Injury Prevention Research

SYMPOSIUM

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INJURY PREVENTION CENTER

POSTER PRESENTATION

ABSTRACTS

01

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Adolescent Psychopathology and Risk of Injuries in Early Midlife: Evidence from a Nationally-Representative Cohort Study

Statement of Purpose
Early-life psychopathology is associated with elevated risk of injury. Prior work has focused on intentional self-injuries, individual mental-health conditions, and injuries sustained in childhood. It remains unclear whether a) psychopathology is associated with unintentional and assault injury, b) associations are evident for internalizing and externalizing psychopathology, and c) associations extend into midlife.

Methods and Approach
In a representative U.S. cohort (N=10,363), we tested associations of adolescent psychopathology with early-midlife unintentional injury, assault injury, and intentional self-injury, after accounting for demographics and adolescent socioeconomic status (SES) and cognitive ability. We also tested associations with unintentional injury in a sibling-comparison to help address unmeasured confounding. Finally, we tested associations with midlife circumstances complicating injury recovery.

Results and Conclusions
Adolescents with psychopathology had elevated risk of midlife assault injury (OR=2.99 [2.23-3.99]) and unintentional injury (OR=1.41 [1.18-1.67]), in addition to intentional self-injury (OR=2.49 [1.60-3.87]), after accounting for demographics and adolescent SES and cognitive ability. Associations with assault and unintentional injury were evident for internalizing and externalizing psychopathology. Siblings with psychopathology were not more likely to experience unintentional injury than their co-siblings without psychopathology, but estimates were imprecise. Adolescents with psychopathology were more likely to experience fair-to-poor self-rated health, low social support, unemployment, lack of health insurance, and unmet healthcare needs in midlife.

Innovation and Significance
These findings identify adolescent psychopathology as a marker of adult injury risk, support the integration of injury prevention with mental-health treatment, and emphasize the need to consider inequitable contexts surrounding injury.

02

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Prevent, Protect, Connect: Translating Firearm Safety Research into Child Injury Prevention Practice

Statement of Purpose
Firearm-related injuries are a leading cause of preventable harm among young children. This project aimed to examine parents' and caregivers' perceptions of firearm storage in households with children aged five years and younger through the SAFE ARMS (Supporting All Families through Education and Responsible Management and Storage) initiative. The goal was to inform community-based injury prevention strategies and support evidence-informed firearm safety practices.

Methods and Approach
As an Injury Prevention Center (IPC) intern in the Child Health and Development Lab at the University of Michigan School of Public Health, I contributed to survey development, community engagement, qualitative analysis, and knowledge translation. I revised the SAFE ARMS survey for clarity and usability and supported University of Michigan Pop-Up Safety Town events by interacting with caregivers and children, distributing surveys, and supporting firearm safety education efforts across multiple Michigan communities, including Ann Arbor, Ypsilanti, Flint, Brighton, Durand, and Hamtramck. I conducted an analysis of the SAFE ARMS survey data that included closed-ended quantitative questions on firearm storage practices and preferences for educational methods (e.g., preferred videos, tutorials, or demonstrations), as well as open-ended qualitative questions capturing caregiver perspectives on firearm safety. Quantitative responses were analyzed descriptively to summarize storage practices and educational preferences, and qualitative responses to open-ended questions identified key perceptions and rationales for preferred learning approaches.

Results and Conclusions
Analysis revealed caregivers' perceptions of firearm storage, common barriers to safe practices, and preferences for how they want to learn about firearm safety, including videos, demonstrations by safety specialists, personal testimonials, or advertisements on secure storage practices. Quantitative results summarized patterns in storage practices and preferred learning methods. These insights were synthesized into a one-page community-facing research brief (summer 2025), which was shared with Michigan Medicine and community partners, and a five-page research brief (fall 2025), which will be shared with the same partners. The briefs highlight caregivers' preferences and community needs, providing evidence to guide future educational strategies that are responsive and contextually appropriate.

Innovation and Significance
This work advances child injury prevention by combining community engagement, quantitative and qualitative insights, and research translation to inform firearm safety education. By centering caregivers' preferences and community needs, the SAFE ARMS project provides a model for implementing community-informed injury prevention interventions and bridging the gap between research and practical educational strategies.

03

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Adolescent Energy Drink Consumption as a Substance Use–Related Injury Risk: A Literature Review

Statement of Purpose
Adolescent energy drink consumption has increased over recent decades and represents an underrecognized substance use–related injury risk. Energy drinks contain high concentrations of caffeine and sugar and have been associated with acute adverse events, like emergency department visits and accidental overdose among youth. This project synthesizes existing evidence on adolescent energy drink consumption through an injury prevention lens to identify modifiable risk factors and prevention-oriented strategies.

Methods and Approach
A structured review of peer-reviewed literature was conducted, including systematic reviews, epidemiological studies, poison control reports, and public health analyses focused on adolescent energy drink consumption. The review emphasized evidence related to acute injury mechanisms, overdose risk, emergency care utilization, marketing influences, and prevention strategies.

Results and Conclusions
The literature demonstrates associations between adolescent energy drink consumption and preventable injury outcomes, including headaches, anxiety, sleep disturbances, elevated blood pressure, tremors, seizures, and cardiovascular symptoms. Poison control and emergency department data indicate thousands of caffeine-related injury encounters annually, with adolescents disproportionately affected. Marketing strategies emphasizing athletic performance and risk-taking increase youth appeal and consumption. Prevention approaches identified include caffeine content disclosure, warning labels, age-based access restrictions, and regulation of youth-targeted advertising.

Innovation and Significance
This project reframes adolescent energy drink consumption as a substance use–related injury prevention issue rather than just a dietary concern. By synthesizing evidence across health outcomes, overdose risk, and policy gaps, this work highlights opportunities for upstream injury prevention and public health intervention.

04

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Six Steps to Squats: Strength and Movement Quality–Focused Rehabilitation With Potential Relevance to Secondary Injury Risk Following Lower Extremity Fractures

Statement of Purpose
Lower extremity fractures are associated with deficits in strength, mobility, and movement quality following weightbearing-as-tolerated (WBAT). This study evaluates whether a structured, progressive squat-based rehabilitation protocol (“Six Steps to Squats”) improves lower extremity strength and functional movement quality during recovery.

Methods and Approach
This prospective comparative study includes adults recovering from a single isolated lower extremity fracture with no prior orthopedic procedures. Experimental participants initiate the Six Steps to Squats protocol within two months of achieving WBAT, while controls achieved WBAT six to twelve months prior without squat-specific training. The protocol progresses through ankle and hamstring mobility, passive hip, knee, and ankle range of motion, passive single-leg range of motion, eccentric squat training, and concentric squat training. Outcomes include standardized hip, knee, and ankle flexion during assisted and unassisted squatting and functional outcomes using the SF-36 questionnaire.

Results and Conclusions
Eighteen patients have been enrolled (13 control, 5 experimental). Preliminary analysis shows greater knee flexion during unassisted squats in control participants further removed from injury, with no meaningful differences in hip or ankle flexion. Subgroup analysis suggests patients with bimalleolar ankle fractures demonstrate reduced squatting performance. No adverse events have been reported, and adherence has been high.

Innovation and Significance
This study presents a standardized, replicable squat-based rehabilitation framework integrating progressive strength loading with functional movement assessment. Improving strength and movement quality during recovery may have downstream relevance for reducing fall and reinjury risk following lower extremity fractures.

05

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Childhood Malnutrition Is Linked to Higher Long-Term Fracture and Mortality Risk

Statement of Purpose
Pediatric malnutrition is a major global health concern with known associations to growth impairment, immune dysfunction, and skeletal fragility. However, the long-term impact of malnutrition on fracture incidence and mortality in children remains poorly defined. This study aims to quantify the five-year risk of fracture and all-cause mortality in pediatric patients with laboratory evidence of malnutrition compared to matched controls.

