strength with Concussion Occurrence**

**Introduction:** Female athletes have shown increased concussion rates during the past decade, particularly soccer players, and are seemingly at a higher risk for concussion than males. Researchers theorize that smaller, weaker necks observed in females could be a contributing factor. **Purpose:** To utilize diagnostic ultrasound to explore the relationship between neck muscle size and concussion occurrence. Also, to explore the relationship between neck muscle strength and concussion occurrence. **Methods:** Thirty-three (33) soccer players aged 19.48 ± 1.54 years (9 males, 24 females) participated in this study. Eleven (11) were concussed (8 females, 3 males) and 22 were non-concussed (16 females, 6 males). Participants were local high school and college soccer players and were excluded from participation if they wore headgear or did neck strengthening of any kind. When a soccer player sustained a concussion, the concussed individual and 3-4 of their non-concussed teammates were recruited for testing. Diagnostic ultrasound evaluated the cross-sectional area (CSA) of the sternocleidomastoid (SCM) and upper trapezius (TRP). A weighted pulley machine and head harness were used to assess neck muscle strength. Absolute neck muscle size and neck muscle strength were made relative values by dividing by head weight. Height, body mass, head and neck mass, head and neck girth, and body composition were also measured. **Results:** Differences in neck muscle size and strength between genders were identified. Males showed to have greater neck muscle strength and SCM and upper TRP muscle CSA than females. The combined relative area for the SCM and upper TRP for concussed females was 0.21 kg/cm² ± 0.03 and for concussed males was 0.17 kg/cm² ± 0.01. The combined relative area for non-concussed females was 0.22 kg/cm² ± 0.05 and for non-concussed males was 0.17 kg/cm² ± 0.04. The total relative neck strength for concussed females was 19.05 kg/kg ± 5.95 and for concussed males was 20.82 kg/kg ± 2.19. The total relative neck strength for non-concussed females was 16.27 kg/kg ± 4.51 and for non-concussed males was 23.08 kg/kg ± 2.97. **Conclusions:** Our findings were consistent and comparable with previous studies that investigated head and neck mass, neck girth, and neck strength. Our findings further support the neck theory, showing that a smaller, weaker neck is indicative of an increased risk for head injury. Our results, in particular the diagnostic ultrasound, offer a better understanding of the neck theory and neck musculature, which could aid to more efficient preventative measures being established.

**Rebecca L. Berger**

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**Effects of Spectral Shift on Dichotic Speech Recognition**

**Introduction:** The number of cochlear implant users, particularly bilateral cochlear implant users, has increased dramatically in recent years. However, there is much variability in the speech perception abilities among bilateral cochlear implant users. Frequency
mismatch occurs in two forms in cochlear implantation. First, the electrode array tends to be located in the basal part of the cochlea creating a high-frequency shift in terms of stimulation. Second, in bilateral implantation, it is difficult to align each implanted electrode at exactly the same depth thus creating a frequency mismatch between the ears. It is unknown how the auditory system integrates the mismatched information in cochlear implant users. **Purpose:** The present study explores whether or not frequency shift affects speech recognition in a dichotic listening situation. The hypothesis is that when the frequency mismatch between the two implants and relative to the original cochlear map is great, listeners will be unable to integrate speech information in the two ears leading to poor speech recognition. **Methods:** Eight (8) native English-speaking, normal-hearing adults between the ages of 19 and 29 years old participated in the experiment. The test materials consisted of vowel and consonant speech materials. The vowel materials were made up of 12 monosyllabic words in a /hVd/ format. There were 4 speakers (2 males, 2 females), resulting in 48 total vowel presentations for each test condition. The consonant materials consisted of 20 syllables in a /Ca/ format. There were 2 speakers (1 male, 1 female), resulting in 40 total consonant presentations for each test condition. The speech signal was vocoder processed with 6, 12, and 18 spectral channels to simulate cochlear implant stimulations. The processed signal was then split in half so that half was presented to the right ear and half was presented to the left ear. The speech presented to each ear had undergone various amounts of frequency shift ranging from 0 to 6 mm in the cochlea. The amount of frequency shift was either equal or unequal in the two ears. Participants listened to word presentations under supra-aural headphones in a double walled sound booth. On a computer screen in front of them was a grid containing all of the possible vowel or consonant combinations and they were asked to click on the word that they heard. The test consisted of 84 total conditions that were repeated once. **Results:** A two-way repeated measures ANOVA showed that there is a significant difference in performance between consonants and vowels (F(1,7) = 71.82, p<0.0001) as well as between the number of channels (F(2,7) = 281.70, p<0.0001). In the present study, the amount of frequency shift presented to the left ear was always less than or equal to the amount of shift in the right ear. One-way ANOVAs were performed to determine the significance of these differences in frequency shift. When the amount of shift was kept constant in the left ear but was changed in the right ear, only one comparison resulted in a significant difference in performance. However, when the amount of shift was changed in the left ear, there were 23 comparisons that resulted in a significant difference in performance (one-way ANOVA, all p<0.05). **Conclusions:** The results are consistent with the hypothesis that when frequency mismatch is great, dichotic speech recognition becomes poor. When the amount of shift was kept constant in the left ear (the ear with less shift), performance was not affected. However, if the shift in the right ear (the ear with greater shift) is kept constant, phoneme recognition performance declined significantly as the shift in the left ear increased. Therefore, the brain may attend to the better ear for speech recognition when there is frequency mismatch between the ears.

Kyle B. Brown

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**Short-time Temporal Fine Structure Improves Speech Perception**

**Introduction:** The role of temporal fine structure in speech perception is still under debate today. Sentence recognition using temporal fine structure extracted with Hilbert Transform has been shown very poor and varies with the bandwidth of the signal. **Purpose:** To evaluate the effects of short-time temporal fine structure processing and its effects on speech processing. **Methods:** The bandwidths used were 1, 2 and 4 equivalent rectangular bands (ERB) and the frequency ranged from 64 to 8932 Hz. Short-time temporal fine structure of English sentences were extracted in short time segments of 50, 100, 150, 200, 250, and 300 milliseconds with the amplitude of each segment determined by the mean amplitude of the envelope. The bandwidths used were 1, 2 and 4 equivalent rectangular bands (ERB) and the frequency ranged from 64 to 8932 Hz. The performance with segments greater than or equal to 100 milliseconds for the 1 and 2 ERB conditions was above 85% correct, however performance quickly declined as segments were greater than or equal to 150 milliseconds. Also performance with 4 ERBs maintained as high as 90% correct across all segment conditions. Short-time temporal fine structure includes the fine structure of speech and may benefit for understanding tone languages, tone recognition, speech in noise, and music perception. **Expected Results:** These results may have important implication for speech processing strategies in cochlear implants.
Within Session Effects in Response to Increased Step Rate in Runners at High Risk for Tibial Stress Fractures

Introduction: Excessive instantaneous and average vertical loading rates (IVLR, AVLR) during running may place runners at high risk for tibial stress fractures. It has been shown the increasing step rate by 15-30% reduces AVLR and IVLR in runners with normal loading rates, which also has a high metabolic cost. It is unknown if increasing step rate in high risk runners (HHRs) would decrease AVLR and IVLR. It is also unknown if increasing step rate by 7.5% will decrease AVLR and IVLR. Purpose: The purpose of this study is to determine the within session effects of a 7.5% increase in preferred step rate on IVLR and AVLR in HHRs. Secondly, to determine the kinematic strategy used to reach the step rate target. Methods: Seventy-two (72) runners were screen and 24 qualified as HRRs. HRRs were defined as IVLR’s greater than or equal to 85 bw/s. Subjects were randomly allocated to an experimental group (EXP) or a control group (CON). 3D kinematics and kinetics were collected during instrumented treadmill running at a self-selected speed. EXP were asked to increase step rate by 7.5% in response to real time feedback (Garmin FR70). CON were not given any cues. Data was analyzed using a 2x2 mixed model ANOVA and effect sizes were calculated. Results: Increasing step rate revealed no statistically significant changes in IVLR, AVLR, or joint kinematics. Conclusions: Although EXP successfully increased SR as prescribed, one session did not yield reduction in excessive impact forces. This suggests either an increase in 7.5% is not sufficient to reduce impact forces or a longer training period is required.

The Effects of 24 Hour Energy Status on Postprandial Glycemic Responses Following Exercise

Introduction: An abundance of scientific literature illustrates how exercise, as minimal as a single bout, improves blood glucose control. The physiological means by which exercise induces its benefit on blood glucose control, similar to dietary management, is in part due to the caloric deficit that is created. In addition, exercise imparts other benefits that result in greater reductions of blood glucose. Currently, there is limited information on how overeating, a common event in our lifetime, may affect the impact of exercise on blood glucose control. Purpose: To investigate how overeating or caloric restriction influences blood glucose and insulin after a single bout of treadmill exercise. Methods: Ten (10) healthy men (18-35 years) will complete three separate trials consisting of a single bout of treadmill exercise and controlled feeding over a twenty-four hour period. Exercise and diet will be controlled to induce a mild caloric restriction, energy balance, and an overfed state over three trials. The treadmill exercise bout will be executed at 60% VO$_{2}$max to expend 10 kcals/kg/FFM. Following the day of controlled feeding, the participant will return to the laboratory the next day for a baseline blood draw and a meal challenge (20 kcals/kg/FFM) followed by subsequent blood draws at 15, 30, 45, 60, 90, 120, 150 and 180 minutes post meal consumption. Data collection is ongoing and no statistical analyses have been made. All values are reported as mean ± standard deviation. Subject characteristics are as follows: 28 ± 5 yrs, 72.6 ± 7.7 kg, 1.8 ± 0.1 m, 14.1 ± 2.3 % body fat and a maximal aerobic fitness (VO$_{2}$max) of 60.3 ± 5.5 mL/kg/min. Results: Initial data has suggested that the increase in blood glucose was somewhat lower, while the glucose rebound post-meal was below baseline and much greater in the 65 kcals/kg/FFM trial. This may suggest a reduced glycemic control.
Introduction: Cognitive effort is a facet of linguistic processing not typically tapped in research or clinical assessment of people with aphasia (PWA), but that has great potential clinical relevance. Pupillometry has been shown to be effective for quantifying cognitive effort; pupillometric methods thus hold promise of applications for PWA. TERPs have been shown to reliably index pupillary movements in relation to cognitive events. In general, greater cognitive effort results in increased pupil dilation; therefore, more difficult tasks elicit larger pupil dilations when compared to less difficult tasks. This change in pupil dilation in relation to cognitive effort has been supported by several studies using linguistic and non-linguistic tasks, including memory load, mental arithmetic, speech shadowing/sentence repetition, sentence comprehension, and cross-linguistic interpretation. Recently, the effectiveness of pupillometry has been demonstrated with PWA. The use of pupillometry to index cognitive effort has the potential to improve the quality of assessment for PWA, yielding information about aspects of comprehension beyond accuracy, response time, and judgments of response quality. Many PWA present with concurrent deficits of motor movements or attention along with language deficits; TERPs measure processing on-line, eliminating the need for additional instructions or intervening response tasks that may confound results from language testing. In order for pupillometry to become an effective method for indexing cognitive effort during linguistic processing tasks, reliable methods must be developed and validated. Of primary concern is the analysis of the myriad data points collected during a specific task. Pupillometric systems have the capability of collecting hundreds of data points per second; treatment and analysis of these data are important factors in the development of sensitive and specific tasks leading to effective and efficient assessment of PWA. Purpose: The purpose of this study was to compare and contrast analytic methods to examine the impact on pupillometric results for adults without neurological disorders. Methods: Forty (40) adults, ages 21-39, with no history of learning disability or neurological disorder from the Athens, OH community participated. All passed screenings for cognitive status, health status, vision, and hearing. Stimuli included easy and difficult single nouns; difficulty was established using a combination of psycholinguistic measures that have estimated word difficulty (frequency, familiarity, age of acquisition, and naming latency). Stimuli also included easy and difficult sentences; active and passive sentences were selected due to robust evidence in the literature of the increased difficulty of processing non-canonical sentences (such as passives). Auditory-visual and auditory-only and single noun and sentence conditions were counterbalanced between participants; easy and difficult stimuli were interspersed and presented in a random order. Items within these conditions were counterbalanced; no participant heard the same stimulus item in both the auditory-visual and the auditory-only condition. Stimuli entailed careful control of factors that may affect responses. In the auditory-visual task, visual and auditory stimuli were presented simultaneously. Instructions were, “You will see pictures and hear words/sentences. Listen to the words/sentences and look at the pictures in any way that comes naturally to you.” In 20% of trials, the auditory and visual stimulus items did not match. These foil trials added an unexpected element to the experimental condition to heighten attentiveness. In the auditory-only task, auditory stimuli were presented via headphones. Participants were instructed to “Pay attention to the meaning of each word/sentence while you look at the image on the screen. It is important to pay attention to the meaning of each word individually. You will not be asked to recall the words/sentences later.” Foil trials in this condition consisted of items followed by a comprehension question. Two analytic techniques were used in order to compare significant results: means-based, in which pupillary measurements were averaged over a time period of interest, and time-slice, in which normalized pupillary measurements were analyzed in 250 ms time windows to examine change over time. A 1.5s time window of interest was analyzed, beginning 200 ms following the onset of processing (i.e., after the onset of the single noun, and after the onset of the verb in sentences). A three-way repeated-measures ANOVA was used to examine the impact of difficulty, modality of presentation, and grammaticality on the mean pupil response. All main effects were significant: difficult stimuli elicited larger pupillary responses than easy stimuli, auditory-only tasks elicited larger pupillary responses than auditory-visual tasks, and sentences elicited larger pupillary responses than nouns. For single nouns (analysis is ongoing for sentences), paired-samples t-tests were used to compare differences in mean pupillary
responses in the 250 ms time windows. **Results:** Significant differences emerged between easy and difficult single nouns, especially in later time windows. This contrasted with the means-based analysis; there was no significant interaction between difficulty and grammaticality (i.e., no significant differences between easy and difficult single nouns or sentences). **Conclusions:** Results obtained here suggest that the time period in which pupillary responses are analyzed may influence the presence/absence of significant effects/interactions. Appropriate time periods may be dependent on the linguistic stimuli (i.e., may be appropriate to use a shorter time period for nouns) and the task. Time-slice analysis may be an effective way on analyzing online changes in momentary effort during linguistic processing, which may elucidate timing of comprehension of linguistic stimuli. In published work, thoughtful rationale for selection of time windows for analysis and reporting of time-window details are important.

