

Kansas State University

**COLLEGE OF
HUMAN ECOLOGY**

**GRADUATE STUDENT RESEARCH
and
CREATIVE INQUIRY FORUM**

Justin Hall, 163

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Sponsored by:

The College of Human Ecology
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Poster Titles and Presenters

- 1) **Size and Timing Matter: Differential Triglyceride Responses to Three Meal Conditions**
Sam R. Emerson; Stephanie P. Kurti; Colby S. Teeman; Emily M. Emerson; Brooke J. Cull; Mark D. Haub; Sara K. Rosenkranz
- 2) **Changes in Intake of CVD-Related Food Components Associated with an Intervention to Reduce Sedentary Time**
Kelsey Casey; Sara Rosenkranz; Emily Mailey; Alyssa Baquero Garcia; Aaron Swank; Richard Rosenkranz
- 3) **Morphology-Driven Super-repellent Polystyrene Electrospun Webs**
Yue Yuan; Jooyoun Kim; Seong-O Choi
- 4) **For This Achievement You Get 3 Hearts”: Relationship Focus Group Findings**
Michelle Busk; S.L. Deitz; A. Vennum; J. Kimmes; S. Conner; P. Dharnidharka; K. Tran
- 5) **PTSD as a Mediator between Trauma Exposure and Attachment Behaviors in Married Adults: Uncovering Unique Gender Differences**
Lauren M. Oseland; Kami L. Gallus; Austin R. Beck; Briana S. Nelson Goff
- 6) **Bystander Intervention, Rape Myth Acceptance, and Responsible Sexuality**
Chelsea Spencer; Allen Mallory; Sandra Stith; Jenna Tripodi
- 7) **The Domains and Boundaries of FLE and Sexuality Education**
Sarah Kuborn; Karen Myers-Bowman
- 8) **Ready for Release? Financial Knowledge of Inmates in a Transitional Center Program**
Katherine (Kate) S. Mielitz
- 9) **Hope, Coping, And Relationship Quality In Mothers Of Children With Down Syndrome**
Jessica D. Cless; Briana S. Nelson Goff; Jared Durtschi
- 10) **Father Work Stress and its Relation to Negative Interaction and Problematic Child Behavior**
Aimee Hubbard; Josh Novak; Jared Anderson; Matthew Johnson
- 11) **On-site and Online Girl Scout Leader Wellness Training for Physical Activity in Troop Meetings**
Brooke J. Cull; Sara K. Rosenkranz; Cassandra K. Knutson; David A. Dzewaltowski; Richard R. Rosenkranz
- 12) **A Meta-Analysis of Cross Cultural Risk Markers for Intimate Partner Violence**
Allen B. Mallory; Sharon L. Deitz; Patricia Barros-Gomes; Bryan Cafferky; Prerana Dharnidharka; Sandra Stith; Kimberly Van

- 13) **Destination Personality: The U.S. Travelers' Perspectives and Insights of Kansas**
Naiqing Lin; Juhyun Kang; Kevin R. Roberts
- 14) **Examining the Effects of Knowledge, Environmental Concern, Attitudes, and Cultural Characteristics on Kuwaiti Consumers' Purchasing Behavior of Environmentally Sustainable Apparel**
Hayat Albloushy; Kim Hiller
- 15) **Influence of Sumac (*Rhus Glabra L.*) Leaves as a Natural Mordant on the Colorfastness of Laundering for Weld Dyed Cotton Bastiste**
Sarif Ullah Patwary; Sherry Haar
- 16) **The Impact of Physical Activity and Resistant Starch on Gut Fermentation**
Jiyoung Kim; Mark Haub; Sam Emerson; Sara Rosenkranz
- 17) **Effect of sodium nitrite on local control of contracting skeletal muscle microvascular oxygen pressure in healthy rats**
Trenton D. Colburn; Scott K. Ferguson; Clark T. Holdsworth; Jesse C. Craig; Timothy I. Musch; David C. Poole
- 18) **High-Intensity Functional Training Improves Strength in Both Novice and Experienced Participants**
G. Kyle Swinford; Katie Heinrich; Tammi Paolilli; Jacob Frye; Taran Carlisle
- 19) **Acute Heart Rate Response During CrossFit Workouts of Varying Duration**
Jacob Frye; Jesse Stein; Yuri Feito; Katie Heinrich
- 20) **Orthotopic Versus Ectopic Tumor Perfusion During Exercise: Implications for Host Tissue Vasoreactivity**
Emmanuel Garcia; Veronika Becker; Elizabeth Gittemeier; Danielle McCullough; Alexander Opoku-Acheampong; Brad Behnke
- 21) **Post-prandial exhaled 8-isoprostane responses to meals of varying caloric and fat content in non-asthmatic, insufficiently active men**
Stephanie P. Kurti; Sam R. Emerson; Sara K. Rosenkranz; Colby S. Teeman; Emily M. Emerson; Brooke J. Cull; Joshua R. Smith; Craig A. Harms
- 22) **Ageing Slows Vasoconstriction Dynamics in Skeletal Muscle Resistance Vessels**
Elizabeth Gittemeier; Tyler Ericson; Rahul Verma; Payal Ghosh; Emmanuel Garcia; Alexander Opoku-Acheampong; Brad Behnke
- 23) **Flavor Variation in Pomegranate Fruits, and Pomegranate Juice-Green Tea Blends**
Federica Higa; Kadri Koppel; Edgar Chambers IV

24) Do pets like sorghum in their food?