Methods and Approach
We conducted a retrospective cohort study of pediatric patients aged 0–18 years who underwent clinical evaluation between January 1, 2018, and July 1, 2018, with five years of follow-up. Malnutrition was defined as serum transferrin ≤204 mg/dL, albumin ≤3.5 g/dL, or leukocyte count ≤1.5 × 10^3/μL. Patients with a history of malnutrition were compared to those with no laboratory evidence of malnutrition. Propensity score matching (1:1) was performed on 22 demographic and clinical variables, including comorbidities such as cerebral palsy, osteogenesis imperfecta, leukemia subtypes, and noninfective enteritis. The primary outcome was five-year fracture risk; secondary outcomes included site-specific fracture patterns and all-cause mortality. Cox proportional hazards models were used to compute hazard ratios (HRs) with 95% confidence intervals (CIs).

Results and Conclusions
After matching, 15,753 malnourished patients and 15,753 controls were analyzed. Malnourished patients exhibited a significantly higher risk of overall fracture (7.3% vs. 6.0%, HR: 1.26, 95% CI: 1.15–1.37, p<0.001), femur fracture (1.4% vs. 0.4%, HR: 4.02, 95% CI: 3.00–5.39, p<0.001), lower leg fracture (1.5% vs. 1.1%, HR: 1.39, 95% CI: 1.14–1.69, p<0.001), fragility fracture (0.2% vs. 0.1%, HR: 4.07, 95% CI: 1.96–8.45, p<0.001), and pathologic fracture (0.5% vs. 0.1%, HR: 5.00, 95% CI: 2.87–8.70, p<0.001). All-cause mortality was markedly elevated in the malnourished group (5.5% vs. 0.7%, HR: 7.84, 95% CI: 6.44–9.55, p<0.001). Fracture risk was also significantly elevated at the one-year mark, particularly for femur and pathologic fractures (HRs: 4.57 and 14.58, respectively).

Innovation and Significance
Pediatric malnutrition is associated with a significantly increased risk of both short- and long-term fracture and mortality. The disproportionate elevation in femur, fragility, and pathologic fracture risk highlights the skeletal vulnerability of this population. These findings support the need for early nutritional screening and bone health surveillance in children with biochemical evidence of malnutrition.

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Effect of Preoperative Malnutrition on Postoperative Morbidity After Distal Femur Fracture Fixation: A Propensity-Matched Study

Statement of Purpose
Distal femur fractures (DFF) are serious injuries most often affecting older adults with multiple medical comorbidities. Malnutrition is known to worsen outcomes in elective orthopedic surgery, but its impact in urgent DFF fixation, where optimization time is limited, remains unclear. This study evaluated whether preoperative malnutrition predicts 90-day morbidity after DFF fixation and whether implant choice influences risk among malnourished patients.

Methods and Approach
Adults undergoing operative DFF fixation from 2005–2025 were identified using the TriNetX U.S. Collaborative Network. Malnutrition was defined as serum albumin ≤3.5 g/dL or leukocyte count ≤1.5×10^3/μL within one year preoperatively. After 1:1 propensity matching for demographics and comorbidities, outcomes were compared between 13,924 malnourished and 13,924 non-malnourished patients. A secondary matched analysis compared plate versus intramedullary nail fixation in malnourished patients (n=662). Ninety-day postoperative complications were assessed.

Results and Conclusions
Malnourished patients had significantly higher rates of nearly all 90-day complications, including sepsis (RR 3.55), surgical site infection (RR 3.05), wound disruption (RR 3.38), pulmonary embolism (RR 2.09), pneumonia (RR 2.45), renal failure (RR 2.53), anemia (RR 1.97), and transfusion (RR 2.52) (all $p<0.001$). Readmission and opioid-related outcomes were also elevated. Among malnourished patients, complication rates were similar between plate and nail fixation, with the exception of lower pneumonia rates in plate fixation ($p=0.045$).

Innovation and Significance
Preoperative malnutrition is a strong, independent predictor of postoperative morbidity after DFF fixation, and risk remains high regardless of implant choice. Early nutritional screening and targeted perioperative optimization should be integrated into trauma workflows to improve outcomes for this vulnerable population.

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Impact of Playing Surface on Lower Extremity Injuries in the Modern-Era NFL

Statement of Purpose
Artificial turf has become increasingly common in the National Football League (NFL), but players and clinicians continue to question whether these surfaces increase the risk of lower extremity (LE) injuries compared with natural grass. This study aimed to synthesize modern-era NFL data comparing artificial turf and natural grass with respect to LE injury incidence and severity.

Methods and Approach
We performed a narrative review of modern-era (2012–2024) NFL-focused epidemiologic studies and league-related data sources that directly compared LE injuries on artificial turf versus natural grass. Studies were identified through peer-reviewed literature and professional reports that included (1) analyzed NFL athletes, (2) reported LE injury incidence or rates by surface type, and (3) used contemporary (“modern-generation”) artificial turf. For each included source, we extracted surface-specific injury rates, effect sizes, and definitions of severe or season-ending injury.

Results and Conclusions
Across 2012–2016 regular-season games, one NFL epidemiologic study reported a 16% higher rate of lower extremity injuries per play on synthetic turf compared with natural turf (incidence rate ratio 1.16). In a more recent analysis of the 2021 and 2022 seasons (718 LE injuries), overall injury incidence was 1.42 injuries per game on artificial turf versus 1.22 per game on natural grass, and the odds of an injury requiring season-ending surgery were 1.60 times higher on artificial turf. A separate study of in-game season-ending LE injuries from 2020–2022 identified 199 such injuries: 79 (39.7%) on natural turf and 120 (60.3%) on artificial turf, corresponding to injury rates of 0.199 and 0.242 per game, respectively, without a statistically significant difference between surfaces. League-reported data from 2012–2018 indicate that non-contact LE injuries overall are 28% more frequent on artificial turf than on grass, with non-contact knee injuries 32% higher and non-contact foot/ankle injuries 69% higher on turf. Contemporary systematic review data across sports suggest higher foot/ankle injury rates and increased knee injury risk on turf among football players.

Innovation and Significance
When assessing modern-era NFL data, artificial turf is consistently associated with higher overall LE injury incidence and greater odds of season-ending surgery. These findings highlight the need for future multi-season NFL studies that standardize turf classification to inform league-wide field-surface policies.

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Perioperative Gabapentinoids Predict Increased Early Morbidity Following Lumbar Decompression

Statement of Purpose
To evaluate whether perioperative gabapentinoid exposure pattern is associated with short-term complications after lumbar decompression.

Methods and Approach
Adults undergoing lumbar decompression (CPT 63047/63048) were identified in TriNetX on January 12, 2026. Exposure groups were continuation, new start, and never. Separate 1:1 propensity score matching was performed for continuation vs never (56,005 pairs), continuation vs new start (6,082 pairs), and new start vs never (6,074 pairs). Time-to-event comparisons used Cox proportional hazards models.

Results and Conclusions
Compared to never users, patient who were continued on gabapentinoids had higher naloxone prescription at 30 days (HR 2.04, 95% CI 1.97–2.12) and 90 days (HR 2.04, 95% CI 1.96–2.11), and higher 30-day acute respiratory failure/mechanical ventilation (HR 1.36, 95% CI 1.25–1.47) and pulmonary embolism (HR 1.38, 95% CI 1.24–1.53). Compared to new-start users, continuation of gabapentinoids was associated with lower acute respiratory failure/mechanical ventilation (30 days: HR 0.75, 95% CI 0.62–0.90; 90 days: HR 0.78, 95% CI 0.66–0.92), lower pulmonary embolism (30 days: HR 0.74, 95% CI 0.58–0.93; 90 days: HR 0.79, 95% CI 0.65–0.96), and lower death (30 days: HR 0.52, 95% CI 0.31–0.88; 90 days: HR 0.54, 95% CI 0.37–0.77). Never users had lower naloxone prescription than new-start users at 30 days (HR 0.55, 95% CI 0.50–0.61) and 90 days (HR 0.54, 95% CI 0.49–0.60).