**Esther A. Chou**

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Applied Health Sciences and Wellness  
Athletic Training

**Ballet turnout: a comprehensive overview of biomechanical changes that may increase risk of injury**

**Introduction:** Performing arts all possess fundamental artistic components. One of these in ballet is turnout, a technique that has been associated with both the success and downfall of a dancer’s career. Turnout of about 180° has long been implied as ideal. Many well-known dancers have outstanding turnout, which may inspire young novice dancers to mimic this unnatural skill that is relatively uncommon in the general population. **Purpose:** The purpose of this project was to review current literature to understand trends in turnout measurement, biomechanics, anatomical limitations, and training. Even small biomechanical changes may lead to complications further up the kinetic chain. Although turnout is instructed to originate from the hips, forcing extreme turnout beyond anatomical limitations is usually compensated by increased tibial rotation or hyperpronation at the foot and ankle. **Conclusions:** Injury surveillance studies have attributed several different musculoskeletal injuries to biomechanical changes incurred by improper turnout technique. These injuries required removal from participation, and some were career-ending. Researchers may be able to use this information to educate dancers and teachers on the anatomical limitations that should be considered during training. Due to the emphasis placed on turnout angle, a dancer’s altered lower limb biomechanics may influence gait and posture. Understanding and teaching evidence-based characteristics of turnout may reduce the risk of injury that can accompany incorrect execution of this movement. Thus, if preventive measures are implemented during ballet training, dancers may be able to prolong their careers.

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Exercise Physiology

**XBOX 360 Kinect: Energy Cost and Enjoyment of Active Video Games in Children and Teens**

**Introduction:** The childhood obesity epidemic, particularly in rural Appalachia, has been well documented. A small imbalance between daily energy intake and energy expenditure (~100 kcal/day) has been associated with unfavorable weight gain in this population, which can be negated by physical activity (PA). Measuring the energy cost of active video games (AVG) will demonstrate their effectiveness in contributing to the recommended 60 minutes/day of moderate-to-vigorous physical activity (MVPA) that can help prevent obesity. **Purpose:** To compare the physical activity energy expenditure (PAEE) and enjoyment (assessed by 3-point Facial Affective Scale) of AVG to traditional sedentary games (SED) and determine their contribution to the daily recommended dose of MVPA. **Methods:** Youth (8 - 17 y) volunteered to play a random selection of six (2 SED, 4 AVG) video games for 6 - 10 minutes each. Prior to participation in the study, height, weight, body composition (5-site skinfold, waist and hip circumference) and resting metabolic rate (RMR) were measured following standard protocols. A portable metabolic analyzer was worn during the games to measure total energy expenditure (TEE). PAEE was calculated as TEE - measured RMR. An accelerometer was worn on the right hip to measure PA intensity (counts/min). To simulate a normal play environment, pairs of youth were tested in a mock living room setting. A three-way mixed model ANOVA was used to compare differences in PAEE (METs and kcals/min) with sex, weight status, and age group as main effects. **Results:** All AVG met the minimum classification for MVPA (5.1 ± 0.3 METs), while all SED games were classified as light intensity
Lucas D. Dargo

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Athletic Training

Identifying the Correlation Between Quality and Patient Safety Indicators and Patient Satisfaction in Athletic Training

Introduction: Despite spending more on health care than any other industrialized country, the U.S. ranks 37th in health outcomes. More than 2.8 million Americans are hospitalized and over 29 million people are treated in emergency departments as a result of violence and injuries each year. Each year Americans spend more than $406 billion in medical care and lost productivity. These demands have jump started rectifying the situation with a paradigm shift from disease to a patient-centric approach: the Patient Centered Outcomes Research Institute (PCORI) and Patient-Reported Outcomes Measurement Information System (PROMIS) were both recent developments to help improve health care outcomes, such as quality of life or satisfaction. Also, the Centers for Medicare and Medicaid Services (CMS) had a recent initiative to improve innovative health outcomes. These efforts have contributed to further development and use of quality and patient safety indicators (QPS). Originally designed for standardizing performance outcomes in different healthcare settings, today they are used as key indicators for performance and reimbursement. There are four types of QPS indicators are four general types: volume, structure, outcomes, and process. Although successfully applied in primary care and nursing settings, little attention has been shown in the field of athletic training. Athletic training programs, the facility, personal, and services provides, experience the same challenges of primary care and nursing facilities due to the increasing number of patients severed, services provided, and have difficulty documenting patient outcomes. For decades, colleges and universities have been increasing the size and scope of their athletic programs, adding not only new teams and sports but also more athletes. To address the needs for increased expectations and demands, the National ATs Association (NATA) formed the Task Force to Establish Appropriate Medical Coverage of Inter-collegiate Athletics (AMCIA). This is one example of how ATs have developed a few possible QPS indicators, however further identification and validation of these indicators needs to be performed. The identification of QPS indicators can aid athletic training programs in detecting their capacity to change and add additional medical services to produce better care and ultimately improved patient outcomes.

Conclusion: In this group of children and teens, AVG elicited sufficient energy cost to contribute to the recommended dose of MVPA for youth.

(1.7 ± 0.0 METs). PAEE (kcal/min) was significantly higher during AVG and for teens (13 - 17 y), males, and those classified as overweight. There was no significant difference in enjoyment between games or game type.

Identifying the Correlation Between Quality and Patient Safety Indicators and Patient Satisfaction in Athletic Training

Introduction: Despite spending more on health care than any other industrialized country, the U.S. ranks 37th in health outcomes. More than 2.8 million Americans are hospitalized and over 29 million people are treated in emergency departments as a result of violence and injuries each year. Each year Americans spend more than $406 billion in medical care and lost productivity. These demands have jump started rectifying the situation with a paradigm shift from disease to a patient-centric approach: the Patient Centered Outcomes Research Institute (PCORI) and Patient-Reported Outcomes Measurement Information System (PROMIS) were both recent developments to help improve health care outcomes, such as quality of life or satisfaction. Also, the Centers for Medicare and Medicaid Services (CMS) had a recent initiative to improve innovative health outcomes. These efforts have contributed to further development and use of quality and patient safety indicators (QPS). Originally designed for standardizing performance outcomes in different healthcare settings, today they are used as key indicators for performance and reimbursement. There are four types of QPS indicators are four general types: volume, structure, outcomes, and process. Although successfully applied in primary care and nursing settings, little attention has been shown in the field of athletic training. Athletic training programs, the facility, personal, and services provides, experience the same challenges of primary care and nursing facilities due to the increasing number of patients severed, services provided, and have difficulty documenting patient outcomes. For decades, colleges and universities have been increasing the size and scope of their athletic programs, adding not only new teams and sports but also more athletes. To address the needs for increased expectations and demands, the National ATs Association (NATA) formed the Task Force to Establish Appropriate Medical Coverage of Inter-collegiate Athletics (AMCIA). This is one example of how ATs have developed a few possible QPS indicators, however further identification and validation of these indicators needs to be performed. The identification of QPS indicators can aid athletic training programs in detecting their capacity to change and add additional medical services to produce better care and ultimately improved patient outcomes.

Purpose: To identify the correlation between QPS indicators and patient satisfaction in athletic training.