Brizio Di Donfrancesco; Kadri Koppel; Greg Aldrich

25) Reproductive Health of Female Firefighters: A Qualitative Needs Analysis

Ainslie Kehler; Sara Jahnke; Brittany Hollerbach; Katie M. Heinrich

26) The First Twenty Exercise Program and Fire Academy Recruits' Fitness and Health

Brittany S. Hollerbach; Ainslie Kehler; Jesse A. Stein; Andrew M. Alexander; Craig Harms; Thomas J. Barstow; Sara A. Jahnke; Katie M. Heinrich

27) Test-retest Reliability of Jump Execution Variables Using Mechanography: A Comparison of Jump Protocols

Lucas Bloms; Grant Tomkinson; John S. Fitzgerald; Sam Johnson; LuAnn Johnson; James N. Roemmich



Size and Timing Matter: Differential Triglyceride Responses to Three Meal Conditions

Sam R. Emerson¹; Stephanie P. Kurti²; Colby S. Teeman¹; Emily M. Emerson¹; Brooke J. Cull¹;
Dr. Mark D. Haub¹; Dr. Sara K. Rosenkranz¹

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ABSTRACT:

PURPOSE: A substantial rise in blood lipids, namely triglycerides, following a meal is associated with increased risk for cardiovascular disease, visceral adiposity, and insulin resistance. However, research investigating the effects of a meal on blood lipids has not utilized test meals that reflect typical consumption. The purpose of this study was to compare the triglyceride response of realistic meals containing moderate fat and energy content against a high-fat meal (HFM) typically used to test triglyceride responses. **METHODS:** Eight men (age: 25.8 ± 6.9 years) completed three meal trials in randomized order: a HFM (17 kcal/kg, 60% fat, 23% CHO); a moderate-fat meal (MFM; 8.5 kcal/kg, 30% fat, 52% CHO); and a biphasic meal (BPM), in which participants consumed the MFM at baseline and again three hours later. Venous blood samples were collected via indwelling catheter at baseline and then hourly for six hours post-meal to assess the triglyceride response. **RESULTS:** Total area-under-the-curve (AUC) for triglycerides was significantly greater following the HFM (1409.3 ± 815.0 mg/dL*6hrs) compared to the MFM (819.1 ± 491.5 mg/dL*6hrs; $p=0.001$) and the BPM (1003.1 ± 825.8 mg/dL*6hrs; $p=0.037$), although the MFM and BPM were not significantly different ($p=0.952$). Incremental AUC for triglycerides was also significantly greater following the HFM (679.5 ± 414.9 mg/dL*6hrs) versus the MFM (213.5 ± 201.7 mg/dL*6hrs; $p=0.004$) and the BPM (300.9 ± 333.0 mg/dL*6hrs; $p=0.018$), with no difference ($p=0.999$) between the MFM and BPM. **DISCUSSION:** These findings suggest that the drastic postprandial triglyceride response following HFMs observed in previous studies may not be representative of the daily metabolic challenge of individuals eating relatively more moderate meals.

Changes in Intake of CVD-Related Food Components Associated with an Intervention to Reduce Sedentary Time

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ABSTRACT:

Background: Insufficiently active individuals may have a high intake of food components thought to increase risk of cardiovascular disease (CVD). Lifestyle changes related to physical activity have been shown to occur alongside changes in diet, but it is unknown whether participating in an intervention to reduce sedentary behavior would be accompanied by dietary changes. Methods: Insufficiently active women (N=49) working full-time sedentary jobs were randomized into one of two 8-week interventions that advised decreasing sedentary time at work. Dietary information was collected through 3-day food records at baseline and week 8. Fasting blood lipids and glucose, blood pressure, and waist circumference were assessed at each time point. Results: At week 8, saturated fat intake was significantly associated with LDL ($r=0.49$, $p<0.01$) and total cholesterol ($r=0.34$, $p<0.05$). Changes in saturated fat consumption from baseline to week 8 were associated with changes in LDL ($r=0.77$, $p<0.01$) and total cholesterol ($r=0.36$, $p<0.05$). Consumption of sugar (baseline: 77.8 ± 37.9 g, week 8: 68.7 ± 35.7 g, $p<0.01$) and sodium (baseline: 3104.0 ± 1051.3 mg, week 8: 2896.5 ± 1245.5 mg, $p=0.05$) decreased from baseline to week 8. Changes in sodium consumption from baseline to week 8 were correlated with changes in LDL ($r=0.36$, $p<0.05$). Discussion: Following an 8-week intervention to reduce workplace sedentary behavior, there were significant decreases in sugar and sodium intake. There were no changes in saturated fat or cholesterol, but there were associations between changes in saturated fat consumption and blood lipids, as well as between sodium consumption and LDL cholesterol. Future research should determine how combining dietary and sedentary behavior interventions impacts health outcomes.

Morphology-Driven Super-repellent Polystyrene Electrospun Webs

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ABSTRACT:

Super-repellent surface design has drawn emerging attention in recent decades due to its applicability to protective and self-cleaning products. It is generally accepted that creating roughness on a low surface energy material is an effective way to fabricate a repellent surface. PURPOSE/METHOD: This study explores electrospinning process to form polystyrene (PS) webs with varied morphology, and investigates the influence of morphology on the wettability. Also, surface modification of the PS (surface tension~33 mN/m) was performed to increase or decrease its surface energy by the air plasma and vapor coating with 1H,1H,2H,2H-Perfluorodecyltrichlorosilane (PFDTs, surface tension~17 mN/m), respectively. The wettability of electrospun webs with different surface energy and morphology was investigated by measuring the contact angle of water, and the results were translated in association with the effects of surface energy and morphology-driven roughness. RESULTS/FINDINGS: Varied surface roughnesses were formed by adjusting the electrospinning conditions; beads, wrinkles, and smooth fibers were formed. With introduction of roughness by beads and fibers, the water contact angle of the web was increased, compared to that of a smooth film. With surface oxidation by air plasma treatment, the electrospun web was completely wet due to the increased surface energy. With PFDTs coating, higher repellency was achieved due to the lowered surface energy. CONCLUSION/SIGNIFICANCE: By adjusting the electrospinning conditions, the morphology of the web can be controlled. A super-repellent polymeric surface can be designed via introducing roughened morphology on a low surface energy material.

“For This Achievement You Get 3 Hearts”: Relationship Focus Group Findings

Michelle Busk; S.L. Deitz; A. Vennum; J. Kimmes; S. Conner; P. Dharnidharka; K. Tran
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ABSTRACT:

Research has suggested a need to move away from in-person curriculum-based interventions to a more customized, accessible form of relationship education (Slaunwhite, 2015). We argue the need to diversify the avenues by which relationship education is currently disseminated by providing relationship education to emerging adults in familiar and easily-accessible formats, such as a mobile phone app. The purpose of this study was two-fold: (1) to obtain an understanding of emerging adults' interest in a phone app uniquely tailored to their relationship needs and (2) to validate the primary themes of content and features of the app with a diverse population.