Innovation and Significance
Perioperative gabapentinoid exposure after lumbar decompression was associated with higher short-term adverse outcomes versus never use; postoperative initiation showed the highest-risk profile and a consistent naloxone safety signal.

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Disrupting Pathways Between Community Violence Exposure and Teen Violent Behavior: Exploring Retaliatory Attitudes and Caregiver Monitoring

Statement of Purpose
Teen violent behavior (e.g., fighting, firearm carriage) is a significant public health concern. The purpose of this study was to identify multilevel socioecological risk (e.g., community violence, teen retaliatory attitudes) and protective factors (e.g., caregiver monitoring) that influence teen violent behavior. Existing literature consistently documents that community violence is a risk factor for teen violence. At least one community-based study identified retaliatory attitudes (e.g., I believe revenge is a good thing) as a psychological mechanism connecting violence exposure to teen violent behavior. Much less research has focused on protective factors that disrupt teen violent behavior. To our knowledge, no studies have examined linkages between community violence, retaliatory attitudes, and teen violent behavior using a national sample.

Methods and Approach
In the present study, we utilized data from the nationally representative Firearm Safety Among Children and Teens Study (FACTS) which surveyed 2,179 teens (ages 14-18) and their caregivers to test whether retaliatory attitudes mediate associations between community violence and teen violent behavior. Guided by resilience theory, we also assessed whether caregiver monitoring (e.g., caregivers have rules for teens) reduces retaliatory attitudes despite community violence exposure. We estimated a moderated mediation with survey weights in MPlus and adjusted for age, gender, race, caregiver education, school violence, and family conflict.

Results and Conclusions
Results indicated that: 1) Retaliatory attitudes mediate associations between community violence and teen violent behavior (unstandardized indirect effect = 0.005; bootstrapped 95% CI [0.001, 0.013]), and 2) The indirect effect of retaliatory attitudes was only significant in the low caregiver monitoring group (unstandardized indirect effect = 0.026; bootstrapped 95% CI [0.011, 0.058]).

Innovation and Significance
Our findings bolster emerging evidence highlighting retaliatory attitudes as an underlying psychological mechanism of teen violent behavior and provides new knowledge on the buffering influence of caregiver monitoring.

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Reclaiming Space, Reducing Violence: Vacant Lot Reuse Strategies and Community Engagement in Detroit

Statement of Purpose
Detroit faces the double burden of violent crime and structural disinvestment. Vacant lot reuse (VLR) is a promising place-based intervention to address these concerns. VLR is guided by Busy Streets Theory, which posits that strong social infrastructure reduces crime by fostering social cohesion. Our prior work suggests that neighborhood connections may enhance these effects. This study evaluates VLR's effectiveness in reducing firearm-related crime in Detroit; compares outcomes by VLR type; and examines the moderating effect of community engagement (CE).

Methods and Approach
We identified VLR intervention sites with support from community partners. After matching intervention sites to a pool of control sites, we ran a mixed effects ANCOVA model, testing the three-way interaction of intervention group designation, pre-post intervention status, and year on firearm-related crime, with random intercepts for each site. We then added interaction terms testing VLR types and CE.

Results and Conclusions
Our ANCOVA models showed that intervention sites had significantly lower rates of firearm-related crime than control sites post-test, confirming VLR's effectiveness. Community gardens and creative placemaking had the greatest buffering effect. Significant reductions in firearm violence relative to control sites were observed only at locations with low CE, but not with high or moderate CE, suggesting the need for further research examining the complexity of implementation contexts.

Innovation and Significance
Our study is the first to examine VLR interventions by VLR type and CE level, contributing to a growing body of literature underscoring the importance of structural place-based interventions to firearm-related crime reductions. Interventions that promote social infrastructure have the potential not only to reduce crime, but also to address long-standing structural inequities and disrupt cycles of disinvestment and violence.

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Epidemiology, Mechanisms of Injury, and Return to Performance Following Concussion in Women's and Men's Division I Collegiate Soccer

Statement of Purpose

Research suggests sport-related concussion (SRC) risk and mechanism of injury (MOI) differ by sex and sport; thus, we aim to describe SRC epidemiology in men's and women's soccer to enhance safe participation in the sport.

Methods and Approach

The Ivy League-Big Ten Epidemiology of Concussion Study, a prospective cohort study, initiated in 2013/14. Over 400 Men and Women participated annually (roster position: 35.8-41.2% midfielder, 29.9-35.8% defender, 17.5-22.5% attack, 11.4% goaltender). We described SRC incidence per 100-athletes with 95% confidence intervals. We classified MOI via percentages: activity type, head impact object, and coded descriptive narratives to contextualize MOI. We summarized median days (interquartile range:(IQR)) between injury to clinical recovery milestones (i.e., injury reporting, and return-to-academics, -symptom resolution, -limited sport, -full sport(RTP)).

Results and Conclusions

Average SRC incidence for Men (n=146) was 6.5/100 athletes (range:3.9-9.0), and Women (n=162) was 6.5/100 athletes (range:6.5-9.0). SRC incidence ranged by position from 4.4-6.1 /100 athletes in Men and 4.6-11.2/100 athletes in Women. Men's most common MOI was person-contact (57.5%, n=84), of which 53 occurred in competition (63.1%); women's was ball-to-head contact (50.6%, n=82), of which 48 occurred in practice (58.5%). Men (72.6%, n=106) and women (69.1%, n=112) often reported SRCs on the same day. Median clinical recovery for men and women was academics: 5 and 6 days, symptom resolution: 8 and 7.5 days, limited sport: 10 and 11 days, and RTP: 14 and 14 days, respectively.

Innovation and Significance

We observed unique injury mechanisms, incidence, and clinical recovery between groups, warranting sex- and position-specific prevention strategies and policy considerations to optimize athlete safety.

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Insight from Participants in Michigan's Overdose Education and Naloxone Distribution Programs

Statement of Purpose
Opioid Overdose Education and Naloxone Distribution (OEND) programs are a key public health strategy for reducing opioid-related overdose deaths. As overdose risk has increased with a toxic and unpredictable drug supply, enhancing the effectiveness, accessibility, and relevance of OEND trainings has become increasingly important. This study examines participants' experiences with OEND training in Michigan, with particular attention to perceived benefits, recommendations for improvement across in-person and online formats, and training outcomes.

Methods and Approach
Data were collected over a one-year period from adults who completed an in-person or online OEND training through a publicly funded community agency in Michigan. Following training, participants completed a web-based survey that included open-ended questions about what was most helpful, what could be improved, and overall training experiences. 539 individuals completed the survey (33% from in-person training; 67% from online training). Open-ended responses were analyzed using thematic analysis to identify patterns in perceived strengths of the training, participant-identified opportunities for enhancement, and perceived outcomes, with attention to similarities and differences by training modality.

Results and Conclusions
Participants identified several strengths of OEND trainings, most notably increased capacity to recognize and respond to overdoses, including administering naloxone and understanding overdose signs and responses. Instructional strategies such as demonstrations, hands-on practice, visuals, and clear explanations were considered particularly helpful, along with experiential learning through stories, guest speakers, and discussions. Participants also valued contextual information related to addiction, legal protections, and community resources. Suggested enhancements focused on additional skills practice, increased engagement, refined organization, recovery-sensitive language, and clearer naloxone distribution processes. Many participants reported increased confidence and readiness to respond to overdoses.

Innovation and Significance
By centering participant perspectives across training formats, this study provides practical insights for strengthening OEND implementation. Findings highlight the importance of flexible, multimodal delivery approaches that combine practical skill-building with contextual and stigma-informed education to enhance overdose response preparedness.

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Parental Preferences for School Safety Strategies by School Type and Perceived Risk

Statement of Purpose
Parents play a critical role in shaping school safety priorities and the adoption of injury prevention strategies. Yet little is known about how their perceptions of risk align with different approaches to school safety. To examine whether the type of school a child attends, level of safety concern, and specific safety issues (e.g., bullying, suicide, shootings) are associated with parents' preference for physical school safety strategies versus social or attentive strategies, grounded in the Stilwell et al. (2024) comprehensive model of school safety.