Methods: Design: This was a hierarchical observational study used to identify quality, patient, and safety indicators in athletic training. The Institutional Review Board approved this study. Participants: In order to capture a wide variety of settings within athletic training, we recruited certified athletic trainers (ATs) and their patients. We attempted to recruit 40 athletic training programs. However, 5 family medicine clinics, 9 colleges/universities, and 2 performing arts medicine clinics based out of universities were ultimately used in this study. A minimum of one certified athletic trainer to a maximum of three certified ATs were asked to complete a quality and patient safety (QPS) indicator survey. There were a total of 17) certified ATs who completed a QPS indicators survey from 11 different sites. These certified ATs were asked to recruit 25 patients per site to complete a patient satisfaction survey. A total of 79 patients completed a patient satisfaction survey from 13 different sites. Instruments: Two surveys were used in order to determine the correlation between quality and patient safety indicators in athletic training and patient outcome satisfaction. The Quality and patient safety indicators survey was made up of 45 questions. These questions were derived from creating a list of previously identified QPS indicators compiled from healthcare settings such as: family practice, hospital, nursing, and assisted living. In addition, possible QPS indicators were identified from the Board of Certification, Inc. (2013) BOC Facility Principles. The survey was separated into four different themes: structure, volume, outcome, and process. The key performance metric was patient outcome satisfaction. The patient outcome satisfaction survey was made up seven questions. Two questions concerned gender and age. The other five questions concerned overall satisfaction, satisfaction of giving input into their treatment, satisfaction of the athletic training programs’ facilities, satisfaction with ATs they came in contact with, and if they were satisfied with the attention they were given. Patients answered these five questions by using a Likert scale. By choosing 1 they were not at all satisfied, 2 for a little satisfied, 3 for quite
satisfied, and 4 for very satisfied. Procedures: Step I, Certified ATs were sent an initial recruitment email from family medicine clinics, colleges/universities, industrial, and emerging practice or other athletic training settings. Step II, After an athletic training program agreed to participate in the study, staff members were sent information about how to fill out the Quality and Patient Safety Indicator Survey and Patient Satisfaction Survey. Both surveys were located on Qualtrics, an online survey tool. A minimum of 1 to a maximum of 3 certified ATs, depending on the size of the athletic training program, were asked to complete a quality and patient safety indicators survey. Each athletic training program was provided with a unique identifying survey link, one for the Quality and Patient Safety Indicator Survey and one for the Patient Outcome Satisfaction Survey. Step III, Once the participating ATs filled out the quality and patient safety indicators survey, they were sent 25 consent forms that contained their unique hyperlink to their site’s survey to distribute to patients who they have treated in the last 90 days. A recruitment flyer was also sent to each program to display where they found appropriate. The patient outcome satisfaction survey was given to patients in the form of a post card if they did not want to fill out the survey online. The post card survey could be returned by the US postal service. Each post card survey was marked with a unique code to identify the athletic training program. Results: Athletic Training Programs: A total of 16 athletic training programs from Ohio, Indiana, Illinois, Pennsylvania, and North Carolina were used in this study. These sites were labeled into three types; 1 colleges/universities (n = 8), 2 family medicine (n = 5), and 3 others (n = 3). Certified ATs: A total of 16 currently certified ATs participated in this study (mean ± SD: age = 27.60 ± 7.5 yrs; yrs of practice 5.67 ± 6.9; 7 males, 10 females; highest level of education = 8 bachelor’s degree, 6 master’s degree, 3 terminal degree) participated in this study. A total of 9 currently certified ATs participated in the study from site 1 (mean ± SD: age = 27.60 ± 8.38 yrs; yrs of practice 6.11 ± 7.99; 3 males, 6 females; highest level of education = 4 bachelor’s degree, 4 master’s degree, 1 terminal degree) participated in this study. A total of 3 currently certified ATs participated in the study from site 2 (mean ± SD: age = 34.67 ± 9.29 yrs; yrs of practice 11.67 ± 8.74; 3 males; highest level of education = 1 bachelor’s degree, 0 master’s degree, 2 terminal degree) participated in this study. A total of 5 currently certified ATs participated in the study from site 3 (mean ± SD: age = 25.2 ± 4.49 yrs; yrs of practice 3.5 ± 3.79; 1 male, 4 female; highest level of education = 3 bachelor’s degree, 2 master’s degree, 0 terminal degree) participated in this study. Responses of the 17 ATs for 10 questions were examined. The majority of participants reported having a friendly environment with flexibly and clear leadership in their practice. In addition, the majority of ATs did not feel rushed while treating patients. ATs reported not being able to adjust usual routines in response to what is happening around them. Patients: A total of 79 patients responded to our patient satisfaction survey. A total of 51 patients returned surveys from site type 1 (mean ± SD: age = 20 ± 1.34 yrs; 13 males, 38 females). Mean scores for questions 3 through 7 were all 3. A total of 3 patients returned surveys from site type 2 (mean ± SD: age = 43 ± 16.64 yrs; males). Mean scores for questions 3 through 7 were all 4. A total of 3 patients returned surveys from site type 3 (mean ± SD: age = 23 ± 3.36 yrs; 10 males, 15 females). Mean scores for questions 3 through 7 were all 4. Conclusions: Athletic trainers need to consider patient satisfaction and allow patients to be a part of the decision making process throughout their treatment of care. Athletic trainers should start to implement protocols that align with PCORI guidelines. Athletic trainers with less than 3 years of clinical experience were shown to have the lowest level of patient satisfaction. Further development and identification of QPS indicators is needed to determine areas of need for further improvement in the field of athletic training.

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Athletic Training

Substance Use and Abuse in the Performing Artist Population

Introduction: The beginning of the scientific investigation of performing artists was distinguished within the first issues of the academic journals: Medical Problems of Performing Artists in 1987 and the Journal of Dance Medicine and Science in 1997. Although in its third decade, research of performing artists still lags behind sports medicine research. It was in the 1920s that anti-doping policies and awareness of substance use in athletics was recognized. This line of investigation was inspired by competitive victories that were fueled by external substances, as well as the deaths of athletes such as that of cyclist Knud Enemark Jensen. The World Anti-Doping Agency (WADA) produced the World Anti-Doping Code document to set standards protecting the integrity of sports and the health of athletes. For performing artists, there are no such codes, regulations or monitoring organizations.
Substance use habits and the deaths of performing artists have continued to be a familiar topic among popular magazines, and yet, remains a novel topic in performing artist research. While this information would be useful in the healthcare of performing artists, research into their overall substance use habits is limited. **Purpose:** Review of literature relative to the quantification and qualification of performing artists’ substance use and misuse habits. **Methods:** Systematic review. Terms: Dance, musician, actor, stage-actor, substance use, substance abuse, smoking, alcohol, binge-drinking, injury and performance anxiety. Inclusion Criteria: Descriptive studies from 1980 or later using either interviews or a survey method to assess substance use habits in performing artists. Exclusion Criteria: Articles not written in English or which were not a primary source were initial criteria. More specifically participants whom classify as exotic dancers or pornographic actors were excluded. Post-mortem bibliographic analyses were also excluded. **Results:** Thirteen (13) articles were accepted (10 quantitative, 3 qualitative). Cultural and Epoch: Spanning three decades and five countries, the frequencies reflect the culture of that moment and place. For example, 38% of Croatian dancers reflect that they become drunk rarely while 20.5% of American musicians note they binge drink weekly. These studies are one year apart; yet reflect a great difference in drinking habits. Definitions: The difference in definitions makes accurate comparison impossible. For example, seven studies measured alcohol consumption. However, the definitions range from binge drinking, drunkenness, 1-2 drinks per day, rarely, or an absent definition. Even the three studies published using the same questionnaire and from the same country managed to produce different definitions between themselves. **Conclusion:** Future studies should aim to accurately capture a range of responses and prevent limiting the participants to certain ill-defined categories.

**An T. Dinh**

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**Cross-cultural and Cross-Generational Study on Perceptions of Dementia: Vietnamese Americans and Vietnamese in Vietnam**

**Introduction:** There are neither epidemiological studies on dementia nor formal data on public awareness and views of the disease in Vietnam. Although the Vietnamese who live in North America and Vietnam are ethnically similar, they have different cultural, education, and political experiences. These affect their perceptions of and experiences with health and disease. This study compared the two groups regarding their perceptions of and experiences with dementia. **Purpose:** The purpose of the study was twofold: (a) to understand the views of dementia in Vietnamese in Vietnam and Vietnamese Americans, and (b) to learn about their experiences with dementia. **Methods:** Design: A descriptive phenomenological approach was used to describe the common meaning of all participants’ experiences of dementia including their knowledge, perceptions, and experiences of the disease. Data collection and analysis: Semi-structured interviews were conducted face-to-face or by phone in the participants’ preferred language, Vietnamese or English, usually in the participant’s home. Responses were recorded, transcribed, and color-coded according to pre-set themes. Intercoder reliability was 96%. **Results:** Two main findings were obtained from this study: (a) the younger VA group was most different from the other three groups in terms of their scientific views of dementia and less traditional view of caretaking; (b) spirituality was not reported as a main factor leading to dementia by all participants. This finding was different from the current literature on Vietnamese Americans. **Conclusions:** This study showed that the need for more public education about dementia in Vietnam is urgent since the majority of the Vietnamese in Vietnam participants viewed dementia as part of normal aging process or lacked a clear understanding of whether dementia was a normal or a diseased process. Public health education messages in Vietnam certainly must take into account the current view of dementia among the public, and this study served as the starting point. Moreover, the fact that not all older Vietnamese American participants thought of dementia as a disease might suggest that public health education toward Vietnamese Americans has not been as effective as expected. It would be beneficial for U.S.
health care professionals and related authorities to examine the effectiveness of dementia publications provided for minorities and their accessibility in the United States, specifically Vietnamese Americans. Further research might also benefit from a larger sample size with participants from various places in Vietnam. This study also showed the lack of interest in learning about dementia in those who have no direct experience with the disease; therefore, a comparative study on views of dementia in Vietnamese in Vietnam and Vietnamese American caregivers might provide a better look at the views of dementia in Vietnamese in Vietnam.

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Impact of Growth Hormone on the Expression of Angiogenic Growth Factors in Subcutaneous and Visceral Adipose Tissue

Introduction: Adipose Tissue (AT) is a very complex tissue comprised of various cell types, an extracellular matrix, and an intricate vasculature. AT is recognized as an active endocrine organ with discrete depots that are functionally, compositionally, and metabolically distinct. AT’s unique characteristic is its plasticity, which refers to its ability to undergo expansion and regression throughout life. Several studies suggest that the negative effects of obesity might be related with inappropriate vascularization and angiogenesis during adipose tissue (AT) expansion. AT angiogenesis may also alter several AT characteristics present in obesity, such as AT immune cell infiltration and fibrosis. Growth hormone (GH) has an impact on AT plasticity, disruption of GH action increases AT mass while increased GH action decreases AT mass in a AT depot-specific manner. GH has been implicated in angiogenesis in several tissues; however, to date, no one has investigated the effect of GH on angiogenesis in AT. Purpose: We compared the expression levels of angiogenic factors in inguinal (subcutaneous) and epididymal (visceral) AT depots of male mice that overexpress bovine GH (bGH) to wild type (WT) littermate controls. We also performed Ingenuity Pathway Analysis (IPA) to examine the predominant cellular pathways that are altered in these animals. Methods: Animals: Male GH and WT littermate control mice were used for all analyses. For RNA-seq experiments, inguinal and epididymal tissues of 6-month-old (n = 6) mice were collected. For milliplex measurements, serum samples from 10 months old mice were used for further evaluation. RNA-Seq Analysis: mRNA was extracted and sequenced at the Ohio University Genomics Facility using the Ion Personal Genome Machine. Sequencing reads were mapped and analyzed using Tuxedo Suite. Subsequent pathway analysis comparing different AT depots between genotypes was performed using Ingenuity IPA (Qiagen), significance of the canonical pathways was calculated with the fisher exact test. Angiogenic heat maps generation: RNA-seq data was analyzed with the R program and the package CummeRbund. 42 angiogenic genes were examined including: Alk, Ang, Angpt2, Areg, Btc, Ccl2, Ccl3, Col8a, Csf3, Csf3r, Cxcl1, Cxcl2, Cxcl1, Edn1, Egf, Eng, Fasl, Fgfl1, Fgfl2, Fgfr, Fst, Gh, Ghr, Hgf, Igf1, Igflr, Ilf7a, Il1b, Il6, Lep, Pcam1, Plg, Prf, Tgflb1, Timp1, Timp2, Timp3, Timp4, Tnf, Vegfla, Vegfbl, and Vegfc. Milliplex Map Mouse Angiogenesis/Growth factor magnetic bead panel: This panel assessed 24 angiogenic factors from serum of bGH (n = 9) and WT (n = 11) male mice. Significant differences were analyzed with T-test. Results: Comparing bGH and WT mice, the inguinal AT depot has more significantly altered genes expressed than the epididymal AT depot. Compared to the inguinal AT depot, the epididymal depot expressed significantly higher levels of several angiogenic factors. Regarding genotype differences, while there were no noteworthy differences in gene expression within the epididymal depot between genotypes, in the inguinal depot, four genes were significantly higher in the WT inguinal depot than in the bGH inguinal depot. Leptin mRNA levels in AT and in circulation were higher in WT than in bGH mice. This angiogenic molecule was the only one that showed same pattern in AT gene expression and in circulation; this could be because AT is the main organ that secretes this adipokine. Overall, only the expression levels of 4 angiogenic genes out 43 genes tested were significantly altered in bGH relative to control mice. Furthermore, IPA analysis revealed that the angiogenic pathway was not significantly altered in either of the AT depots evaluated. Canonical pathways related to the immune system and fibrosis were among the significantly changed pathways in both depots in bGH mice. Conclusions: GH may have a greater impact on the inguinal depot as has been previously proposed. These results obtained by this work support the notion that visceral AT is more vascularized than subcutaneous. These data suggest that GH could have a slightly negative impact on AT vascularization in the subcutaneous depot. This study suggests that the characteristics seen in mice with increased GH action (decreased AT mass, and decreased insulin
sensitivity), do not involve changes in AT angiogenesis. Canonical pathways related to the immune system and fibrosis were among the significantly changed pathways and should be more fully explored in AT depots of bGH mice.

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The Role of Attention Focus Switching and Working Memory on Children's Auditory Comprehension

Purpose: This study examined the contributions of a working memory storage capacity (WMs) and attention switching ability in predicting children's auditory complex sentence comprehension. Methods: Forty-four (44) children completed a listening span task indexing WMs, an auditory attention focus switching task, and an agent selection task indexing auditory comprehension of object relative (OR) sentences. Results: Results of hierarchical regression indicated that WMs and attention switching accuracy (but not attention switching speed) each accounted for significant/unique variance in the children's OR comprehension. Conclusions: The findings agree with the emerging developmental language literature by showing that WMs plays a role in children's OR sentence comprehension. The findings also provide substantively new and important insights by suggesting that attention focus switching may be even more critically important to OR comprehension than WMs.