We collected data through focus groups of emerging adults (18 – 29) in differing relationship levels. Focus group members were asked questions aimed at understanding emerging adults' opinions on lacking relationship knowledge and effective mobile app formats. A structured interview guide was used to facilitate the focus group discussions. All focus group meetings were recorded and later transcribed. Data were analyzed using a thematic analysis approach (Braun & Clark, 2006).

Analysis of the data revealed six primary categories. Our largest category, (1) newsfeed, included themes such as relationship advice, communication skills, realistic expectations, and managing outside influences.

Other health related fields have already begun having success with prevention strategies that take advantage of the interactive capabilities of mobile technologies. The enthusiasm and richness of data in this study demonstrates that emerging adults have a strong desire for relationship education that is relevant and uniquely catered to their needs and questions.

PTSD as a Mediator between Trauma Exposure and Attachment Behaviors in Married Adults: Uncovering Unique Gender Differences

Lauren M. Oseland; Kami L. Gallus; Austin R. Beck; Briana S. Nelson Goff

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ABSTRACT:

There is a significant body of research that describes the negative impact of traumatic stress on marital relationships. However, few empirical studies have explored the pathways trauma takes to harm these important interpersonal bonds. Using a sample of 116 married adults, this study examined whether the effects of trauma exposure were associated with connecting behaviors (i.e., accessibility, responsiveness, engagement) found to promote secure attachments and if this association was mediated by any of the four PTSD symptom clusters (i.e., intrusion, avoidance, negative alterations in cognition, and arousal). Actor mediation models were run to assess symptom cluster mediation of trauma exposure and connecting behaviors. Results revealed that Total PTSD scores, as well as the avoidance, negative alterations in cognition, and arousal symptom clusters mediated the relationship between trauma exposure and connecting behaviors in males only. No indirect effects were found for females. Findings are significant because they shed light on potential gender-specific pathways trauma may take to threaten relationships instrumental to recovery. Identifying the mechanisms by which trauma impacts the marital relationship is of particular importance based on the existing research which highlights these bonds as a significant asset in the recovery process.

Bystander Intervention, Rape Myth Acceptance, and Responsible Sexuality

Chelsea Spencer; Allen Mallory; Sandra Stith; Jenna Tripodi

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ABSTRACT:

Sexual assault is a huge problem on college campuses (Cantor et al., 2015). There is growing recognition in the literature that bystander intervention programming may be a promising program to engage college students as proactive allies in reducing campus sexual violence (Katz & Moore, 2013). This study seeks to learn if students' awareness of healthy sexuality and knowledge of what constitutes as a sexual assault increases students' likelihood of intervening as a bystander. We surveyed 619 undergraduate students at a Midwestern university using a reduced version of the Bystander Behavior Scale (Coker et al., 2011), the Updated Illinois Rape Myth Acceptance Scale (UIRMA; McMahan & Farmer, 2011), and the Brief Sexual Attitudes scale (Hendrick, Hendrick & Reich, 2006). When we entered the overall UIRMA, its four subscales, and the measure of sexual responsibility into a regression equation, the six factors significantly predicted only 3% of variance in bystander intervention behaviors ($R^2 = .03$, $F(5, 606)$ $p < .01$). Teaching students about rape myths is clearly not enough to increase bystander intervention behaviors on campus. By focusing primarily on educating students about rape myths, there is a failure to address the root systemic issues that cause rape myth adherence. Addressing community climate, rather than simply educating individuals about rape myths, allows for the message to be heard (Banyard, et al., 2004).

The Domains and Boundaries of FLE and Sexuality Education

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ABSTRACT:

INTRODUCTION: The purpose of this study was to examine Family Life Education-Human Sexuality (FLE-HS) and Sex Education (SE) in regards to their domains and boundaries. According to Arcus (1995), one of the areas of professional conflict or tension is differentiating between FLE and SE. The goal was to understand how scholars and practitioners in these fields conceptualize sexuality education. The overarching research question was: How are SE and FLE-HS conceptualized? Using social construction theory and a phenomenological approach, we build upon the DFP model produced by Myers-Walls, Ballard, Darling, & Myers-Bowman (2011). The same journalistic questions of why, what, when, for whom and how were used to analyze SE and FLE-HS. **METHODS:** The journalistic questions of Why, What, When, For whom, and How were identified within each field by using the constant comparative method to complete a content analysis of 35 publications by scholars and by interviewing certified professionals in each field (n=5). **RESULTS:** Results indicated that SE and FLE-HS are similar in many ways; it is the approach each takes that makes them different. Sex Education takes a holistic approach while FLE-HS takes a contextual approach when teaching sexuality education. This approach, in turn, affects the rest of the education, including the domains that were identified. **DISCUSSION:** The results of this study will help develop a more accurate definition of each field. A more accurate definition will help recipients better understand which education is the best fit.



Ready for Release? Financial Knowledge of Inmates in a Transitional Center Program

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ABSTRACT:

BACKGROUND: Recent work at a Transitional Center in Georgia (Mielitz, 2015) provided Georgia Department of Corrections officials with evidence of the importance of financial education for transitioning inmates. Inmates approaching their re-entry into society are also preparing to encounter financial decision-making, which makes financial education training imperative as they prepare to restart their financial lives.

PURPOSE: Expand research specific to the financial literacy of transitioning inmates.

Framing this study with human capital theory suggests the following hypotheses:

- H1: The higher the level of completed education the higher the financial literacy scores.
- H2: Inmates who were employed prior to incarceration will have higher financial literacy scores than those who were unemployed.
- H3: Inmates who had a bank account prior to incarceration will have higher financial literacy scores than those who did not.
- H4: Inmates who had only one incarceration will have higher financial literacy scores.

METHODS: Primary data were collected at 13 Transitional Centers in Georgia via self-selection convenience sampling of inmates within 90 days of their tentative parole date or max out release date. Linear regression was used to investigate the predictive power of the IVs (education, employment, account, number of incarcerations) on the DV (financial literacy).