Methods and Approach
Data are drawn from the C.S. Mott Children's Hospital National Poll on Children's Health, a nationally representative survey of parents of U.S. children ages 6 to 12 (N=1,000). Parents reported the type of school their child attends (e.g., public, private, charter), their level of concern about school safety, and which issues they consider relevant to their child's school. Parents also identified which strategies they believed would be most effective for improving school safety. Strategies were mapped onto the comprehensive model of school safety (Stilwell et al., 2024) and categorized as (1) physical (e.g., building security, onsite law enforcement), (2) attentive (e.g., confidential reporting systems, threat detection), or (3) social (e.g., teacher training, counseling). Multiple regression analyses will examine associations between school type, safety concerns, and perceived safety issues with parents' preferred prevention strategies, adjusting for demographic covariates.

Results and Conclusions
Analyses will assess whether parents' preferences for physical versus social or attentive strategies vary with perceived risk level.

Innovation and Significance
This study advances injury prevention research by applying a comprehensive school framework to parental perspectives, an influential group in school safety decision-making.

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Penetrating Trauma in Pregnancy: Affliction of a Vulnerable Population

Statement of Purpose
Penetrating trauma, including firearm and stab injuries, is a leading cause of maternal mortality in the United States and represents a high-risk, resource-intensive clinical scenario for patients. Despite its severity, limited contemporary data describe how pregnant patients with penetrating trauma differ from their non-pregnant counterparts. This study aimed to characterize the demographics, injury patterns, presentation, and outcomes of pregnant patients experiencing penetrating trauma and to compare these findings with non-pregnant female patients of similar age.

Methods and Approach
We performed a retrospective descriptive analysis using the National Trauma Quality Improvement Program (TQIP) database from 2020 to 2023. Female patients aged 9 to 55 years presenting with penetrating trauma were included (n= 1,057). Pregnancy status was identified using the pre-existing condition variable. Pregnant patients were compared with non-pregnant female patients within the same age range. Demographics, baseline physical and mental health characteristics, injury mechanism and severity, hospital characteristics, and outcomes were assessed. Univariate analyses were performed to compare groups.

Results and Conclusions
Pregnant patients with penetrating trauma were younger (median 25 vs 29 years), more frequently insured by Medicaid (61% vs 46%), and more often identified as Black (57% vs 41%) compared with non-pregnant patients (all $p < 0.001$). Pregnant patients had lower rates of smoking, hypertension, and diabetes and similar or lower rates of mental illness. Firearms accounted for a greater proportion of injuries among pregnant patients (70% vs 50%), with higher rates of assault (70% vs 55%; $p < 0.001$). Pregnant patients were more likely to test positive for opioids and had higher injury severity (median NISS 8 vs 5; $p < 0.001$). These injuries were more frequently managed at for-profit, level IV trauma centers.

Innovation and Significance
This national analysis highlights the disproportionate burden of firearm-related assault among pregnant patients experiencing penetrating trauma and identifies important demographic and socioeconomic disparities. These findings underscore the need for targeted injury prevention strategies and trauma recovery interventions to address firearm violence and improve maternal outcomes in this vulnerable population.

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A biomechanics lab-based clinical trial evaluating neck strengthening exercise as a concussion prevention strategy

Statement of Purpose

To determine the effect of a neck strengthening exercise program on cervical muscle size, strength, and neuromuscular activation, as well as head accelerations during standardized lab-based loading.

Methods and Approach

RCT in 40 high school athletes (15.5±1.4 years; 37% female). Participants completed a 12-week whole-body resistance training program including targeted neck strengthening exercises (n=19) or a control program not targeting the neck (n=21). Lab assessments at baseline and after 4-, 8-, and 12-weeks measured neck size (circumference, sternocleidomastoid cross-sectional area [SCM-CSA], total cervical muscle volume [CMV]), strength (isometric maximum voluntary contraction [MVC], rate of force/torque development [RFTD]), and neuromuscular activation (during maximum voluntary isometric co-contraction [VIC]), as well as head kinematics (linear and angular areas under the acceleration vs. time curves: LinAccAUC, AngAccAUC) during standardized multidirectional direct force application to the head with/without anticipatory bracing.

Results and Conclusions

A significant group-time interaction effect was present for MVC, with greater increases in the experimental group ($p=0.038$). Significant time and group-time interaction effects were present for VIC ($p=0.017$, $p=0.027$, respectively), with increases over time in both groups, greater in the experimental group. LinAccAUC and AngAccAUC decreased over time in both groups following direct force application to the head, with lower LinAccAUC and AngAccAUC magnitudes and smaller decreases over time in the experimental group. Changes in VIC were inversely associated with small changes in LinAccAUC and AngAccAUC (both $p<0.001$). The exercise program may have begun to influence head accelerations through early strength gains attributable to neuromuscular adaptation.

Innovation and Significance

Future research should consider a longer duration of exercise or alternative, more dynamic forms of targeted neck strengthening exercise.

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Preoperative Hypothyroidism and Postoperative Injury Risk After Lumbar Fusion

Statement of Purpose
Postoperative complications following lumbar fusion represent a significant source of preventable injury, morbidity, and functional decline, particularly among patients with modifiable medical comorbidities. Hypothyroidism is a common endocrine disorder associated with impaired immune function and altered bone metabolism, both of which may increase vulnerability to postoperative injury. This study aimed to evaluate the association between preoperative hypothyroidism and short- and long-term postoperative complications relevant to injury prevention following lumbar fusion.

Methods and Approach
A retrospective, propensity score–matched cohort study was conducted using the TriNetX database to identify adults who underwent primary lumbar fusion between 2002 and 2022 with a minimum of two years of follow-up. Patients with preoperative hypothyroidism were identified using ICD-10-CM code E03.9 and matched 1:1 to euthyroid controls based on demographic and clinical risk factors. Outcomes included early (45-day) medical complications and late (2-year) mechanical complications associated with postoperative injury and loss of function.

Results and Conclusions
After matching (2,850 patients per cohort), hypothyroid patients experienced a higher risk of early postoperative sepsis at 45 days. At two years, hypothyroidism was associated with increased risks of chronic device-related infection, wound disruption, and proximal junctional kyphosis. No significant differences were observed in reoperation or pseudoarthrosis rates. These findings indicate that hypothyroidism is associated with increased risk of preventable postoperative injury following lumbar fusion.

Innovation and Significance
This study identifies preoperative hypothyroidism as a modifiable risk factor for postoperative injury after spine surgery. By highlighting opportunities for preoperative screening and medical optimization, these findings support targeted injury prevention strategies to reduce infectious, mechanical, and functional complications in surgical populations.

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Characterizing injury mortality in two regions of Kenya

Statement of Purpose
Injuries are a leading cause of premature mortality worldwide, with a disproportionate burden in low- and middle-income countries. In rural settings, injury risks may be shaped by socioeconomic, environmental, and climatic factors, yet few African studies have linked these to injury mortality. We aim to characterize injury-related mortality in two rural regions of Kenya and examine socioeconomic and environmental factors associated with different injury mechanisms.

Methods and Approach
We analyzed population-based verbal autopsy data from the Nagasaki University Kenya Medical Research Institute Health and Demographic Surveillance System. Causes of death were assigned using standardized verbal autopsy procedures. Injury mortality patterns were examined by mechanism, age, sex, season, and region. Mortality records were linked with household socioeconomic indicators and environmental characteristics. Descriptive analyses and regression models were used to assess associations.

Results and Conclusions
A total of 208 injury-related deaths were identified, with a higher number observed in Mbita than Kwale. Injury mortality was highest among young adults, with substantial mortality also among young children. Violence and road traffic injuries accounted for the largest share of deaths, followed by drowning, falls, animal-related injuries, poisoning or overdose, and burns. Injury mechanisms varied by region, with higher proportions of drowning and burn-related deaths in Mbita and greater shares of falls and snakebite deaths in Kwale. Several injury types exhibited seasonal patterning, and injury-related mortality was more common among individuals from lower socioeconomic households.