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Exercise Physiology

Beep Test Predictability of VO2 Max and Lactate in Division I Collegiate Field Hockey Players

Introduction: Fitness professionals have been employing a multistage 20 m shuttle-run test (Beep test) in order to quickly and efficiently assess cardiovascular fitness among athletes and the general population alike. The Beep test has been elicted over as an established field assessment for estimation of VO2max in the laboratory for the due to ease of use, low cost, and convenience. Both tests are similar in nature in that they both slowly increase in intensity each minute to ensure aerobic fitness is being testing over anaerobic fitness. Previous research has validated the test in on males, the general population, and female collegiate soccer players on male athletes, but has yet to be validated in female collegiate field hockey players. The data regarding the Beep test on female athletes is limited. Purpose: To determine if the Beep test is a valid technique for predicting maximal oxygen uptake (VO2max) as compared to laboratory assessment of VO2max (labVO2max) in collegiate field hockey players as well as to determine if there was any significant difference in post-test blood lactate levels between the two tests. Methods: The participants were 55 female Division I collegiate field hockey players (mean ± SD) (age 19.6 ± 1.2 yrs; weight 64.7 ± 6.1 kg; body fat 24.5 ± 5.5%). Each participant completed both the labVO2max and Beep test to volitional fatigue. The protocols used in both tests gradually increased in intensity each minute, Beep test by speed and labVO2max by both speed and grade, to ensure the reliance on aerobic metabolism. Laboratory assessed VO2max was done via gas analysis during treadmill running of progressive intensity. VO2max from the Beep test was estimated using a validated technique based on how many stages and shuttles of the Beep test they completed, which is based on overall top speed the athlete achieved. Results: Average for the labVO2max was 46.5±4.2 ml•min⁻¹•kg⁻¹, and 46.4±4.5 ml•min⁻¹•kg⁻¹ for the Beep test, which were not significantly different according to a paired t-test. Average blood lactate for labVO2max was 10.3 ± 2.2 mmol/L and 10.8 ± 2.5 mmol/L for the Beep test, with paired t-test showing a significant difference (p = 0.07). A strong positive correlation between labVO2max and Beep predicted VO2 max (r = 0.61, p = 0.05) was established. However, only a moderate correlation between blood lactates for the labVO2max and Beep (r = 0.41, p = 0.05). Conclusion: The Beep test is a valid predictor of VO2max in collegiate field hockey players when compared to a labVO2max, but may not be ideal for predicting blood lactate levels.

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Food Security, Produce Intake/Behaviors, and Cervical Health of Adult Women Living in Rural Appalachian Ohio: A Pilot Study
Introduction: Low household food security (HFS) and high cervical cancer rates have been reported in Appalachian Ohio. High antioxidant intake may reduce the risk of human papillomavirus (HPV) infection and progression to cervical cancer. **Purpose:** This study examined differences in: (a) HPV status; (b) risky sexual behaviors (c) produce intake; and (d) produce-related behaviors between food secure and food insecure women who are attending a clinic for gynecological care in rural Appalachian Ohio. **Methods:** The USDA household food security module, validated produce intake and behavior-related questions, and the Risky Sexual Behavior Index questionnaire were used. Differences were determined using the chi-square test, Mann-Whitney U test, and Univariate General Linear Model. **Results:** Participants (n = 153; HPV negative: n = 139, 91.4%; HPV positive: n = 13, 8.6%) were 29 ± 8 years and primarily White/Non-Hispanic (n = 144, 94.1%). For HFS, 113 (75.3%) had high food security, while 37 (24.7%) women experienced marginal, low, or very low HFS. Most (66%) of the study participants met the U.S. recommendations for daily fruit and vegetable intake. According to the risky sexual behavior level categorization, there were 49 (35.5%) women at a low-risk level, 28 (20.3%) at a medium level, and 61 (44.2%) who were at a high-risk level, with the food insecure group showing a higher risky sexual behavior score compared to their counterparts (p<0.001). The risky sexual behavior scores were significantly higher in the HPV-positive group than the HPV-negative group (p = 0.021). There was a significant difference between food secure and food insecure groups for perceived diet quality with median scores of 78.68 and 59.57 respectively, p = 0.014. However, there was no significance difference in HPV status by adult food security. **Conclusion:** Women who live in food insecure households have a higher possibility to have high risky sexual behaviors related to cervical cancer and low perceived diet quality.

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Athletic Training

**GPS and Accelerometer Evaluation of Child Play at Recess**

**Introduction:** Previous studies on activity level at various locations were restricted to observation and subjective identification of activity level. The use of GPS units and accelerometry offers the identification of location and level of physical activity through objective measures. The use of objective allows for more accurate data analysis. **Purpose:** The purpose of this study was to assess the uncertainty of measuring the intensity, duration and location of children’s physical activity using accelerometry and GPS. **Methods:** Thirteen (13) children wore accelerometers (GT3X+, ActiGraph, Pensacola, FL) and GPS (Tracking Key; LandAirSea, Woodstock, IL) units on 3 different days during recess (20 minutes) to determine physical activity level and location of activity. The data was analyzed by the software ArcMap (ArcGIS; ESRI, Redlands, CA) which offers visualization of the data as well as various analysis including descriptive statistics, error and tracking. Descriptive statistics are reported for data analysis. **Results:** Descriptive statistics show that children were most sedentary in the North Playground (26.61% of all time). Children were most active in the South Playground (29.34% of all time). Uncertainty zone accounted for 26.1% of all data. Only 5,246 data points were successfully paired between accelerometers and GPS units (11.2%). 72.27% of the data within the uncertainty zone was within MVPA. **Conclusion:** GPS and accelerometry is a viable tool for measuring children’s PA intensity, duration, and location, however appropriate GPS settings need to be identified for improved data collection.

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Exercise Physiology

**A Comparison of Anaerobic Threshold Methods in Fit and Trained Male Runners**

**Introduction:** Anaerobic threshold (AT) occurs when the body relies more heavily on anaerobic energy pathways rather than aerobic energy pathways, in order to meet the energy demand. Ventilatory threshold (VT) has been utilized by exercise scientists and endurance coaches as an indicator of AT and is a strong predictor of running performance. VT is also used for the prescription of exercise and in order to compare changes over time due to training. There are several methods for determining VT. **Purpose:** To compare computer generated VT measurement (COMP) with four established VT detection methods; V Slope (VS), VE/VCO² (V2), pattern recognition (PR) and cross over (CO) methods. **Methods:** Seven (7) college-aged fit and trained male runners (20.6 ± 2.1 years of age) volunteered and took part in health and fitness testing including a health history questionnaire...
(HHQ), running history questionnaire (RHQ), measurements of height, weight, body fat (skin folds), and maximal oxygen consumption (VO\textsubscript{2max}) via motorized treadmill and metabolic cart. Oxygen consumption (VO\textsubscript{2}), minute ventilation (VE), respiratory exchange ration (RER), and carbon dioxide production (VCO\textsubscript{2}) were measured. VT was then generated by the computer system (COMP) and by the VSLOPE, VE/VCO\textsubscript{2}, PR, and CO methods. A RM ANOVA (p<0.05) was used to determine the differences between methods. A LSD Post Hoc test was used to determine differences between specific methods.

**Results:** Participants were 64.8 ± 9.3 kg, 170.8 ± 8.1 cm, with a body mass index (BMI) value of 22.2 ± 1.9 and average body fat of 6.5 ± 2.2%. Average running experience was 7.8 ± 3.1 yrs with absolute VO\textsubscript{2max} values of 3.5 ± 0.7ml/kg/min. Results displayed average oxygen consumption at VT as 2.2 ± 0.5 l/min (COMP), 2.4 ± 0.5 l/min (VS), 2.5 ± 0.4 l/min (V2), 2.5 ± 0.6 l/min (PR) and 2.8 ± .7 (CO), respectively. THE RM ANOVA revealed significant differences among VT detection methods (p<0.05) for VO2 at VT (sig. = 0.002), % at VT (sig. = 0.002) and HR at VT (sig = 0.001). The COMP method was significantly different than the CO and V2 method for all variables and with the PR method for all variables except the HR at VT.

**Conclusions:** It was found that the COMP method differed with the CO, PR and V2 methods on several exercise prescription variables. In general, the COMP method displayed more conservative measurements of VT whereas the CO method exhibited more liberal measurements. Thus, researchers should be advised to conduct further testing when prescribing exercise at VT intensities in order to determine an athlete's ability to exercise at such intensities.

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**Job Performance Evaluation of Currently Employed Athletic Trainers to determine Athletic Training Program Effectiveness**

**Introduction:** Athletic training (AT) education accrediting body, Commission on Accreditation of Athletic Training Education (CAATE), mandates a comprehensive assessment plan for all professional AT program. In order to ensure the high quality of professional competency in athletic training, constant evaluation and improvements must be made. Educational competencies specified by the NATA Education Council, defined and implemented by CAATE, and tested by Board of Certification. Academically, governing bodies such as the CAATE and the BOC exam are used to set standards among all programs preparing athletic trainers for the professional world. There is a disconnect between the academic standards and actual real world practice. The BOC only serves as a knowledge benchmark. However, as seen through research, knowledge is not the only quality that is considered when assessing the competence of an athletic trainer. Currently, no tool exists to identify/quantify performance after graduation/certification. An entry-level alumni survey could identify a program's performance in adequately training/educating students for the needs and challenges of the professional world. An athletic training program should be measured not only by the knowledge the students have gained by the experiences that were gained that effects behavior and character. In order to evaluate overall program effectiveness assessed measure of their performance while practicing could be assessed. **Purpose:** The purpose of this study is to measure program effectiveness through a performance evaluation of direct medical supervisors of recently graduated professional athletic trainers in order to establish areas of strength and weakness within a program. **Methods:** Two surveys were created within Survey Monkey; AT Demographic Information and Direct Medical Supervisor Questionnaire. An email was sent to all professional AT program directors explaining the purpose of the study and asking them to forward the email to program graduates from the previous 3 years. The email contained hyperlinks to the surveys for the athletic trainer and a second hyperlink to be forwarded to their direct supervisor evaluation. The supervisor was then asked to evaluate the athletic trainer’s performance behavioral characteristics and skills performance. The direct supervisor survey should have taken approximately ten minutes to complete. Once the surveys were completed, they were match paired and coded to remove any identifying data to maintain anonymity. **Results:** The direct medical supervisors, gave an average score of 49.6 ± 13 out of 56 (88.6%) for skills and 79.7 ± 8.5 out of 88 (90.6%) for behavior and characteristics. **Conclusions:** The research shows that overall recent graduates are performing as expect or above expectations regarding clinical skills and behaviors/characteristics that have been deemed important by previous research. With further development, this tool could be implemented as an alumni performance assessment for programs—giving a post-graduate perspective as a part of an overall program assessment plan.
Introduction: Professionals working in high stress environments, such as those in the helping profession, are more susceptible to experiencing burnout. Because mental and physical healthcare professionals face the daily challenge of assisting people in overcoming their individual problems, they are at higher risk of burnout. Emotional exhaustion, depersonalization, feelings of incompetence, and encumbered productivity are all characteristics of burnout. Professionals experiencing burnout are not able to provide quality services to their patients/clients, therefore understanding and identifying the risks will enable plans for preventative action to ensure the well-being for both the professional and the consumer. 

Purpose: The purpose of this research is to evaluate the perceptions and experiences of burnout of rural mental and physical healthcare professionals. Rural professionals have fewer resources than those in urban areas, which increases the risk for burnout for those in the helping profession. Another motivating factor for this research is to identify personal characteristics (i.e., age, gender, education) of the healthcare providers that contribute to burnout.