RESULTS: N=261; Education, full-time employment, having had a bank account prior to incarceration, and multiple convictions are all significant predictors of an inmate's financial literacy.

DISCUSSION: This study will broaden the scope of the literature on financial literacy and may also influence criminal justice policy regarding education of transitioning inmates.

Mielitz, K. S. (2015). Financial Education for Prisoners: Program Development and Implementation in a Work-Release Facility. Proceedings of the Association for Financial Counseling and Planning Education. Retrieved from <http://www.afcpe.org/wp-content/uploads/2015/11/2015-Proceedings-Final-1115.pdf>.



Hope, Coping, And Relationship Quality In Mothers Of Children With Down Syndrome

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ABSTRACT:

Parents of a child with Down syndrome have been shown to experience higher levels of stress and poorer coping than families of typically developing children (Sanders & Morgan, 1997). Parenting a child with Down syndrome may pose unique challenges for parents' relationship quality (Marshak & Prezant, 2007). Structural equation modeling was used with a sample of 351 mothers of children with Down syndrome to test if hope mediated the association between various parental coping behaviors and relationship quality. Results indicated a greater degree of religious coping and internal coping were each significantly associated with more hope, whereas support seeking from others was not related with more hope. Higher hope was significantly associated with greater relationship quality. An indirect effect from both religious coping and internal coping to hope, and then hope to relationship quality was identified. Results imply the importance of both religious and internal coping strategies as well as the vital role of hope in higher relationship quality of mothers. Implications for professionals may include fostering not only coping strategies but also hope to improve intimate partnership in parents of children with Down syndrome. Future research endeavors may wish to explore whether this effect is present in more racially diverse populations as well as how coping behaviors and hope may affect relationship quality in fathers.

Father Work Stress and its Relation to Negative Interaction and Problematic Child Behavior

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ABSTRACT:

Purpose: The purpose of this study was to determine if father's work stress was predictive of negative father-child interaction and problematic child behavior for children 5 years old and younger.

Research Question: What impact does father's work stress have on his relationship with his child, specifically the child's behavior and negative interactions with his child?

Methods: We used data from the German Panel Analysis of Intimate Relationships and Family Dynamics (Pairfam) project (Nauck, Brüderl, Huinink, & Walper, 2013). 185 fathers were used to complete a path analysis using Mplus 7.0 (Muthen & Muthen, 2012) with maximum likelihood estimation. Time 1 father work stress was added as a predictor variable, and time 2 father-child negative interaction and time 2 child behavior were added as latent outcome variables. To increase confidence in our model, we controlled for several important variables.

Results: We found that more work stress at time 1 was associated with more negative father-child interaction and more problematic child behavior at time 2.

Discussion: These results provide evidence for the damaging effects of father work stress on children over time in children younger than five.

On-site and Online Girl Scout Leader Wellness Training for Physical Activity in Troop Meetings

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ABSTRACT:

PURPOSE: Health promotion efforts in Girl Scouts (GS) have been successful in improving physical activity (PA) opportunities during troop meetings. The present study sought to evaluate the effectiveness of on-site and online leader wellness training on troop meeting PA and sedentary behavior. **METHODS:** Eighteen GS troops were randomized to on-site (n=9; 93 girls) or online (n=9; 88 girls) leader training. At baseline (January-February), leaders self-reported PA (scale 0-4; 0= no PA, 4= >30min PA) and sedentary behavior during one meeting, and girls from on-site trained troops also wore Actical accelerometers. During trainings, leaders set troop-specific wellness implementation goals in five areas, including increasing PA and reducing sedentary behavior. Leaders received ongoing feedback and resources to assist with meeting implementation goals. On-site leaders attended implementation goal setting and wellness trainings in person, while online leaders received training via website and emails from researchers. Following the training sessions (April-May), a post-intervention assessment was conducted, where the PA assessments were repeated. **RESULTS:** At baseline, there were no differences between groups for self-reported implemented PA (p=0.86) or sedentary behavior (p=0.66). From baseline to post-intervention, on-site troops increased PA more than online troops (on-site= +1.0±1.0, online=-0.17±0.75;p=0.037). Changes in sedentary behavior did not differ between groups (p=0.49). After training, on-site troops increased accelerometer (Actical)-measured steps per meeting (1,468±2,233steps;p=0.012), as well as moderate-to-vigorous PA (17.4±21.7min;p=0.012), while reducing sedentary behavior (-13.2±15.1min;p=0.025). **CONCLUSION:** Wellness goal training delivered on-site led to improvements in both PA and sedentary behavior during meetings, thus improving the health-promoting aspects of the GS setting.

A Meta-Analysis of Cross Cultural Risk Markers for Intimate Partner Violence

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³*Counseling and Family Science, Loma Linda University*

ABSTRACT:

Over the last few decades, there has been a movement towards identifying risk markers of intimate partner violence (IPV) to encourage preventative interventions (e.g., Stith, 2008; Schafer, Caetano, & Cunradi, 2004). The majority of IPV research originates from the United States (U.S.) and has neglected to examine cultural influences on IPV risk markers. We sought to understand if these cultural differences effect which risk marker are related to physical IPV.

We screened over 13,000 research articles from 1969-2012 that were found using research search engines and keyword searches. Articles had to be in English and have male perpetration of IPV as the outcome. These articles were subjected to exclusion criteria resulting in 903 effect sizes (ES) from 303 studies. Hofstede's individualism scale (Hofstede and Minkov, 2010) was used to group countries as individualistic or collectivistic. Because the US accounted for the majority of individualistic studies three groups were made: U.S., international individualistic, and collectivistic.

Emotional abuse was the strongest ES across groups ($r = .51$). Overall, all risk markers had significant associations with male perpetration of physical IPV. Collectivistic and U.S. groups had similar ES and the U.S. had larger effect sizes than the international individualistic countries. A number of risk markers significantly differed between the groups such as emotional abuse ($Q_b(2) = 11.79, p < .001$). Culture appears to play a role in determining the strength of IPV risk markers; more research outside the U.S. is needed further elucidate culture's differences for assessing risk and preventing physical IPV.