Innovation and Significance
Injury-related mortality in these rural Kenyan regions was substantial and heterogeneous across demographic, geographic, seasonal, and socioeconomic contexts. This research contributes to the injury prevention field by integrating population-based verbal autopsy data with socioeconomic and environmental information. Additionally, it generates evidence from a region with one of the highest burdens of injury-related mortality that remains underrepresented in academic research.

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Parent and Athlete Experiences and Perceptions of Head Impacts in High School Water Polo

Statement of Purpose
Prior studies indicate that head impacts and concussions are common in high school sports and that many parents and players are concerned about the risks of long-term harm. Less is known about how often players experience head impacts with brief, concussive symptoms (HI-BCS), such as ringing in the ears or “seeing stars”, how often they report these events to coaches or family, what level of concern they have, and what actions are typically taken in the aftermath of these incidents. The objective of this study was to conduct a cross-sectional survey of Michigan high school water polo players and their parents to define experiences, understanding and responses to HI-BCS.

Methods and Approach
Participants were recruited using convenience sampling at local high school water polo events and word of mouth using a recruitment flyer. We deployed a cross-sectional survey of concussion and HI-BCS experience, awareness, and perceptions that was derived from prior studies of concussion knowledge. A total of 36 parents (n=25) and players (n=11) from five area high schools in eastern Michigan completed separate surveys. Due to ongoing data collection, statistical analyses were descriptive and exploratory.

Results and Conclusions
Findings indicated parental-athlete agreement regarding the risks of concussion and head impacts with concussive prolonged symptoms, but differed in experiences and responses regarding HI-BCS. Players reported continued participation following HI-BCS, while parents were less likely to perceive these events as common or concerning. Symptom duration was suggested as a determinant factor in whether head impacts were recognized and acted upon.

Innovation and Significance
Findings from this survey regarding head impact and potential concussion experiences among this stakeholder group may provide water polo-specific opportunities for prevention and inform educational initiatives for parents, athletes, coaches, and officials participating in high school-level water polo activities."

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Sources of Firearm Training or Safety Information & Firearm Audit Frequency: An Analysis of the 2023 National Firearm Attitudes and Behaviors Study (NFABS) Data

Statement of Purpose
The purpose of this study is to investigate associations between the number of firearm training or safety information sources and the auditing of firearms at home (i.e., checking stored firearms to ensure none is missing).

Methods and Approach
We used the National Firearm Attitudes and Behavior Study (NFABS), a cross-sectional, nationally representative study of adults in the United States in 2023 to explore associations between the number of sources of firearm training or safety information and audit frequency among firearm owners. We further characterized patterns of sources of firearm training or safety information through latent profile analysis (LPA).

Results and Conclusions
Exposure to a greater number of sources of firearm training or safety information was significantly associated with greater audit frequency among firearm owners (p=<0.001). The LPA revealed three distinct profiles of firearm safety information exposure (1: high information exposure, except social media, 2: high information exposure including social media and 3: low information exposure except family). Older age and greater perceived importance of firearm safety counseling by healthcare providers were associated with a higher likelihood of membership in the low information exposure except family class relative to the others.

Innovation and Significance
It may be the case that seeing firearm safety information from multiple different sources legitimizes the information and emphasizes firearm risks leading to greater audit frequency; a previous study found that increased number of sources was associated with increased asking about firearms in the homes their children visit.

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A Feasibility Study of Cloud-Based OCR for Digitizing Forensic Injury Mortality Records in Low-Resource Settings

Statement of Purpose
In many low- and middle-income countries (LMICs), such as Botswana, forensic mortality records remain paper-based, limiting timely injury surveillance and public health response. Optical character recognition (OCR) offers a potential pathway to digitize these records and support structured mortality surveillance. However, most OCR solutions are poorly suited for LMIC contexts, as they often require substantial technical expertise and reliable local computing infrastructure. These constraints hinder sustainable deployment and highlight the need for a scalable, low-burden digital workflow that supports data governance, sovereignty, and individual privacy while enabling structured forensic data extraction.

Methods and Approach
We developed a cloud-native workflow using the Amazon Textract AnalyzeDocument API with its query-based extraction feature to process forensic pathology reports from the Botswana Police Service. Queries were aligned with an existing REDCap data dictionary, enabling direct variable-level extraction. Extracted data were automatically transferred into REDCap, minimizing local infrastructure requirements and dependence on specialized software engineering personnel.

Results and Conclusions
In a pilot evaluation using a limited training corpus (n=10 forensic records), the custom extraction adapter achieved an overall F1 score of 58.8%, with 61.3 precision and 56.5% recall across forensic variables. Performance varied by field type, with higher accuracy for structure demographic elements and lower performance for handwritten content. The system successfully demonstrated end-to-end automated mapping of scanned records into REDCap-compatible fields, enabling a verification-focused workflow rather than full manual data entry.

Innovation and Significance
This feasibility study demonstrates that a query- and cloud-based OCR approach can support structured digitization of forensic mortality data in low-resource settings with minimal technical infrastructure. Although current performance metrics reflect pilot-scale limitations, the architecture is designed to improve with expanded and more representative training datasets. This approach offers a practical pathway for transitioning from manual data entry to scalable injury surveillance systems in LMIC contexts.

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Residential Segregation and Suicide Mortality Among Black Americans: Addressing Methodological Challenges and Misclassification

Statement of Purpose
Black suicide mortality in the U.S. remains understudied. Research suggests that ethnic density may confer benefits for mental well-being. Additionally, suicides are undercounted due to misclassification as undetermined intent or accidental deaths among racial minorities, which can obscure true associations between social contexts and suicide risk. This study investigated the relationship between residential segregation and suicide among Black Americans. The study also addresses the impact of systematic bias from misclassification by medicolegal death investigation system types (medical examiners, coroner systems) on observed associations.

Methods and Approach
Data for Black adults (18+) were obtained from the National Violent Death Reporting System (NVDRS) in 29 states and D.C. (2017–2022). County-level segregation, operationalized as Black ethnic density, Black isolation, and Black-White (B-W) interaction, were constructed from the American Community Survey 5-year estimates and linked to the NVDRS. Semi-probabilistic quantitative bias analyses were used to correct for misclassification of suicides as undetermined deaths. Survey-weighted logistic regressions were run, accounting for state fixed-effects, individual, and county-level covariates including deprivation and population density.

Results and Conclusions
A total of 14,480 cases of suicide (N=9,083) and undetermined deaths (N=5,397) were analyzed. Higher B-W interaction (lower segregation) was associated with increased odds of mortality (OR=1.09 per 10% increase; 95% CI: 1.03, 1.16). Black ethnic density and isolation were not significantly protective. Bias correction attenuated associations, indicating that failing to account for this error would underestimate suicide risk.

Innovation and Significance
This study advances injury epidemiology by correcting for suicide misclassification, differentiating effects of distinct segregation indices, and using comprehensive administrative records. Findings highlight the importance of culturally nuanced models that challenge dominant suicide theories by focusing on structural and salient exposures.

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Association Between Biological Sex, Free-Living Physical Activity, and Concussion Recovery in College-Aged Individuals

Statement of Purpose
To examine the association between biological sex, time spent in free-living physical activity (PA), and recovery outcomes following concussion.

Methods and Approach
A prospective study of individuals who sustained a concussion within 5 days of enrollment was conducted. At the initial visit, participants completed demographics and injury questionnaires and were provided with an Axivity AX6 watch to track PA minutes during the next seven days. At the FMC visit, days to symptom resolution was recorded. Univariate linear regressions examined the relationship between biological sex, time spent in light physical activity (LPA), moderate-to-vigorous physical activity (MVPA), and recovery outcomes (i.e., days to symptom resolution, days to full medical clearance [FMC]). Statistical significance was set at $p<0.05$.