Methods: Mental and physical healthcare providers currently employed at Hopewell Health Centers, Inc. were invited to participate in a survey questionnaire. The response included 104 professionals; 17 males and 87 females. The survey questionnaire consists of 43 questions measuring variables of burnout, job satisfaction, and social support, in addition to a brief demographic section. Results: The results reveal that mental healthcare professionals are at higher risk of burnout than physical healthcare professionals. Job satisfaction is a strong indicator of burnout experienced by the professional healthcare provider. Those who work with children are at higher risk for burnout than those professionals who work with adults. The results also show that social support does not appear to be a factor in burnout. Finally, females are at higher risk of burnout than male healthcare professionals. 

Conclusions: Recognizing the signs of burnout is essential to preventing it, creating awareness in the workplace and promoting self-care technique may act as a protective factor. Providing resources and increasing support for those professionals who are at higher risk of burnout will ensure both professional well-being and quality service to consumers. 

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Immediate Effect of Lumbar Spinal Manipulation on Segmental Motion Assessed with Ultrasound Imaging

Introduction: The immediate effect of lumbar manipulation has typically been measured either with gross measurements of total lumbar motion, invasive procedures, or expensive imaging techniques. These techniques have obvious drawbacks that make their clinical usefulness limited. Ultrasound (US) imaging has been shown to be a reliable tool to identify segmental motion of the spine. Purpose: The purpose of this study was to determine the immediate effect of 2 common lumbar spine manipulation techniques on segmental spinal motion in healthy adults. We hypothesized that lumbar segmental spinal motion would increase immediately after receiving a single low lumbar manipulation, but this increase will have diminished by the 20 minute post measurement. Methods: The two manipulation groups received a single grade V low lumbar manipulation from an experienced manual therapist. The supine group was positioned in supine with lateral flexion of the trunk to the right and manipulated with a left trunk rotation. The side lying group was positioned in right side lying with the hips and knees flexed and the manipulation was applied with left trunk rotation. If an audible occurred during the test mobilization, no further manipulation was done. If there was no audible during rotation set-up, then a high velocity, low amplitude thrust was delivered. The control group, did not receive a grade V manipulation, but, instead, remained supine on a table for the same amount of time that it would take to perform the manipulation. Prior to, immediately after, and 20 minutes after the manipulation or control positioning, US images (6cm curvilinear transducer, 5MHz, GE, Logiq e) of the lumbar spine were recorded in relaxed standing, seated flexion, prone extension, and bilateral standing side bending to determine segmental motion between L3-4 and L4-5. Spinous processes were imaged for flexion/extension, and transverse processes for side bending. A mixed model repeated measures ANOVA was used to compare pre and post measurements at each lumbar level for each movement within and between groups. Results: There
were no significant differences (P>0.05) in measured distances in relaxed standing, flexion/extension, and bilateral side bending movements at either L3-4 or L4-5 within all groups between time periods. There were also no differences (P>0.05) between the 3 groups. Conclusion: A single rotational low lumbar manipulation does not affect L3-4 and L4-5 segmental spinal motion in healthy individuals measured with US imaging immediately after or twenty minutes after manipulation.

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The Influence of Catastrophic Injury on a Child's Current Physical Activity and Obesity Status

Introduction: Physical activity (PA) declines dramatically across age groups between childhood and adolescence. For example, 42% of children (6 - 11 y) obtain the recommended 60 minutes a day of moderate-to-vigorous PA (MVPA), whereas only 8% of adolescents achieve this goal. Recent reports show that only 34.7% of children and adolescents in the United States participate in regular MVPA (moderate-to-vigorous physical activity). The dramatic rise in obesity has been linked to a reduction in PA levels in children and adolescents. Obesity, a state of excess body fat, is commonly assessed using the body mass index (BMI), a ratio of weight to height. The CDC defines childhood weight status into four categories: underweight; BMI<5th percentile, healthy weight; BMI = 5th-85th percentile, overweight; BMI = 85th-95th percentile, and obese: BMI >95th percentile. Physical inactivity in adolescence is one of the primary predisposing factors to increased morbidity, since many of the chronic diseases of adults are initiated in childhood. The unique patterns of children’s PA provide unique challenges to measuring and quantifying the behavior. Objective monitors, such as accelerometers, have become tools for measuring and quantifying the intensity of PA in children and adolescents. Children and adolescents are more susceptible to PA-related injuries than adults because of their under-developed coordination and balance, longer reaction times, and ability to assess the level of risk in certain activities. Anatomical and biomechanical differences found in a growing body make children and adolescents prone to injuries and injury patterns. Purpose: To compare the weight and PA status in youth with and without a previous catastrophic injury, and to determine the relationship among the duration of injury recovery, PA level and weight status in those children with a catastrophic injury. Methods: Design: Retrospective, cross-sectional study. Setting: Rural high school in Athens, Ohio. Participants: Healthy high school students (n = 20; 16.1 ± 1.0 yrs) were classified as either those who previously suffered a catastrophic injury (INJ; n = 11) or those who have not suffered a catastrophic injury (CON group; n = 9). Protocol: After signing of the informed consent/assent documents, each student completed the questionnaires. Anthropometrics: Height was measured to the nearest 0.5 cm and weight to the nearest 0.1 kg to calculate body mass index (BMI). Body fat calipers were used to measure skinfold thickness at the triceps, biceps, subscapular, suprailiac, and calf to calculate body fat percentage using age-appropriate body density calculations. Physical Activity Level: An accelerometer (GT3X+, Actigraph, Pensacola, FL) was worn to measure habitual PA for 7 consecutive days. The GT3X+ is a small (4.6 cm x 3.3 cm x 1.5 cm), lightweight (19 g) device that is sensitive to movement in all three planes of motion for all ages. The accelerometer was initialized to sample at a frequency of 30 Hz and record data (counts) in 1-sec epochs. Upon return, the accelerometers were downloaded to a computer and the data were analyzed using the ActiLife Data Analysis Software (version 6.10.1). Statistics: SPSS Statistics software was used to analyze the data: An independent t-test compared the PA and obesity status measures between the INJ and CON groups. The relationship between obesity status, age of injury, and length of time loss was calculated using Pearson rank correlations. Data was adjusted for normalcy and significance was set at ≤ 0.05. Results: There was no difference in height, weight, or body composition between groups (p>0.05). Although there is evidence of a recent rise in obesity, this study found that all participants averaged within normal limits of BMI. There was no difference in MVPA participation between INJ and CON groups. All participants acquired an average of 63.6 ± 21.5 min of daily MVPA, contrary to the reported 8 (42%) of youth obtaining the recommended amount. All participants in the current study were high school athletes. No significant difference in perceived behaviors (Health Behavior Questionnaire score: 56.8 ± 2.9) or perceived quality of life (PedQL socre: 15.5 ± 10.9) between groups. Higher scores on the Tampa Scale of Kinesiophobia for the INJ group than the CON group was unexpected. A score above 34 points on the Tampa Scale of Kinesiophobia suggests a fear of movement due to risk of injury. Conclusions: Catastrophic injury or duration of the recovery from an injury had no affect the weight
status or PA level, compared to those who did not have a previous catastrophic injury. The expected outcome for the questionnaires was to see a decrease in perceived health behavior and quality of life for the INJ group, however no difference was found between INJ and CON groups. The INJ group showed more fear of movement than the CON group via the Tampa Scale of Kinesiophobia, which was an expected outcome.

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Auditory Stroop Using Spatial Stimuli

Introduction: Alternative and Augmentative Communication (AAC) refers to several methods and tools that are used as forms of communication by individuals who are unable or limited in their speech function. Recent studies have suggested that 8 to 12 of every 1,000 people use some form of AAC due to communication deficits and because of the increasing amount of individuals that use AAC has evolved to meet the needs of a wide variety of individuals with many different communication needs. While graphic symbol interface AAC devices are commonly used and provide a number of possibilities for exploration of visual cognition, there is still a need to explore cognition through other senses. In circumstances an individual has both motor and visual impairments, a visual graphic interface would not suffice, and thus an auditory scanning mode of communication needs to be explored. Two methods for making graphic interfaces more accessible for these individuals include the use of auditory icons and spatial auditory cues. Purpose: The purpose of this study is to evaluate the influence of spatial auditory stimuli when the semantic meaning of the spoken word is incongruent with the location of the sound. Based on previous auditory Stroop research we predict that individuals will respond to incongruent stimuli with reduced accuracy and prolonged reaction times. Methods: In our current study, twenty students between the ages of 18-30 were instructed to answer out loud “Where did the sound come from?” regardless of the word said. The stimuli presented were both congruent and incongruent. Results: Reaction times for both the vertical and horizontal plane were unaffected by congruency, however reaction times in the vertical plane were significantly prolonged when compared to the horizontal plane. Conclusions: Reaction times for both the horizontal and vertical plane were unaffected by congruency as well as the accuracy of responses in the horizontal plane. However, the anticipated reduced accuracy was found in the vertical plane. Research in psychoacoustics has determined the well-known minimum audible angle paradigm which is often used in the study of localization of sound. Based on this research, it is stated that an individual is able to notice a difference in the location of a sound as little as 2 degrees in the horizontal plane. In the vertical plane the minimum audible angle is greater, at 17 degrees. Although our research was conducted using a 45 degree angle, our results signify that the saliency of the vertical cues have a significant effect on the accuracy of localization. Implications of these results on AAC devices show the importance of salient spatial cues in the vertical plane to ensure the most accurate responses.

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Noise Tolerance and the Frequency Following Response

Introduction: In 2011, Li & Jeng studied the effects of noise on the FFR when the signal stimulus, /i/ and the Gaussian white noise were presented to the same ear. Their findings showed a turning point of around 0 dB SNR, at which the FFR began to degrade. Purpose: The present study examined the effects of noise on the FFR when the same stimulus and noise were presented to opposite ears. Methods: Native Mandarin speakers (2 males, 10 females) were recruited from Ohio University and the surrounding community. There were 18 conditions in total with varying intensities of 40, 55 and 70 dB SPL and varying SNRs of No Noise, -12, -6, 0, +6 and +12 dB SNR. Results: Results showed a slight decrease in robustness of the FFR as the SNR conditions worsened; however, the FFR remained relatively stable and indicated no clear turning point. Conclusion: When comparing results from Li & Jeng’s 2011 study with the present study, we suspect the noise tolerance processing to be a peripheral mechanism.
Assessing the Change of Substance Use & Mental Health in Participants of The Salvation Army’s Anti-Human Trafficking Program

Introduction: The attention given to the issue of human trafficking is growing. Anti-trafficking programs exist, for instance The Salvation Army’s Anti-Human Trafficking Program in Central Ohio. However, there is still a great need for specific and long term services for this population. This study takes a look into the Anti-Human trafficking Program to determine if it will have a positive impact on some of the negative factors commonly experienced by victims. If the results are optimistic, perhaps funding for more trafficking specific programs and treatment facilities will exist for those who have endured this injustice. Purpose: The purpose of this study was to examine if change occurred in the substance use and mental health of participants involved in the Anti-Human Trafficking program over the course of 9 months. Methods: This study was conducted using 25 closed cases from The Salvation Army’s Anti-Human Trafficking Program. It looks at the change in substance use and mental health of participants involved in the program for 9 months. The cases used involve only females ranging in age from 18 to 60. A risk assessment, provided by The Salvation Army, was used. This assessment tool is a 10-point Likert scale arranged as: 0-2 In Crisis, 3-4 Vulnerable, 5-6 Stable, 7-8 Safe, and 9-10 Thriving. Results: The relation between the Anti-Human Trafficking program and substance use at the initial intake through the first three months of participation positively increased. At this point in time participants go from receiving no intervention to receiving services for three months consecutively. The largest increase occurred from the 6th month to the 9th month with an increase in mean score of 0.5. Positive growth occurred in mental health for participants from their first initial intake through their first three months of services. Between months 3 (8.3) and 6 (7.3), a steady rate occurred with a slight decrease from month 6 (7.3) to 9 (8.1). This could be due to the nearness of the participant’s termination of services. Programs designed specifically for victims of human trafficking experience positive outcomes. The mean scores of both substance use and mental health displayed a positive increase from the participant’s initial intake throughout their sixth month of receiving services.

Conclusion: The intervention of the Anti-Trafficking Program had a positive impact on program participants.

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Does Item Order/Placement Play a Role in Immediate Memory Assessment?