Destination Personality: The U.S. Travelers' Perspectives and Insights of Kansas

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ABSTRACT:

Compared to other states, Kansas has not been as successful in capturing and sustaining the U.S. travel market. Thus, the purpose of this research is to understand how travelers perceive the destination personality of Kansas and its correlation with brand equity. Specific questions to be addressed include: 1.) What are the key dimensions of destination personality that describe Kansas? 2.) Does brand equity have a mediating effect on destination personality and tourism satisfaction? 3.) Is there a strong correlation between key dimensions of destination personality and tourist's revisit intention? Pilot studies (n = 40) will help identify and validate the unique traits that describe Kansas. The main study (N = 550) will be distributed via an online marketing company in a hope to receive at least 384 valid responses. Sample size was calculated based on a population sampling estimate method from Dillman (2011). Cronbach's alpha of 0.70 or higher will be used to ensure the reliability of the scales. Confirmatory factor analysis and model fit analysis will be conducted to test if the model appropriately fits the data. The results will help researchers and tourism professionals in the state of Kansas understand potential travelers' attitudes towards Kansas. The conceptual model can also serve as a theoretical background for future researchers to apply brand personality and brand equity theory in the tourism content. Tourism companies can use this study to better align marketing campaigns to increase tourism in local communities and support the local and state economy.

Examining the Effects of Knowledge, Environmental Concern, Attitudes, and Cultural Characteristics on Kuwaiti Consumers' Purchasing Behavior of Environmentally Sustainable Apparel

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ABSTRACT:

BACKGROUND: This study is being conducted because Kuwait is a large consumer market for apparel goods and there is a gap in literature on sustainable apparel with regards to Kuwait. **PURPOSE:** The purpose of this study is to inquire about the knowledge, attitudes, and behaviors of Kuwaiti female consumers regarding environmentally sustainable apparel.

METHOD: This study uses a quantitative survey and qualitative interviews in order to acquire data from Kuwaiti females aged 18-67. This mixed method approach includes a survey instrument featuring five different pre-established scales to acquire data through quantitative methods on a population of Kuwaitis acquired through snowball sampling. The study also includes semi-structured interviews with Kuwaiti females. **RESULTS/FINDINGS:** The data analysis of the quantitative survey responses of the female Kuwaiti nationals showed that their level of knowledge on the environmental impacts of the T/A industry was low, their level of environmental concern was neutral, their ESA attitudes were neutral, and their ESA purchase intentions were slightly positive. Additionally, the cultural dimensions of the surveyed population showed high power distance and collectivism, low long-term orientation and uncertainty avoidance, and intermediate levels of masculinity and indulgence. The qualitative interview responses showed low levels of power distance, low levels of long-term orientation, and low levels of individualism in terms of the cultural dimensions. The interviews also revealed that Kuwaiti culture is strongly influenced by the Islamic religion, and the culture supports high levels of consumerism and ostentatious consumption. The participants did express environmental concern, but they were limited in their environmental knowledge. A majority of qualitative participants did not express any attitudes toward ESA, and none of the participants had purchased ESA products previously. **CONCLUSION:** Female Kuwaiti nationals are limited in their knowledge related to T/A environmental risks and are generally unaware of ESA and its purpose. The study's data could be used to provide educators with information through which to tailor curricula towards the knowledge, attitudes, and beliefs of Kuwaiti nationals. Additionally, this information could be essential for manufacturers and retailers of ESA products.

Influence of Sumac (*Rhus Glabra L.*) Leaves as a Natural Mordant on the Colorfastness of Laundering for Weld Dyed Cotton Bastiste

Sarif Ullah Patwary; Sherry Haar

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ABSTRACT:

Smooth sumac (*Rhus Glabra L.*) is a US native shrub historically used for medicine, food, tobacco, tannin, and dyes. Smooth sumac has a high tannin content due to the galls formed on the underside of the leaf by sumac leaf gall aphids. Due to unsustainable practices in the textile dyeing industry, there has been a renewed interest in natural dyes, including plant mordants. Plants, rich in tannin content (oak gall, myrobalan) or aluminum accumulating (symplocos) are potential sources of natural mordants that may be viable alternatives to chemical metallic mordants. In this research, we evaluated three mordant treatments: 1) aluminum acetate (5%), 2) ground sumac leaves (50%, 10%, 150%, 200%), and 3) combination of both treatments (sumac leaf followed by aluminum acetate). Mordanted cotton batiste samples were dyed with weld (5%). Colorfastness to laundering and staining was conducted according to AATCC test methods and resulting colors were rated using CIE L*a*b values. Descriptive statistics (mean and standard deviation) were used to describe color change. Overall, the sumac and aluminum combination at 200% gave best colorfastness results, followed closely by the same treatment at 150%. Sumac and aluminum acetate at 150% and 200% had less staining. While the aluminum acetate only treatment had the most color difference, it should be noted that it also retained the bright yellow color expected of weld by natural dyes. These findings indicate that sumac has potential as a natural mordant in terms of enhancing colorfastness to laundering.

The Impact of Physical Activity and Resistant Starch on Gut Fermentation

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ABSTRACT:

Purpose: Physical activity (PA) and resistant starch (RS) beneficially affect metabolic health. However, little is known about their combined effects on gut health. Thus, the purpose of this study was to investigate the combined effects of PA and RS on gut health and blood glucose responses. Methods: Twenty participants (Female: 11, Male: 9, Age: 24 ± 3 yr) (BMI: 24.5 ± 3.9 kg/m²) with no symptoms of metabolic diseases participated in the study. Participants wore accelerometers (Actical at the wrist) for seven days to determine physical activity status (less active vs. more active). Following PA screening, participants visited the lab twice and at each visit they consumed a standardized energy dense meal along with lemonade. The lemonade contained different doses (5g and 25g) of RS type 4 and participants received both doses in random order. Postprandial breath hydrogen and blood glucose responses were assessed when they were fasted for 11-12 hours and the assessment occurred until 6th hour. Results: The less active group consuming the 5g RS dose experienced an increase in ($p < 0.05$) breath hydrogen production (50.76 ± 49.37) compared to all the other treatments (40.41 ± 35 , 35.48 ± 34.41 , 38.06 ± 51.85). The incremental area under the curve for glucose was not different between either PA group or RS dose through two-way analysis of variance ($p < 0.05$). (statistics and p-values needed). Conclusion: These results indicate that gut health in young healthy participants, as assessed by postprandial breath hydrogen production, may be differentially affected by PA status when different doses of RS are consumed.