Results and Conclusions
Forty-two college-aged individuals (31 [74%] female; age=21.2±2.6 years; days to symptom resolution=15.1±13.5 days) were included. Females spent an average of 428.6±145.4 minutes in LPA and 767.1±376.1 minutes in MVPA. Males spent an average of 427.7±109.8 minutes in LPA and 989.2±339.7 minutes in MVPA. There was no significant relationship between sex and time spent in LPA ($F[1,40]=0.00$, $p=0.98$) or MVPA ($F[1,40]=2.97$, $p=0.09$). Additionally, days to symptom resolution ($F[1,40]=0.86$, $p=0.36$) and FMC ($F[1,40]=1.49$, $p=0.23$) were similar between males and females. There were no significant associations between sex, free-living PA, and concussion recovery outcomes, suggesting that biological sex may not meaningfully impact PA participation during concussion recovery in college-aged individuals.

Innovation and Significance
Engaging in free-living PA is a recommended treatment for concussion recovery, with prior research demonstrating the benefits of both LPA and MVPA. The current study examined the potential role of biological sex in the association between free-living PA and recovery outcomes in college-aged individuals, which may have important implications for concussion treatment prescription.

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Variations in Cervical Muscle Morphology: Advancing Parametric Human Models for Transportation Safety

Statement of Purpose

The objective of this study is to quantify the effects of sex, age, stature, and body composition on cervical muscle morphology using a population-scale computed tomography (CT) dataset, with the aim of improving the biofidelity of injury-relevant human models used in transportation safety research.

Methods and Approach

CT scans from over 600 adults were processed using an AI-based segmentation pipeline (TotalSegmentator). Three-dimensional geometries were generated for six cervical muscle groups and analyzed using a custom MATLAB workflow to extract biomechanically relevant metrics, including mean and maximum cross-sectional area (CSA). Demographic and anthropometric variables were incorporated into population-level statistical analysis using analysis of covariance (ANCOVA) to evaluate the effects of sex, age, BMI, and stature.

Results and Conclusions

Mean cervical muscle CSA was 1049 ± 224 mm^2 in males and 755 ± 157 mm^2 in females. In an ANCOVA controlling for age and stature, sex was a significant predictor of CSA ($F = 206.0$, $p < 0.001$), with males exhibiting an average 264 mm^2 greater CSA. Age ($F = 52.3$, $p < 0.001$) and stature ($F = 11.5$, $p < 0.001$) were also significant predictors. A supplementary model substituting BMI for stature confirmed persistent sex effects independent of body size, indicating that sex-based differences in cervical muscle morphology are not captured by size-based scaling alone.

Innovation and Significance

This study introduces a fully automated, large-cohort framework for quantifying cervical muscle morphology that overcomes limitations of traditional slice-based and posture-dependent CT and MRI based measurements. The findings provide population-representative morphological inputs for parametric human models and expose limitations of current scaling approaches that may mischaracterize injury tolerance. Incorporating these data is critical for advancing more accurate and equitable transportation safety design.

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Neighborhood Context and Fatal Falls Among Older Adults in Michigan: A Spatial Hierarchical Analysis, 2006–2024

Statement of Purpose
Fatal falls among older adults show strong geographic variation, but it remains unclear whether this reflects persistent place-based risk or statistical instability in small-area estimates. This study examines associations between census tract–level neighborhood disadvantage, affluence, and fatal fall mortality among adults aged 65 years and older in Michigan from 2006–2024, with particular attention to traumatic brain injury (TBI) and spatial clustering.

Methods and Approach
We analyzed Michigan death certificate records from 2006–2024 for decedents aged ≥65 years who died within 48 hours of an unintentional fall (ICD-10 W00–W19). Analyses included all eligible fall deaths and a subset meeting criteria for TBI. We summarized demographic and temporal patterns and mapped census tract counts across multi-year periods. To stabilize small-area estimates and quantify spatial and temporal variation, we fit hierarchical Poisson models with population offsets, spatial random effects, and smooth temporal components, adjusting for neighborhood disadvantage, affluence, and tract-level percent non-Hispanic Black.

Results and Conclusions
The analytic sample included 11,588 fall-related deaths; 27.3% met criteria for TBI. Most deaths occurred among adults aged ≥85 years (52.2%), and 51.7% of decedents were female, though head injury and TBI deaths were more common among males. In adjusted models of all fall deaths, higher neighborhood disadvantage (RR 1.15, 95% CrI 1.05–1.26) and affluence (RR 1.04, 95% CrI 1.01–1.08) were associated with increased mortality, while a higher percent of non-Hispanic Black was associated with lower mortality. Associations were weaker in TBI-only models, though disadvantage remained elevated among women and adults aged 85+. Residual spatial clustering was minimal after adjustment.

Innovation and Significance
This study integrates statewide mortality data with spatial hierarchical modeling to distinguish structural neighborhood risk from small-area instability in fatal fall mortality. Findings highlight the role of neighborhood context, particularly for vulnerable subgroups, and support combining clinical fall prevention with community-level strategies in socioeconomically disadvantaged areas.

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Social and Environmental Inequalities in Drowning Risk in the Great Lakes Region

Statement of Purpose
Drowning is a leading cause of injury-related mortality globally, yet remains understudied in the Great Lakes region of North America. Most U.S. research focuses on unintentional drownings and large water bodies, with limited attention to intentional drownings or the social and environmental contexts shaping risk. This study examines patterns and determinants of both unintentional and intentional drowning mortality in Michigan from 2006–2024, with emphasis on demographic disparities, neighborhood disadvantage, and climate conditions.

Methods and Approach
We analyzed municipal death records from Michigan spanning 2006–2024, identifying drowning deaths using ICD-10 code T75.X and injury-specific fields. Descriptive analyses characterized drowning mortality by sex, race, age, intent, and location. Population-adjusted mortality rates were compared across demographic groups. Associations between drowning mortality and neighborhood-level socioeconomic indicators derived from the U.S. Census, as well as temperature-based climate measures, were assessed using regression models.

Results and Conclusions
A total of 3,041 drowning deaths were identified. Most deaths occurred among men (74.5%) and white individuals (75.5%), though population-adjusted rates were substantially higher among Black males aged 15–44 compared with white males. Females experienced a higher proportion of intentional drowning deaths, including homicide. Drowning mortality was positively associated with neighborhood social disadvantage (RR 1.19, 95% CI 1.14–1.23) and percent Black population (RR 1.81, 95% CI 1.62–2.00). Sustained freezing temperatures were associated with reduced winter drowning risk.

Innovation and Significance
This study provides a comprehensive, population-based assessment of both unintentional and intentional drowning mortality in the Great Lakes region. By integrating social, demographic, and climatic determinants, it highlights the need for drowning prevention strategies that extend beyond water safety education to address structural inequities, mental health, and environmental context.

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Intimate partner violence and infant and child mortality in Kenya: a cross-sectional analysis of the 2022 Demographic and Health Survey

Statement of Purpose
Intimate partner violence (IPV) is a pervasive public health problem globally and remains highly prevalent in sub-Saharan Africa, including Kenya. While the health consequences of IPV for women are well documented, less is known about its potential impacts on infant and child survival. IPV may increase child mortality risk through multiple injury-related pathways, including maternal physical injury, psychosocial stress, household instability, reduced healthcare utilization, and broader socioeconomic and geographic factors. This study examines the association between maternal experiences of IPV and infant and child mortality in Kenya using nationally representative survey data.

Methods and Approach
We conducted a cross-sectional analysis using data from the 2022 Kenya Demographic and Health Survey (DHS). The analytic sample included women aged 15–49 who completed the IPV module and provided complete birth histories. Exposure was defined as self-reported lifetime experience of physical, sexual, or emotional IPV by a current or former partner. Outcomes included any reported infant death (death before age one) and child death (death before age five) among live births. Logistic regression models were used to estimate associations between IPV exposure and mortality outcomes. Models adjusted for potential confounders including maternal age, educational attainment, household wealth index, marital status, place of residence, and partner characteristics. All analyses accounted for the DHS complex survey design using sampling weights, clustering, and stratification.