Introduction: It is common for memory to be assessed when evaluating a concussion. Two assessment tools used to assess memory that are included in the Sports Concussion Assessment Tool-3 (SCAT 3) are the Standardized Assessment of Concussion (SAC) and Maddock’s Score. Though memory assessment is common with concussions, little attention has been paid to the factor structure of these tools. Purpose: To evaluate the role of item placement/order for the immediate memory section of the SAC using factor analysis. Methods: Design: Cross-sectional design. Setting: Laboratory. Participants: Two-hundred seventy-three (273) participants with no history of concussion in the previous 6 months (21.2 ± 1.8 years; n = 121 men, n = 152 women) volunteered for this study. Intervention: Participants completed a health history questionnaire. The participants were administered new 10 word lists which were developed to be similar to the word lists found on the SAC. The word lists were designed to be more difficult by increasing word length, examining relationships among items, and determining rhyming patterns. The administration of the immediate memory section was changed by increasing the immediate memory to 10 words repeated 1 time. Main Outcome Measures: The immediate memory items were analyzed using Principle Axis Factoring (PAF) with a varimax rotation. The factors were confirmed using Parallel Analysis (PA). Results: Three factors were extracted from the Principle Axis Factoring analysis which was confirmed through Parallel Analysis. The mean eigenvalues approach of parallel analysis was used to determine the number of factors, yielding three factors (PAF eigenvalues > PA eigenvalues: Factor 1: 1.796 > 1.313, Factor 2: 1.327 > 1.214, Factor 3: 1.129 > 1.140). The first factor included items (rotated-factor weights): 9 (0.574), 10 (0.441), and 8 (0.301). The second factor included items: 1 (0.667), 2 (0.337), 4 (0.132), 3 (0.036), 6 (0.015) and 5 (-0.052). The third factor included item 7 (0.507). These factors were also confirmed when including two additional word lists of...
10. **Conclusions**: Considering the results from the Principle Axis Factoring, it appears that item placement and order does play a role when developing memory lists. It seems that participants choose between two groups of words; either group 1 (beginning of the word list) or group 2 (end of the word list). Items 1 through 6 can all be found on one factor which makes sense if the participants started by remembering words at the beginning of the word list. This coincides with the idea that people tend to remember between 5 and 6 words at a time. Items 8 through 10 were also on the same factor, which makes sense if participants started to remember words towards the end of the word list first. Because Item 7 is between the normal memory ranges it makes sense that it has its own factor.

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**Frequency-Following Responses to Voice Pitch in Chinese Neonates: Representation of Innate Processing**

**Introduction**: Voice pitch is used to help with speech understanding for individuals using tonal and non-tonal languages. The different pitches of your voice can also have different meanings depending on whether or not you use a tonal or non-tonal language as well. We use what is known as the frequency-following response (FFR) to help identify and track changes in voice pitch. There have been several studies published recording the FFR in infants and adults using speech and non-speech stimuli. What has remained unclear is whether or not you can record the FFR in newborn infants less than three days old using more than one tone. **Purpose**: The purpose of this study was to record the FFR in Chinese infants that were less than three days old using four different Mandarin Chinese tones. **Methods**: Forty-four (44) Chinese infants from a hospital in Taiwan that were less than three days old were recruited in this study. Four different Mandarin Chinese tones that mimicked the English vowel /i/ were presented to the newborns via an insert earphone with an infant ear tip at 60 dB SPL. Surface recording electrodes were used to record the brainstem responses from the infants. **Results**: The results demonstrated that the FFR is recordable in newborn infants that are less than three days old to four different Mandarin Chinese tones. **Conclusions**: Since the FFR can be recorded in newborn infants that are less than three days old using more than one tone, it supports the possibility that we are born with the ability to identify and track changes in voice pitch. The human auditory brainstem has the ability to follow the fundamental frequency contours of the recordings.

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**Age and Gender Differences of Maximum Hyoid Excursion in Normal Swallowing**

**Introduction**: Hyoid movement is critical component for pharyngeal stage of swallowing. The hyoid bone involves complex physiological events of pharyngeal stage through moving anteriorly and superiorly. Anterior and superior movement of hyoid bone refers to hyoid excursion. The hyoid bone moves anteriorly to help the passage of the bolus into the upper esophageal sphincter (UES). The elevation of hyoid contributes to protection of the airway. It is important to achieve the maximum vertical and anterior displacement of the hyoid in order to execute safe swallowing. Temporal characteristics of swallowing change with aging, although older individuals do not have swallowing disorders. Previous researches reported older individuals had slower initiation of hyoid movement, longer duration of laryngeal closure and pharyngeal transition time. Those temporal characteristics are associated with hyoid excursion and aging. **Purpose**: This study examined age and gender difference in the duration of maximum hyoid excursion during normal swallowing. **Methods**: Videofluoroscopic swallowing examinations (VFSEs) were recorded on 66 normal individuals. VFSE was obtained on normal individuals using the same methodology. The fluoroscopic tube was focused in the lateral plane on the oral cavity and the nasopharynx to below the UES area. Each participant swallowed two 5 ml and 10 ml boluses of the thin liquid. A procedure for duration of maximum hyoid excursion was measured as the time between the initiation of hyoid elevation and when the hyoid reached the maximum placement. Statistical comparisons were used by two-way analysis of variance (ANOVA). Independent variables are age, gender, and bolus volume. Significant level was set as p<0.05. **Results**: Reliability For intra-judge reliability, the investigator randomly selected and reanalyzed 20% of the subjects. A significant correlation between the first and second judgment was observed for duration of hyoid excursion (r = 0.89, p<0.01). For inter-judge reliability, a second judge analyzed the same
subjects. That judge’s results were compared with the results of the primary investigation. A significant correlation was observed between judges for duration of hyoid excursion \((r = 0.90, p<0.01)\). Older individuals showed significantly longer duration of maximum hyoid excursion than younger individuals \((F(1, 124) = 84.010, p<0.01)\). Older individuals had a mean duration of hyoid excursion of 0.56 seconds and younger individuals had a mean duration of hyoid excursion of 0.36 seconds. Hyoid excursion in older individuals slowly performs during swallowing compared to younger individuals. Women had significantly longer duration of maximum hyoid excursion than men \((F(1, 124) = 7.335, p = 0.008)\). Women had a mean duration of maximum hyoid excursion of 0.47 seconds. Men had a mean duration of hyoid excursion of 0.42 seconds. Hyoid excursion in women takes longer to reach the maximum placement compared to hyoid excursion in men. However, there was no significant difference between volumes in duration of maximum hyoid excursion \((F(1, 124) = 0.025, p = 0.928)\). Conclusions: Older individuals had longer duration of maximum hyoid excursion than younger individuals. It indicates that the hyoid bone in older individuals elevated slowly to reach the maximum position during swallowing than younger individuals. Older individuals have a decreased reserve of swallowing. Reserve is defined as the difference between necessary movement to accomplish a task and the actual movement used. The reserve plays an important role in the occurrence of disease and illness. The reduced reserve and subsequent slower hyoid excursion may put older individuals in risk of aspiration. However, the older individuals did not show penetration or aspiration. Our previous studies have showed that the slower hyoid excursion co-occurs with prolonged pharyngeal transition and longer opening of upper esophageal sphincter (UES). The longer duration of maximum hyoid excursion in older individuals may be compensated by altering other temporal mechanisms of swallowing with age such as longer opening of UES. The results of this study indicated that women had slower hyoid excursion than men. Physiological difference in gender may play an important role in hyoid excursion. Men may have stronger muscles in oropharynx than women. However, women may not be more susceptible to develop swallowing complication. Slower hyoid excursion in women can be compensated. Previous research reported that neurophysiologic changes may correspond increasing the duration of swallowing with aging. This finding supports that changing of neuromuscular activity with age could affect slow hyoid excursion in older adults. This indicated that the slow hyoid excursion is likely related to reduction in sensory and neuromuscular function as age increases. The temporal measurements of hyoid excursion help identify aging process and possible pathophysiology in patients with dysphagia. The finding of this investigation provided important insights of preventive approach for the older individuals. It is important to develop exercise program for the older individuals. The future study will focus on the relationship between hyoid excursion and other temporal measurements of swallowing in normal and disordered swallowing.

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Assessing Listening Effort in Hearing-Impaired Individuals Using Cognitive Tasks in Various Background Environments

Introduction: Research on the communication abilities of persons with or without hearing loss has focused primarily on speech intelligibility measures. However, the complex nature of communication processes cannot be truly captured by currently used spoken word recognition tasks. Difficulties in language comprehension by hearing impaired listeners may not only be due to peripheral hearing loss, but also to cognitive factors such as attention and working memory. Purpose: The purpose of this experiment was to objectively assess the listening effort required to perform cognitive tasks in difficult listening situations. Working memory plays an essential role in language comprehension. Working memory can be thought of as a short term cognitive workspace in which information is both stored and processed. However, working memory only has a limited storage capacity and competes for the same pool of cognitive resources that are used for processing. It was hypothesized that the addition of background noise would occupy some of these cognitive resources, leaving less room for storage and processing, and observed as a decline in performance. Methods: Three tasks were used in this experiment: the Working Memory Span Task (WMST) Attention Switching Task (AS) and a Listening Comprehension task (LC). Before each primary task, each participant underwent extensive sentence and digit recognition tasks to pinpoint the signal-to-noise ratio (SNR) where he or she was able to maintain 90% intelligibility in each of three background noises (16 Hz interrupted noise, modulated speech-spectrum noise, and four-person multi-talker babble). These levels...
were used for each of the primary tasks respectively. The WMST consisted of spoken digits followed by sentences in which the subject was asked to determine the semantic plausibility of each sentence, and then recall the digits in serial order after a given block length. The AS task used single digits grouped into two categories: "Low" = 1, 2, 3, 4 and "High" = 6, 7, 8, 9. Participants were presented with consecutive digits and asked to decide whether each digit was low or high, and also to keep a running total of how many digits were in each category. They were then asked to recall the totals from each category after a given block length. These tasks were performed in quiet and in each of the three background noises. The LC task required participants to listen to recorded spoken passages and then answer critical thinking questions about each passage. There were six passages averaging three to five minutes in length. This task was performed in quiet and multi-talker babble. Results: The WMST accuracy results of digit recall showed no significant difference across conditions. The time taken to decide whether each sentence was semantically plausible or not was recorded as reaction time (RT). Results show that the quiet condition had a significantly longer reaction time than all other conditions. The AS accuracy results showed that the interrupted noise condition had significantly lower accuracy than the quiet and multi-talker babble conditions. There was no significant difference in RT across conditions. The RTs for switch presentations (when a digit switched from one category to the other relative to the one prior) and non-switch presentations (when a digit remained in the same category as the one prior) were measured and switch RTs were significantly longer than non-switch RTs in all conditions. There was no significant difference in accuracy performance in the LC task between the two conditions. Correlations were run between the accuracy performance in the WMST and AS tasks vs. LC accuracy. A significant correlation was found between AS accuracy and LC accuracy in the noise condition. Conclusions: In the AS task, the addition of background noise was detrimental to accuracy performance. However, in all other tasks, accuracy performance was not affected by the addition of background noise. In the AS task, reaction times were not affected by background noise, and in the WMST the quiet condition actually had the slowest reaction time. We propose that the difficulty of the tasks was not high enough to see the breakdown in performance caused by the addition of background noise at relatively low levels (maintaining 90% intelligibility). It is possible that the low levels of background noise heightened participants' arousal enough to equate performance in the conditions.