Effect of sodium nitrite on local control of contracting skeletal muscle microvascular oxygen pressure in healthy rats

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ABSTRACT:

Exercise intolerance characteristic of diseases such as chronic heart failure and diabetes is associated with reduced nitric oxide (NO) bioavailability from nitric oxide synthase (NOS); resulting in an impaired microvascular O₂ driving pressure (PO₂mv: O₂ delivery – O₂ utilization ratio) and metabolic control. Infusions of the potent NO donor sodium nitroprusside augment NO yet decrease mean arterial pressure (MAP) thereby reducing its efficacy for patient populations. We hypothesized that local NO₂⁻ administration would elevate resting PO₂mv and slow PO₂mv kinetics (increased τ : time constant, MRT: mean response time) during muscle contractions without compromising MAP. In 12 anesthetized male Sprague-Dawley rats, PO₂mv of the circulation-intact spinotrapezius muscle was measured by phosphorescence quenching during 180 s of electrically-induced twitch contractions (1 Hz) before and after superfusion of NaNO₂ (30 mM). NO₂⁻ superfusion elevated resting PO₂mv (CON: 28.4 ± 1.1 vs NO₂⁻: 31.6 ± 1.2 mmHg, $P \leq 0.05$), τ (CON: 12.3 ± 1.2 vs NO₂⁻: 19.7 ± 2.2 s, $P \leq 0.05$) and MRT (CON: 19.3 ± 1.9 vs NO₂⁻: 25.6 ± 3.3 s, $P \leq 0.05$). Importantly, these effects occurred in the absence of any reduction in MAP (103 ± 4 vs 105 ± 4 mmHg, pre- and post-superfusion respectively; $P > 0.05$). These results indicate that NO₂⁻ supplementation delivered to the muscle directly through NO₂⁻ superfusion enhances blood-myocyte O₂ driving pressure without compromising MAP at rest and during muscle contractions. This strategy has substantial clinical utility for a range of ischemic conditions.

High-Intensity Functional Training Improves Strength in Both Novice and Experienced Participants

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ABSTRACT:

PURPOSE: This study examined the effect of high-intensity functional training (HIFT) through CrossFit™ on strength gains after 6 months (M). **RESEARCH QUESTION:** As a general physical preparedness program (GPP), can HIFT improve strength? **METHODS:** Participants included 37 adults (46% women) ages 18-66 (mean age=31.4±13.1yrs). Participants indicated previous HIFT experience, which was dichotomized as <6M (n=18), or ≥6M (n=19). Strength was assessed by 1-repetition maximum (RM) lifts for the overhead press (P), back squat (S), and deadlift (D) at baseline (B) and 6M. Paired samples t-tests were used to examine changes over time for each lift accounting for both experience and sex.

RESULTS: Both men and women saw significant strength improvements from B to 6M. Women saw significant improvements in all three lifts in both experience categories. Differences for women with <6M HIFT experience were increases in P (t=3.3, p=.017), S (t=2.6, p=.046), and D (t=2.5, p=.049), and those with ≥6M HIFT experience were increases in P (t=3.2, p=.013), S (t=3.4, p=.008), and D (t=2.5, p=.033). Men with <6M HIFT experience saw significant improvement with an increase in S (t=2.9, p=.017) only, while those with ≥6M HIFT experience saw significant improvement with increases in S (t=3.3, p=.011) and D (t=3.5, p=.008).

CONCLUSION: CrossFit, a GPP HIFT program, elicited strength improvements in both men and women, novice and experienced alike, with women seeing the greatest number of improvements. The marked number of strength improvements seen in most participants could be due to greater neuromuscular recruitment from a constantly varied fitness program.

Acute Heart Rate Response During CrossFit Workouts of Varying Duration

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ABSTRACT:

Objective: Although CrossFit is considered a high intensity exercise program, little data exist regarding intensity achieved during CrossFit workouts.

Research Question: This study aims to identify trends in heart rate response during CrossFit workouts, and the differences that can be seen in intensity based on workout duration.

Methods: Participants, 8 adults (7 males, 1 female), with 1-7 years of CrossFit experience, were placed into 3 testing groups. An incremental exercise test was used to establish peak oxygen uptake (VO₂peak) and peak heart rate (HRpeak) using the Bruce treadmill protocol¹ and a Parvo TrueOne 2400 metabolic system. Groups completed 3 well-known CrossFit workouts in randomized orders on 3 consecutive days. Workouts named Chelsea (CH; 30-minute gymnastics triplet), Fight Gone Bad (FGB; 17-minute, 1 minute intervals of 3 lightweight resistance movements, plyometrics, and rowing.), and Annie (AN; short-duration monostructural and gymnastics couplet for time) were used. Heart rate was continuously monitored with Polar V800 monitors and Polar H7 sensors. Data were entered into SPSS and Joinpoint for analysis.

Results: Relative VO₂peak was 48.31±8.99 ml/kg/min. HRpeak post VO₂peak was 181.3±8.8 bpm. CH, FGB, and AN each elicited average heart rates of 92.4±3.3%, 91.9±3.9%, and 87.8±3.1% respectively, with no significant differences seen.

Conclusions: All three workouts elicited HR around 90% of maximum. Duration of CrossFit workouts, utilizing lower skill and lighter resistance movements, does not appear to affect participants ability to maintain high intensity levels of exercise.