Results and Conclusions
The study included 32,156 women, of whom 1,629 reported experiencing IPV. Approximately 73 percent of women reported having at least one live birth. The mean age of respondents was 29.1 years. Among women with a birth history, 5.6% percent reported at least one infant death and 2.9% percent reported at least one child death. 6.7% of women reported experiencing physical intimate partner violence In adjusted models, IPV exposure was associated with elevated but non-significant odds of infant mortality (OR 1.67 95% CI [.65-3.51]). Additional factors associated with mortality included maternal education, household wealth, and rural residence.

Innovation and Significance
Maternal exposure to intimate partner violence was associated with elevated, though non-significant, odds of infant mortality. These findings are consistent with hypothesized injury-related and psychosocial pathways and suggest IPV may be an important household-level risk marker. These findings suggest that domestic violence may represent an injury-related household risk factor, supporting its inclusion within injury prevention strategies for infant and child mortality.

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Risk and Protective Factors Associated with Firearm Access and Suicide Risk Among 18-29 Year Olds

Statement of Purpose
This study examines the role of demographic and contextual risk and protective factors related to firearm access and suicide-related outcomes among young adults ages 18-29 to understand youth suicide mechanisms.

Methods and Approach
Data from a nationally representative survey of young adults ages 18-29 (N = 1077) were analyzed. Descriptive statistics identified demographic, household, and geographic characteristics associated with firearm access. Hierarchical binary logistic regressions were used to model associations between study variables and the outcomes of suicidal ideation and suicidal behavior across four steps: 1) demographics, 2) self-reported current access to a firearm in the home, 3) geographic and household characteristics, and 4) contextual risk and protective factors.

Results and Conclusions
Multiracial/White, cisgender male, married, and Midwest/South participants reported higher rates of firearm access. Black/African American, Latino, Asian, and sexual minority young adults had significantly lower odds of firearm access compared to White heterosexual peers. Married young adults, those living in rural areas, and the Midwest/South areas had increased odds. In the multivariate analyses, firearm access was significantly associated with suicidal ideation in Step 2; however, this was no longer significant after controlling for household and geographic characteristics. There was no significant association between firearm access and suicidal behavior.

Higher levels of social support and coping through positive reframing decreased risks for ideation, while coping using substance use, self-blame, and disengagement increased risk. Suicidal behavior was linked to income, youth violence exposure, and coping sub-scales of substance use and religion.

Innovation and Significance
Understanding the complex interplay of firearm access, social support, youth violence exposure, coping, and other risk and protective factors is crucial in preventing youth suicide. Findings can inform violence prevention and harm-reduction strategies among young adults at increased risk for poor mental health outcomes.

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A quantitative meta-analysis of neural response to cognitive challenge in children and adults with a history of maltreatment

Statement of Purpose
Child maltreatment (CM) is widespread form of Adverse Childhood Experiences (37% of children investigated) and costs society ~$2 trillion per cohort. CM is linked to decreased behavioral, cognitive, and social functioning, leading to long-term academic, mental health, and economic costs. CM often begins early, persists, and is linked to disabilities, chronic absenteeism, and frequency effects on outcomes. Cognitive neuroscience studies of childhood brain development post-CM are necessary for understanding this complexity but are often small and have inconsistent findings. A functional neuroscience meta-analysis will help to drive future research.

Methods and Approach
A PRISMA review (Page et al., 2021) in PubMed (fMRI + cognition + childhood maltreatment terms) through April 2024, plus grey record search of citing articles was conducted. 46 full texts were screened and 19 studies included in Activation Likelihood Estimation (ALE) with NiMARE 0.5.0; Gaussian 8 mm kernel, Monte Carlo 5000 iterations, FDR q<.2; Z-maps also examined (Reeders, Yanes, and Laird 2023).

Results and Conclusions
Several cognitive control regions (IFG, insula, precentral gyrus, ACC, dlPFC) showed greater activation in CM vs. controls (uncorrected). This suggests cognitive control may be a functional pathway underlying post-CM behavior; a potential target for intervention. These findings align with the stress acceleration hypothesis, in which it is believed that CM may accelerate the development of control systems to manage stress. Additional results of increased activation in the hippocampus, salience (insula), and motor regions (SMA) may reflect altered or delayed processing in memory and salience formation.

Innovation and Significance
This is the first quantitative meta-analysis of cognitive control in humans with childhood maltreatment (CM) histories. Understanding the brain correlates of childhood exposure to maltreatment will assist in the development of tertiary prevention of CM cognitive outcomes. More high-powered, domain-specific studies across developmental stages are needed to test maturation effects and refine targets for intervention.

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Establishing a Standardized Squat Classification System to Assess Functional Deficits Relevant to Injury Risk

Statement of Purpose
Orthopaedic clinical exams lack a standardized method to assess global lower extremity function. The squat is a multi-joint movement reflecting mobility, strength, balance, proprioception, and pain, making it a useful benchmark for identifying functional deficits relevant to injury risk. This study introduces and evaluates a novel squat classification system for standardized assessment in the orthopaedic clinic.

Methods and Approach
The system includes two components: squat depth (Grades 1–4), reflecting eccentric strength, range of motion, and pain, and ability to rise (Grades A–C), reflecting concentric extensor strength. Twenty-five patients were photographed at maximal squat depth during assisted and unassisted squats. Hip, knee, and ankle flexion angles were measured using DetroitBoneSetter.com. Four groups—orthopaedic residents (n=2), medical students (n=2), undergraduate students (n=3), and ChatGPT—classified each patient. The senior resident's ratings served as the gold standard. Inter-user reliability was assessed using Fleiss' Kappa, and accuracy was defined as percent agreement.

Results and Conclusions
Medical students demonstrated near-perfect agreement ($\kappa = 0.83$), followed by residents ($\kappa = 0.77$). Undergraduates ($\kappa = 0.45$) and ChatGPT ($\kappa = 0.49$) showed moderate agreement. Accuracy for squat depth grading was 83.3% among residents and medical students, compared with 59.7% for undergraduates and 41.7% for ChatGPT ($p < 0.05$). All groups achieved 100% accuracy for ability-to-rise grading. These findings indicate the system is reliable, teachable, and reproducible among clinically trained users.

Innovation and Significance
This standardized squat classification system provides a practical framework for identifying lower extremity functional deficits relevant to injury risk and delayed recovery, supporting its use as a functional assessment tool in orthopaedic settings.

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Promising outcome measures for the neurological investigation of repeated low-level blast exposure: A needed synthesis for an emerging injury topic research field

Statement of Purpose
Studying repeated low-level blast exposure (rLLBE) is challenging due to its unique neuropathophysiology and subclinical nature. There remains a gap in synthesized guidance for appropriate rLLBE outcome metrics. This work reviews current and promising neurological outcome metrics post-rLLBE.

Methods and Approach
We identified cognitive, symptom, and sensory (ocular, auditory, balance) outcome metrics used post-rLLBE from peer-reviewed literature through October 2025. We compiled key results and study characteristics, then summarized field applicability, implementation lessons, and participant and administrative burden. We present recommended metrics for future research.

Results and Conclusions
We present 30+ cognitive tests, 20+ self-reports, 12 ocular assessments, 8 auditory evaluations, and 11 balance assessments. Defense Automated Neurobehavioral Assessment was promising, while most other cognitive tests showed null effects. Questions probing neurological symptoms (headaches), cognitive function (forgetfulness), and mood (irritability) showed effects, while those assessing diagnosable mental health conditions did not. Most hearing assessments (75%) were null, though self-reported tinnitus showed effects. All balance assessments were null except AccWalker and Limits of Stability/SMART Balance Master. Six ocular tests showed effects while 11 did not. Overall, several assessments are promising for studying cognitive, balance, and symptom outcomes. Focused efforts on ocular and auditory assessments are needed.

Innovation and Significance
There has been a substantial rise in rLLBE research. Use of metrics not shown to be effective often leads to null results, slowing progress and contributing to research fatigue. Informed rLLBE outcome metrics improve integration, support scientific consensus, and increase efficiency.