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Communication Sciences and Disorders

On the Holistic Nature of Auditory Feature Retention

Introduction: The ability to maintain and make use of sounds in the environment is essential for interpreting the world around us and is called auditory scene analysis. The way in which these sounds or events is dependent on one's auditory processing abilities. And individual can only maintain and use so many pieces of information depending upon their working memory capacity. Previous research by Cowan shows that individuals can hold and utilize 3-5 pieces or chunks of information. A chunk is a useful piece of information, and it can be as simple as a word or a sound or as long as a paragraph, it just depends on how the individual combines the information to make use of it. Auditory objects are entire auditory events and all of its component features. Auditory features are dimensions that make up an auditory event such as the loudness or location. Pollack and Ficks found that individuals are able to make judgments on the upwards of 8 auditory features with high accuracy. However, their methodology may have allowed for use of compensatory strategies, such as chunking, that artificially expanded the limits of working memory. However, research on auditory feature retention shows that each feature decays at its own rate suggesting that each feature individually is held as its own object within working memory. Purpose: If an auditory event is the object participants are using within working memory, they should be able to accurately judge all the features within the event. Alternatively, if an auditory feature is the object participants are using within working memory, participants may struggle to hold more than a few features with high accuracy. Methods: Participants made judgments on the binary state of auditory stimuli containing the follow six features: loudness, duration, locations, pitch, amplitude modulation, and complexity. Training for each feature individually occurred first, with feedback, to facilitate learning. Participants were trained to the binary state of each feature and met a performance criterion of 90% per feature in order to continue in the study. The first task of formal data collection contained 3 training and 3 evaluation runs of 100 trials each. Participants made judgments on 6 features within one auditory event in random order, and no feedback was given. Then participants made
judgments on 6 features in one auditory event in fixed response order with 3 runs of 100 trials each. Then participants completed tasks similar to the first one; however, with 5, 3, and 1 feature(s) to be judged, respectively. Each additional task, as before, contained 3 runs with 100 trials each and no feedback was given. The last three tasks of 5, 3, and 1 feature were completed by half of the participants in the order of 1, 3, and 5 features to control for order effect. Results: All participants perform best when there are less features to be judged. When the number of features to be judged is within the limits of fundamental working memory capacity, individuals have high performance accuracy and these results are significantly different than the results obtained for performance accuracy at and above the upper limits of working memory capacity. There is no difference in performance found when subjects judge 5 and 6 features. Null results were obtained for the hardest condition of judging 6 features when the response format was random and fixed. Conclusions: Listeners performance improves as the number of features to be judged decreases suggesting each feature is being held as its own object within working memory. There was no difference in performance found for the most difficult test condition when response order was random or fixed. Based on our results, individuals do not readily chunk auditory features; however, performance from a subset of participants suggests it is possible.

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Athletic Training

**Evaluation of Core Body Temperature, Urine Specific Gravity, and Hydration Status in Collegiate Modern Dancers**

**Introduction:** Performing art medicine is an emerging field in athletic training and there is a need to know of the potential risks for this population. There is a lack of research on dancers concerning hydration and heat illness. **Purpose:** The objectives of this study are: to compare pre- and post-activity core body temperatures, urine specific gravity values, and body weight measurements of all participants (active and non-active) to determine risk of heat illness; determine if modern dancers have an increased risk of heat illness compared to non-active participants; and to determine if modern dancers are properly hydrating prior to and during a two hour dance class. **Methods:** Design: Case-control study. Experimental pre- post-test study (repeated measures ANOVA for independent and dependent variables). Setting: Mid-western collegiate modern dance class. Patients or Other Participants: 18 total participants. 9 collegiate modern dancers and 9 non-dancers (control group). Interventions: The independent variables of this study are time, relative humidity, ambient air temperature, and core body temperature. Time will be measured in thirty minute intervals throughout the dance class where 0 minutes is the beginning of the class and 120 minutes is the end, a digital psychrometer used for measuring ambient air temperature and relative humidity of the dance studio, CorTemp® sensors and data recorder for core body temperature measurements. Using SPSS statistical software a 2x5 repeated measures ANOVA with between factor (groups) and within factor (time) will be performed for core body temperature. *The project is in a stage of data collection.*

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Physical Therapy

**Physical Therapy Intervention Including Body Weight Support Treadmill Training for a Young Child with Partial Agenesis of the Corpus Callosum: A Case Study**

**Introduction:** Agenesis of the corpus callosum (ACC) is a congenital brain anomaly that affects 4 in 1000 births and involves the complete or partial absence of the corpus callosum. Persons with callosal disorders may share common physical, communication, social, behavioral and cognitive features such as vision impairments, hypotonia, poor motor coordination, motor milestone delay, and low pain perception. However, individual differences exist, ranging from subtle developmental and cognitive deficits to severe disability. **Purpose:** Given the limited availability of evidence related to physical therapy (PT) for children with ACC, the purpose of this retrospective case study is to describe PT interventions including body weight support treadmill training (BWSTT) and associated outcomes of one child with a diagnosis of partial ACC. **Methods:** This child received PT services 1-2 times/week from 5 to 34 months of age. BWSTT was used in conjunction with traditional PT interventions from 18 to 24 months of age for a total of 20 sessions. Traditional interventions included task-specific activities, handling and adaptive equipment to facilitate strengthening and acquisition of motor milestones and
functional skills. BWSTT included treadmill ambulation up to 30 minutes per session at a tolerable speed with assist to achieve appropriate lower extremity kinematics. Overground ambulation included using push toys, gait trainer and manually assisted gait. The child’s functional abilities and developmental milestones were monitored using observational analysis, the Alberta Infant Motor Scales (AIMS) and the Pediatric Evaluation of Disability Inventory (PEDI).

**Results:** Repeat AIMS scores between 5 and 9 months of age showed motor development below the 5th percentile. At initiation of BWSTT at 18 months, the child used rolling and crawling for mobility and PEDI normative standard scores for functional skills (FS) and caregiver assistance (CA) mobility domains were below the 10th percentile. Following cessation of BWSTT at 24 months, FS and CA mobility scores were still below the 10th percentile but the child progressed to creeping, cruising and walking with hand held assist for mobility. Between 18 and 24 months, change scores on PEDI scaled scores in both mobility domains (12.4 and 20.2) demonstrated minimal clinically important differences (MCID). By 27 months, the child ambulated with a posterior walker for community mobility. At 29 months, FS and CA mobility scores increased to the 15th and 24th percentiles respectively and the CA mobility change score (13.9) showed MCID. By 34 months, she ambulated independently for limited distances within her home. **Conclusions:** This retrospective case analysis supports the use of multiple PT interventions to promote development of motor milestones and functional mobility in a child with partial ACC and significant motor delay. BWSTT appeared to be a useful adjunct to traditional interventions for facilitating emergence of functional ambulation.

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**Identification of Clinically Important Gait Abnormalities Observed Through Video**

**Introduction:** In a previous study, 22 gait abnormalities were deemed clinically important by content experts. This study is the next phase for tool development that would increase the accessibility of gait assessments to the running population, in which injuries are common, regardless of geographical location. **Purpose:** To establish the reliability of clinicians’ abilities to identify clinically important gait abnormalities with video. **Methods:** The Reliability: Observational Gait Analysis Tool (ROGAT) was developed based on the 22 gait abnormalities deemed clinically important by the Gait Abnormalities: Clinical Importance Survey (GACIS) in a previous study. Volunteers served as the walkers for ROGAT and underwent a lower extremity physical examination (PE) by the primary researcher. Prior to the completion of ROGAT participants completed an educational session to become familiar with ROGAT and the gait abnormalities they were asked to identify. ROGAT consisted of 25 gait videos of the volunteer walkers with either an anterior, posterior, or lateral view in which the participant identified all of the gait abnormalities present. **Main Outcome Measures:** The variables evaluated in ROGAT include agreement among raters, agreement of time 1 and time 2, and the agreement among the raters and the results of the lower extremity physical examination (PE). A mean of >0.15 or <0.8 was used to determine the reliability in which abnormalities the raters agreed upon whether present or absent. To determine which abnormalities had an agreement among the raters and the PE, a mean of >0.8 and SD <0.2 was used. **Results:** Sixteen (16) licensed and currently practicing athletic trainers (mean ± SD: age 27.9 ± 8.8 yrs; 7 male, 9 female; experience 4.9 ± 6.5 yrs; 13 without extra gait training, 3 with extra gait training) volunteered to participate in the study. The range of agreement among the raters for ROGAT is 0.63 to 0.98. The range of agreement among the same rater for time 1 and time 2 is 0.74 to 0.84. When the chance of probability is factored out with Cohen’s kappa, the inter-rater reliability becomes 0.00 and the intra-rater reliability range becomes 0.08 to 0.13. Twelve of the 22 clinically important gait abnormalities met the validity criteria. Four additional abnormalities were added to the 12 valid gait abnormalities due to the consideration of mean agreement among raters. **Conclusions:** The identification of gait abnormalities through video was determined to have good inter- and intra-rater reliability. However without the possibility of chance, the identification of gait abnormalities through video is poor. Sixteen (16) of 22 clinically important gait abnormalities were agreed upon the presence or absence among raters and valid when compared to a PE. The lack of frequent clinical application of gait assessments, years of experience, and external gait training in addition to various video quality and walker clothing factors could have influenced which of the 22 gait abnormalities were determined reliable and valid.
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Assessing Functional Health Literacy in Athens County

Purpose: To assess the level of functional health literacy in Athens, Ohio and determine whether associations exist between inadequate health literacy and social and economic determinants of health.

Methods: The Rapid Estimate of Adult Literacy in Medicine – Revised (REALM-R) and the Newest Vital Sign (NVS) were administered to screen patients at risk for inadequate health literacy skills. Recruitment took place in the waiting area of the Family Medicine Clinic in Parks Hall, Athens, Ohio. Results: 25% and 35% of participants were considered to be at risk for inadequate health literacy based on REALM-R and NVS respectively. Both REALM-R and NVS scores varied significantly by highest level of education attained and self-reported annual household income. These findings confirm results from existing literature and reiterate the close connection between health literacy and the underlying social and economic factors leading to poor health status. Conclusions: Inadequate health literacy is prevalent in the southeast Ohio region and may be more so than the results indicate, as the study was done within an academic institutional environment, likely attracting a disproportionate number of educated participants. Our findings call for a more comprehensive definition of health literacy that encompasses the notion of empowerment and greater autonomy, which inevitably leads to addressing the underlying social and economic determinants of health.

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Household Food Insecurity is Associated with Low Produce Intake in Adult Mothers Living on Prince Edward Island and Using Family Resource Center Services

Introduction: Prince Edward Island is characterized by low household food security (HFS) compared to other Provinces, especially among female lone parents. Low produce intake may be linked to chronic disease and has been associated with household food insecurity. Purpose: This study examined differences in produce intake by food security status of adult mothers with young children living in Prince Edward Island and using Family Resource Center services.

Methods: Survey of mothers ≥18 years (USDA HFS module; produce intake and behavior-related instrument). USDA HFS module was scored using Canadian methods. SPSS software was used to tabulate data. Descriptive statistics were used to describe the sample, and ANOVA was used to assess for differences in produce intake among food security groups. Results: Participants (n = 282) were primarily white (n = 262, 92.9%) and married (n = 164, 58.2%). Age ranged from 18-53 years (30 ± 5 yrs, n = 282). Regarding household adult food security of participants (n = 282), 197 (70.1%) experienced food security during that past 12 months, while 84 (29.8%) experienced food insecurity (food insecure, moderate [n = 46, 16.4%]; food insecure, severe [n = 38, 13.5%]). Total produce (p<0.001), fruit (p<0.001), and vegetable (p = 0.001) differed by HAFS, with mothers who experienced severe food insecurity consuming less total produce than food secure or food insecure (moderate) mothers by 1.8 and 1.0 servings daily, respectively. Conclusions: Mothers of young children living on Prince Edward Island who experience severe food insecurity have lower produce intake compared to other mothers. Further exploration of programs and services to improve food insecurity among these mothers is warranted.