Orthotopic Versus Ectopic Tumor Perfusion During Exercise: Implications for Host Tissue Vasoreactivity

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ABSTRACT:

Solid tumors, like those present in prostate cancer, contain areas of hypoxia resulting in less effective radiation therapy. Studies designed to combat tumor hypoxia have utilized both ectopic (tumor cells implanted in the subcutaneous area of the flank) and orthotopic tumor models. In orthotopic models, exercise has been demonstrated to reduce tumor hypoxia, whereas in ectopic models the effects of exercise are equivocal. Preliminary studies from our laboratory found a significant increase in blood flow to orthotopic prostate tumors versus a reduction in blood flow in ectopic tumors during moderate intensity exercise. Given this data, it was hypothesized that subcutaneous adipose arterioles and skin arterioles (ectopic tumor host tissue) in rats would have greater vasoconstriction versus prostate arterioles (orthotopic host tissue) in response to the alpha-adrenergic agonist norepinephrine (NE). Arterioles from each location were harvested from male Copenhagen rats (n=20) and cannulated with glass micropipettes for in vitro analysis. Vasoconstriction to cumulative doses of NE (10⁻⁹ – 10⁻⁴ M) were recorded. There was a significantly higher peak vasoconstriction to NE in subcutaneous adipose arterioles (92 ± 7%) versus both skin (59 ± 8%) and prostate (55 ± 7%) arterioles. There were no significant differences in vasoconstriction between skin and prostate arterioles. In conclusion, during exercise when sympathetic nerve activity is increasing, the greater vasoconstriction in the host-tissue arterioles of ectopic versus orthotopic tumor models may result in diametrically opposite responses in tumor blood flow and hypoxia. These data are critical in designing exercise studies using tumor models

Post-prandial exhaled 8-isoprostane responses to meals of varying caloric and fat content in non-asthmatic, insufficiently active men

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ABSTRACT:

INTRODUCTION: Consumption of a Western diet, characterized by calorically-dense and nutrient-poor foods, may lead to lifestyle diseases (1). Lifestyle diseases are associated with elevated oxidative stress, and even a single high-fat meal (HFM) increases 8-isoprostane (oxidative stress biomarker) systemically (2). The postprandial oxidative stress response has not been investigated in the airways, and our purpose was to assess the systemic and exhaled 8-isoprostane responses to meals of different caloric and fat content. **METHODS:** Eight non-asthmatic men (age: 25.8±6.9 years) completed two trials in random order. Following a 10-hour fast, subjects consumed either a HFM (17 kcal/kgbw mass, 60% fat) or a moderate-fat meal (MFM) (8.5 kcal/kgbw, 30% fat). Airway 8-isoprostane was collected via exhaled breath condensate at baseline, 3 hours and 6 hours post-meal. Triglycerides and systemic 8-isoprostane were assessed hourly via venous blood samples until 6 hours post-meal. **RESULTS:** Triglycerides significantly increased post-meals, and were greater post-HFM compared to post-MFM ($p < 0.01$). Systemic 8-isoprostane increased from baseline to 6 hours ($34.2 \pm 28.8\%$, $p < 0.05$), but did not differ between HFM and MFM ($p = 0.37$). Airway 8-isoprostane decreased post-MFM from baseline to 3 hours ($\Delta = -0.44$ pg/mL, $p = 0.03$) and post-HFM from 3 to 6 hours ($\Delta = -0.38$ pg/mL, $p = 0.04$). **CONCLUSIONS:** Oxidative stress increases systemically and decreases in the airways postprandially. Airway 8-isoprostane responses may vary according to the meals caloric and fat content. Future research should focus on elucidating the mechanisms that explain the postprandial oxidative stress responses to varying meal types.

Aging Slows Vasoconstriction Dynamics in Skeletal Muscle Resistance Vessels

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ABSTRACT:

With advancing age there is a reduced ability to tolerate orthostatic stress and perform exercise. An increase in peripheral vascular resistance (PVR) during both of these challenges, facilitated in part by sympathetically mediated vasoconstriction, is requisite to maintain central venous return and arterial blood pressure. In aged subjects, the ability to rapidly enhance PVR is diminished, which contributes to orthostatic intolerance in many aged individuals. The purpose of this investigation was to test the hypothesis that the rate of arteriolar vasoconstriction will be diminished with old age. Resistance arteries from the highly oxidative red portion of the gastrocnemius muscle of young (6 mo old; n=4) and aged (24 mo old; n= 4) Fisher-344 rats were isolated and cannulated. Then after exposure to 10-4M norepinephrine, the temporal characteristics of vasoconstriction were quantified. With old age, the delay before the onset of constriction was ~ 5x longer than the younger counterparts (young, 0.7 ± 0.1 vs. aged, 3.7 ± 0.4 s), and the time to SS was substantially prolonged (young, 6.6 ± 0.4 vs. aged, 19.5 ± 1.2 s). Despite no difference in the overall magnitude of vasoconstriction between groups, the rate of vasoconstriction was blunted with old age (young, 35.9 ± 9.1 vs. aged, 14.1 ± 0.9 μm/s). During orthostatic stresses, a reduced ability to vasoconstrict peripheral arteries would lead to blood pooling in the periphery, diminished venous return and an inability to maintain mean arterial pressure. The precise mechanisms responsible for the reduced rate of vasoconstriction are currently being investigated.

Flavor Variation in Pomegranate Fruits, and Pomegranate Juice-Green Tea Blends

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ABSTRACT:

Pomegranate Juice-Green tea blends Descriptive Flavor Profile and Consumer Research.

BACKGROUND: Pomegranate fruit and its juice has increased in popularity due to beneficial health properties, mainly for their high polyphenol content. Tea is one of the most consumed beverages in the world, and Green tea (GT) is known to have the highest polyphenol content of all varieties. The objective of this study was to explore sensory differences of pomegranate juice (PJ) and GT blends at different ratios, followed by consumer research. **METHOD:** A group of six highly trained panelists evaluated the 6 juice-tea blends (90:10, 80:20, 70:30, 60:40, 50:50, and 40:60) and determined flavor characteristics. A total of 100 consumers evaluated the liking of the beverage blends. **RESULTS/FINDING:** Descriptive analysis showed differences in flavor. Blends showed higher Green and GT like for samples higher in tea concentration, but lower in Berry, Beet, Floral, Sweetness, and Chery flavors. Significant differences were found in liking of the samples. The highest in PJ and lowest in GT blend was liked the most. **CONCLUSION:** PJ-GT blends research will continue with determination of Total Phenolic Content, in order to find the optimal concentration of the blend. This will enable to determine a beverage with the highest polyphenol content and consumer acceptability.

Do pets like sorghum in their food?

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ABSTRACT:

Kansas is the top producer of sorghum in the US. This crop grows well in arid climates with lower water requirements. To increase the use of sorghum, industries such as pet food can be targeted. To do this, understanding aspects such as sensory properties and pets' acceptance of the final products is essential. The objectives of this study were to investigate the sensory profile of dry dog food containing sorghum and to investigate dogs' acceptance of these products. Three samples containing different sorghum fractions and a control sample containing mixed grains were manufactured. A trained human descriptive sensory panel described the sensory characteristics of the samples. In addition a total of 30 dogs of different size, age, and breed were selected for a one-bowl in-home palatability study to test pet acceptance of samples. The dogs were served each of the foods for 5 consecutive days in a randomized order. Differences among samples from the descriptive analysis were small and mostly related to the appearance and texture of the samples. Samples manufactured with sorghum and the control sample had similar flavor and aroma profiles. The palatability study with dogs showed no significant difference in dogs' acceptance between control and sorghum samples. The results from this study indicated that sorghum has no major effect on flavor or aroma properties of extruded pet foods. Further, the dogs seemed to like the foods manufactured with sorghum and other grains equally. Thus these results encourage the use of sorghum in dry dog food products.

Reproductive Health of Female Firefighters: A Qualitative Needs Analysis

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ABSTRACT:

Although female firefighters account for only 3-5% of the US fire service, this still represents over 10,000 women. Despite a growing body of research on the health impact of firefighting, women are usually excluded due to small sample size. There has been little research conducted on the reproductive health of female firefighters. Recent findings have linked female firefighters with a larger incidence of negative birth outcomes compared to the national average. This alarming information highlights the gap in knowledge, and is critical for departments. **PURPOSE:** To determine the knowledge level, concerns, and policies in place regarding the reproductive health of female firefighters. **METHODS:** 73 female firefighters and fire service leaders were solicited for participation in focus groups. The discussion on reproductive health began with "What concerns exist related to reproductive health among women in the fire service?" Using 2-phase coding process, all interviews were transcribed verbatim then coded thematically with NVivo analysis software. **RESULTS:** The following themes were identified: 1) lack of knowledge on pregnancy policy, 2) uncertainty about job roles, 3) firefighters receive little education on reproductive health. **DISCUSSION:** Addressing reproductive health through education and policy will benefit the fire service. Adoption of a policy such as the NFPA Standard 1582 (9.18) will minimize confusion, clarify timelines, roles, and may help with female recruitment and retention. Due to potential firefighting hazards, policy and education on reproductive health is critical.

The First Twenty Exercise Program and Fire Academy Recruits' Fitness and Health

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ABSTRACT:

Firefighting is inherently dangerous with well documented injury/fatality rates. Firefighters struggle with poor health/low fitness levels, including high (>80%) rates of overweight/obesity. The First Twenty Performance Program (TF20) provides foundational education around fitness, mental performance, and nutrition online. **PURPOSE:** This study compares performance, acceptability, and feasibility results from TF20 with usual care physical training for firefighter recruits.

METHODS: Participants were current firefighter cadets (n=11 males, 23±2.79 years). Using a pre-test, posttest design, participants were randomly assigned to usual care (self-directed individual fitness program) or TF20. All participants provided informed consent. Both groups completed health assessments, anthropometric, and performance measures at baseline which will be repeated at posttest. Performance was assessed using the Candidate Physical Ability Test (CPAT) and other fitness/strength measures. Acceptability/feasibility will be measured posttest by psychosocial measures assessed by a short questionnaire and 5-10 minute interview. TF20 will complete 12 weeks of programmed workouts; usual care will continue current exercise behaviors.

RESULTS: Results will help establish program effectiveness and provide effect sizes and parameter estimates for the design of a larger randomized controlled trial. A successful study would provide alternative guidance for exercise prescription designed specifically for the firefighter population.

DISCUSSION: This study directly addresses improving health and fitness among firefighter recruits. Results may be useful in the design and implementation of training programs tailored to improving both individual firefighting skills and fireground performance.

Test-retest Reliability of Jump Execution Variables Using Mechanography: A Comparison of Jump Protocols

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ABSTRACT:

Jump mechanography (JM) allows for the evaluation of force-time variables reflecting jump execution, which may enhance screening for functional deficits that reduce physical performance and determine causes for performance changes. However, JM is limited by test-retest reliability of force-time variables. Therefore, the purpose of this study is to examine test-retest reliability of jump execution variables (JEV) assessed from JM between two protocols.

Methods: 32 women (mean±SD: age=20.8±1.3 yr, height=167.6±6.3 cm, mass=68.2±12.7 kg) and 16 men (age=22.1±1.9 yr, height=181.5±5.0 cm, mass=94.1±24.6 kg) attended a familiarization session and two testing sessions. Participants performed six squat jumps (SJ) per session, with a self-selected squat depth for three jumps and controlled squat depth for the remaining jumps. JM data was recorded, sampled at 1,000Hz and filtered with a cutoff frequency of 90.9Hz using Bertec Digital Acquire™. JEV were calculated using a macro program in Microsoft Visual Basic. Eight force-time variables were assessed. Test-retest reliability was quantified as the systematic error (using %difference between jumps), random error (using coefficients of variation), and test-retest correlations (using intraclass correlation coefficients).

Results: JEV demonstrated good reliability, evidenced by very small systematic errors (mean ±95%CI: -1.2 ±2.3%), small random errors (mean ±95%CI: 17.8 ±3.7%), and very strong test-retest correlations (range: 0.73-0.97). Differences in random errors between controlled and self-selected protocols were negligible (mean ±95%CI: 1.3 ±2.3%).

Conclusion: JEV demonstrated good reliability, with no meaningful differences between the SJ protocols. Therefore, a self-selected SJ depth protocol can be used to assess force-time variables with negligible impact on measurement error.