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Release from Retroactive-Retention Interference for Acoustic Duration

Introduction: Interpreting an ongoing acoustic event involves retention of sound of information over time. Intervening stimuli and secondary cognitive tasks can decrease retention accuracy for duration of marked empty intervals and rhythmic tonal sequences. However, retention of some temporal-acoustic information (i.e., silent-gap length between stimuli) is resistant to interference from subsequently presented auditory stimuli. Purpose: The purpose of this study was to determine the difference limen for duration (DLD) over a prolonged retention interval. It was also of interest to determine the effect of arrhythmic,
interpolated-sound sequences on DLDs. We hypothesized that DLDs would be larger for conditions in which there was interference in the retention intervals. We also hypothesized that the interference pattern for DLDs would closely follow those reported for pitch, as opposed to the temporal gaps between stimuli; that is, interference would occur in the presence of interpolated tones, and would release if listeners were provided a location cue. Methods: This study used 5 normal hearing adult females (aged 21-26 years). All participants had approximately 6 hours of training prior to formal data collection. The stimuli were Gaussian-noise bursts (12.0 kHz low-pass filtered) that were roved in duration and level. The interstimulus intervals and stimuli were also roved in duration and level in order to control for potential rhythm cues. The Single Interval Adjustment Matrix (SIAM) adaptive tracking procedure was used in formal data collection. Participants were to determine whether the duration in the comparison stimulus was longer than in the standard stimulus by selecting "Yes" or "No" on a touch screen monitor. Performance was evaluated in three conditions. The first condition had a silent retention interval. The second condition had four temporally separated noise bursts, and the third condition had four intervening noise bursts with an inter-aural level difference cue, resulting in the stimuli being heard in the right ear only. Results: Results were averaged across 4 runs for each condition. The performance per run was determined by the mean of the final 4 reversals obtained with the SIAM procedure. A repeated measures ANOVA indicated a significant difference in DLD by condition. Post-hoc results indicated that DLD values obtained for the first and third conditions (silent interval and inter-aural level difference cue) were comparable to one another, but were significantly lower than the second condition. Conclusions: In conclusion, retention of stimulus duration exhibits retroactive-retention interference outcomes more closely aligned with those reported for pitch. Localization cues provide moderate-to-complete release from intrusive-retention interference for most of the listeners in this study. Temporal duration information does not follow the pattern of certain other temporally based acoustic events, namely silent-gap retention, suggesting that they are maintained and/or processed differently.

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Retention of Gap Length in Normal-Hearing Listeners

Introduction: Interpreting a soundscape involves retention of information about and between various acoustic dimensions. Time-based relationships involve the comparison of temporal markers. For non-overlapping sounds, interposed-perceptible silence becomes part of their temporal relationship. Just Noticeable Differences (JNDS) for gaps are roughly 3-100 ms for 3-300 ms temporal markers when retention intervals are >750 ms, dependent upon standard gap as well as marker duration. The presence of intervening stimuli can disrupt retention of features of sound within Auditory Working Memory (AWM), namely, pitch, loudness, and location. Prolonged retention intervals also reduce resolution for pitch and loudness. Purpose: To determine JNDS for gap length over a prolonged retention interval and to determine the effect of intervening-noise bursts on gap length retention. Methods: Six (6) normal-hearing adult females were used for this study. They all passed a temporal acuity screening task. The stimuli used were brief silent periods between two Gaussian-noise bursts (12.0 kHz low-pass filtered). The markers for the stimuli were roved in duration and level. The interstimulus intervals were also roved to control for potential rhythms. The interstimulus interval was a prolonged length of 5000 ms. An adaptive tracking procedure was used for participants to determine whether the gap in the comparison stimulus was longer than the gap in the standard stimulus (Yes or No). Performance was evaluated in 3 conditions. Condition one had a silent retention interval. Condition 2 had four intervening noise bursts without gaps in the retention interval. Condition 3 had four intervening noise bursts which contained brief gaps. Results: There was neither an overall statistical difference for condition (repeated measures ANOVA, F(2,10) = 2.72, p = 0.13, Geisser-Greenhouse corrected) nor any specific condition that differed significantly from the others (Tukey-Kramer Post hoc analyses, p>0.05). There was a significant difference across subject performance, indicating that subjects performed differently throughout the experiment. Conclusions: JND values are similar to the 300 ms marker duration data reported by Abel (1972) and Stellmack et al. (2013) who employed retention intervals of 500 ms and 750 ms, respectively.
The mean JND in the current study was 26 ms over a 5000 ms retention interval. Stimuli within the retention interval had no effect upon the JND for gap length. Previous reports indicate that retention of pitch, loudness, and location are disrupted significantly in the presence of intervening sounds. Temporal properties of stimuli may be retained in a manner that differs somewhat from that used for the percepts of pitch and loudness.

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The Influence of Feature Detection on Working Memory in Complex Auditory Fields

Introduction: The auditory system has been shown to be sensitive to some acoustic features of sound, a process termed feature detection. This automatic process responds selectively to salient qualities of auditory stimuli. Feature-selective neuronal activity has been demonstrated in animal studies for acoustic traits such as frequency modulation (e.g., Rees and Møller, 1983; Bieser, 1998), amplitude modulation (e.g., Rees and Møller, 1983), and duration (Chen, 1998). Cusack and Carlyon’s (2003) behavioral study on perceptual asymmetries in human audition found that frequency-modulated targets are easier to detect in a field of pure-tone distracters than vice versa. The result of such feature detection is improved performance on some sensory tasks, presumably through activation of specialized neural structures. Purpose: The present study investigates whether feature detection influences discrimination of auditory information as a function of listening field complexity, retention interval duration, and working memory span. Methods: Seven (7) adult participants (aged >18 yrs) with hearing within normal limits who reported no abnormal auditory processes and/or abnormal attention function completed a discrimination task, memory span task, and retention task for this project. The discrimination task was to determine whether participants were able to hear the difference between FM and pure-tone stimuli. The span task employed quantified the number of modulated and steady stimuli a listener could retain in sequence reliably. For the retention task on each trial, two fields (windows) of stimuli, a standard and a comparison, were presented separated by different retention intervals (i.e., 0.5, 2.0, or 4.0 s). Each field contained 1 target and up to 4 distracter tones. In the standard window, the tones were randomly distributed in frequency (262 Hz to 4192 Hz) and temporal location within a 2 s window. One of the tones served as the target and the remainder, if present, as background distractors. Participants judged whether the comparison field was the Same or Different than the standard field by pressing a box labeled for same or for different on a touch-screen monitor. Conditions were presented in a random order across each run. Listener performance for standard and comparison fields containing 0, 1, 2, and 4 distracter stimuli were obtained. The results were analyzed using two separate repeated-measures analysis of variance (ANOVA) tests with Huynh-Feldt sphericity correction as well as a Bonferroni-Dunn multiple-analysis correction. Prior to these analyses, the average proportion correct scores across two runs for each condition were arcsine-transformed. Results: For the first analysis, the transformed proportion correct values were analyzed with retention interval and number of distractors as independent variables. The outcomes of the first analysis indicated that there was a significant difference for number of distractors (F(3,6) = 191.76, p = 0.002564), but not for retention interval (F(2,4) = 0.66, p = 0.503761). For the second analysis, the transformed proportion correction values for only the conditions containing distractors were analyzed with condition as the independent variable. The outcomes of this analysis indicated that there was a significant difference by condition (F(7,14) = 15.39, p = 0.004677). Post-hoc tests results (± = 0.05) indicated that the performance in the different conditions which contrasted only in background type (i.e., conditions 2 vs. 8, and 4 vs. 6) differed significantly from one another and that performance in the modulated background conditions generally was poorer than that in the unmodulated background conditions. Conclusions: The results provide measures of the presumed influence of FM-feature detection upon the ability of a listener to compare (i.e., discriminate differences between) two fields of auditory stimuli separated in time for various target and background configurations. Performance in the tasks was heightened substantially in conditions favorable to the influence of FM-feature detection. That is, performance in unmodulated backgrounds was significantly better than in modulated backgrounds. The outcomes of the present study revealed that discrimination performance in unmodulated background conditions is better than in modulated backgrounds and decreased as the number of background stimuli increased. Performance, however, was not dependent upon the length of the retention interval between the standard and comparison windows. Lastly, individual listener performance was evaluated as a function of the
number of background stimuli with regards to the participant’s working memory span. Individuals with higher working-memory spans, appear to perform better (greater proportion correct) regardless of the number of background stimuli and with greater consistency (lower std. dev.) in conditions with few background stimuli. Overall, the present study found that FM-feature detection influences discrimination performance as a function of the number and modulation state of the background stimuli.

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Athletic Training

Validation of the Rest and Neurocognitive Recovery Concussion Application as a Physical and Cognitive Rest Measure

Introduction: Current concussion guidelines call for physical and cognitive managed rest following a concussion. To better treat concussed athletes and evaluate these guidelines, objective monitoring measures are needed. The Rest and Neurocognitive Recovery Application (RNRCA) was developed for the concussed athlete and health care provider to assist in tracking concussion symptoms, daily activities, and overall wellbeing of the athlete. Purpose: To validate the use of the RNRCA in monitoring physical and cognitive activity when compared to an Activity Diary.

Methods: Participants who volunteered for the study were college students, intercollegiate athletes, and club sport athletes, all over the age of 18. Concussed participants were diagnosed with a concussion by a licensed athletic trainer during their regular sports season. RNRCA logs were sent directly to the primary investigators e-mail and forwarded to the designated team athletic trainer. ADs were collected following completion of the study. Results: No physical, cognitive, or electronic activities showed significance when comparing the two devices that collected activity data. Behavioral activities that were most highly associated with concussion symptoms were reading, watching television, attending class, and exercising.

Conclusions: RNRCA successfully collected physical and cognitive activity data in sequence to an Activity Diary. Higher power is needed in order to validate the use of the application with concussed subjects.

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Inactivation of Polyphenol Oxidase in Different Varieties of Pawpaw (Asimina triloba) by High Pressure Processing

Introduction: Asimina triloba, commonly known as pawpaw, is a delicious and nutritious fruit that is mainly cultivated in eastern North America. However, the pawpaw fruit is only for local consumption so far because of its highly perishable characteristics. The ripened fruit turns brown within 2 to 3 days after picked, which makes it nearly impossible to be promoted in the market. Purpose: The objective of this project is to determine the effect of high pressure processing (HPP) on polyphenol oxidase (PPO), the enzyme responsible for its unwanted browning. We hypotheses that HPP could significantly inhibit the PPO activation in different varieties of pawpaw fruit.

Methods: HPP is an increasingly common processing technique used by food manufactures today to prevent the unwanted browning of products through inactivating the related enzymes like PPO. Through this project, the effectiveness of HPP on inhibiting the activation of polyphenol oxidase in pawpaw fruit will be determined. We have measured the protein content (Lowry assay) and enzyme content to determine the Polyphenol activity of our pawpaw samples.

Results: We have found that the PPO activity varies according to different varieties, the storage periods, and the samples with or without High Pressure Processing. Conclusions: Results of this research indicates that HPP has some effects on preventing enzymatic browning on food products. The storage days negatively impact the PPO activities as well. Meanwhile, we found that the variety of Susquehanna has the lowest PPO activity compares to the other two.
Introduction: Speech-language clinicians and researchers are often challenged in assessing accurately and with confidence the language comprehension abilities of people with neurological disorders. Incorrect responding or failure to respond on traditional tests of comprehension does not necessarily indicate a comprehension failure. Use of spontaneous eye movements as individuals listen to auditory verbal stimuli and naturally look at carefully controlled image displays may improve the accuracy of comprehension assessment in people with neurological disorders. Results reported to date support the feasibility of employing eye-tracking methods to index reading and auditory linguistic comprehension. Purpose: The validity of an eye-tracking-based Mandarin Chinese version of the Multiple-Choice Test of Auditory Comprehension (MCTAC) was evaluated. Methods: Twenty (20) adult native speakers of Mandarin Chinese (13 females, 7 males; age 21 to 28, M = 23.9, SD = 1.6) participated. The MCTAC presented in each of the two conditions: pointing and eye-tracking. The eye-tracking version always presented first to avoid participants' perception that they should select a target image with their eyes. Custom analysis software was used to determine fixation coordinates and duration, and to eliminate blink artifacts. Fixations were defined as having a minimum duration of 100 ms of stability with tolerance of 4 degrees vertically and 6 degrees horizontally. Visual attention on each image within each display is expressed as the proportion of fixation duration on that image, divided by the total duration of all fixations on the display during a trial (Hallowell et al., 2002). Results: Eye-tracking: participants consistently allocated a significantly greater proportion of total fixation duration in a trial to the “target” items. Conclusions: Eye-tracking results support the validity of the eye-tracking version of the Mandarin MCTAC in capturing comprehension responses for language-normal adults. Further validation and standardization of both versions of the test is warranted.