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Sex and Awareness Effects on Head-Neck Biomechanics During a Simulated Curb Strike

Statement of Purpose
Whiplash-associated disorders affect millions of Americans annually and are one of the leading causes of pain following an automotive-related accident. While studies have investigated occupant kinematics of collisions in the fore-aft direction, fewer studies have examined non-collision vertical perturbations (e.g., speed bumps, curbs, etc.), where occupant motion is primarily a road-induced vertical acceleration. Since previous literature has shown that women are more susceptible to whiplash injury in rear-end collisions, this study aims to explore sex-based differences in a vertical perturbation.

Methods and Approach
Twenty-five subjects aged 18-24 (12F/13M) were recruited and consented (HUM00236538). Head-neck kinematics were collected using two wearable sensors affixed to the forehead and sternum. Four electrodes were placed on the left sternocleidomastoid (SCM) and upper trapezius (UT) muscle to measure muscle activity using surface electromyography. Participants drove over a simulated curb at 25 mph using a driving simulator 3X in two conditions: aware (sunny/day) and unaware (foggy/nighttime). A two-way ANOVA was used for statistical analysis.

Results and Conclusions
Females showed higher SCM and UT activation than males across metrics (SCM iEMG: $p<0.001$; UT iEMG $p<0.001$; UT peak_%MVC $p=0.004$; SCM peak_%MVC $p=0.002$), with no effects of condition ($p > 0.05$). Males exhibited higher peak head acceleration ($p=0.003$) with no effects on condition or interaction. Females had greater neck muscle activation than males during a curb strike. However, unlike other studies that investigated either frontal or rear-end perturbations, males exhibited higher peak linear acceleration, suggesting that sex-based differences in occupant kinematics may be direction-dependent.

Innovation and Significance
Few studies have quantified occupant responses during vertical perturbations. However, non-collision vertical perturbations are highly relevant and often more frequently encountered in daily driving.

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Street-Based Foot Care for Injury Prevention Delivered by Three Street Medicine Teams

Statement of Purpose
People experiencing homelessness (PEH) sustain disproportionately high rates of injury, including increased hospitalization after trauma and markedly elevated fall risk among older adults. These disparities are driven by impaired mobility, environmental exposure, and limited access to preventative care. Prior studies demonstrate higher fall prevalence and distinct injury patterns among PEH compared to housed populations. Lower-extremity and foot conditions are common yet often untreated and can impair gait, balance, and ambulation, increasing risk for falls, infection, and secondary injury. This project examines street-based foot care as an injury prevention strategy targeting mobility limitations among PEH.

Methods and Approach
In 2025, 385 medical students across three street medicine teams from the University of Michigan, Michigan State University, and Wayne State University provided supervised foot care in street and shelter settings across Southeast Michigan. Interventions included foot assessments, wound and nail care, treatment of fungal infections, and footwear support. Teams collected standardized encounter data documenting the care setting and the chief concern addressed. Data were centrally compiled to quantify encounter volume and characterize care delivered.

Results and Conclusions
Across 747 medical encounters with unhoused patients, 230 (30.8%) involved foot care in street settings, with an additional 137 foot-related encounters occurring in dedicated foot clinics. Commonly addressed conditions included wounds, infections, painful nail disorders, and hyperkeratotic lesions. These pathologies impair mobility and balance and are known contributors to fall risk and injury, particularly among older adults. Findings demonstrate a substantial burden of preventable injury-associated conditions. Future evaluation will incorporate pre- and post- encounter assessments (i.e., foot pain severity, prior falls, self-reported mobility) to better quantify injury risk reduction.

Innovation and Significance
This work reframes foot care as an underrecognized injury prevention intervention for a high-risk population. Integrating foot care into community-based services may reduce mobility-related injury risk and support broader injury prevention efforts for PEH.

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Peer Interactions Among Patients in a Mobile Methadone Treatment Program

Statement of Purpose
Mobile methadone programs have expanded access to opioid treatment and may play an important role in overdose prevention. Previous research has focused on access and outcomes of mobile opioid treatment programs while social experiences of patients receiving care in these settings has received less attention. Peer interactions among patients may influence treatment engagement and harm reduction behaviors, yet these dynamics have rarely been examined within mobile program contexts. This study describes the prevalence, context, and perceived helpfulness of peer interactions among patients receiving services through a mobile treatment program.

Methods and Approach
A survey was conducted with patients (N = 106) in a Detroit-based mobile treatment program. Survey items assessed whether participants interacted with other patients connected to the program, where these interactions occurred (e.g., onsite or outside of clinic settings), and perceived helpfulness of these interactions. Demographic characteristics were also collected. Descriptive statistics were used to summarize the prevalence and characteristics of peer interactions and perceived helpfulness. Comparisons were then conducted to examine variation in peer interactions across demographic groups.

Results and Conclusions
Most participants reported interacting with other patients connected to the mobile methadone program during clinic visits (61.3% reporting “sometimes” and 29.2% reporting interactions “often,”). Similarly, most participants reported contact with patients outside the clinic (61.9% reported “sometimes” and 29.5% reported “often”). Among participants who reported peer interactions, most rated them at least somewhat helpful to their recovery. Some differences in the frequency and perceived helpfulness of peer interactions were documented across demographic subgroups.

Innovation and Significance
Results provide novel data on peer interactions among mobile treatment program patients. Examining the prevalence and perceived helpfulness of peer interactions in mobile treatment settings highlights the importance of social environments, in addition to service delivery features, when designing mobile treatment programs.

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The Firearm Violence Vulnerability Index

Statement of Purpose
Understanding community-level vulnerability to firearm violence is central to effective injury prevention, yet access to comprehensive firearm injury data is limited. While standardized area deprivation indices exist for other public health crises, no analogous tool exists for firearm violence. We sought to create a novel Firearm Violence Vulnerability Index (FVVI) to forecast community risk for firearm assault, providing a guide for prevention planning and research efforts.

Methods and Approach
National fatal and non-fatal shooting data from 2018–2022 were obtained from the Gun Violence Archive and merged via census tract with 30 population characteristics from the 2020 American Community Survey and Opportunity Atlas. Variables captured social, structural, and environmental determinants of health. Census tracts were randomly split into training (80%) and test (20%) sets to develop an XGBoost machine learning model that predicts shootings per 1,000 residents. The model was assessed using permutation feature importance and Shapley Additive Explanations. Performance was evaluated using mean Poisson deviance (MPD) and deviance goodness-of-fit (D^2). Choropleth maps were created to visualize risk.

Results and Conclusions
206,082 shooting incidents across 84,122 census tracts were included. FVVI demonstrated strong predictive performance on the test set (MPD 2.21; $D^2 = 0.56$). The most influential predictors of high shooting rates within a census tract included reliance on food assistance, low rates of owner-occupied homes, low historical third-grade math scores, parental incarceration during childhood, and lack of access to broadband internet. FVVI accurately identified communities at risk for firearm violence.

Innovation and Significance
The FVVI is the first national model to predict firearm violence risk using population characteristics alone. This approach enables identification of vulnerable communities even where firearm injury data are sparse, supports targeted intervention planning, and offers a systematic framework for prevention research and resource allocation.

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Statewide Evaluation of MDHHS Office of Community Violence Intervention Services Grant Partners

Statement of Purpose
In 2022, firearm injuries (all types), were among the five leading causes of death for people ages 1-44 in the U.S. Firearm injuries were the leading cause of death among children and teens ages 1-19 (CDC, 2026).

MDHHS's Office of Community Violence Intervention Services (OCVIS) is amongst the few state government offices focused exclusively on advancing community violence intervention (CVI) through a public health approach, while strengthening Michigan's CVI ecosystem. OCVIS supports community-based organizations implementing evidence based and evidence informed CVI strategies, including but not limited to street outreach, case management, transformative mentorship, and workforce development. To assess early implementation and outcomes, OCVIS partnered with Michigan Public Health Institute (MPHI) to conduct a mixed-methods, cross-site evaluation of OCVIS funded programs operating across the state of Michigan.

Methods and Approach
Quantitative data were collected monthly from eight of the 13 funded organizations during the October 2024 - September 2025 grant period; data included program activities, outputs, and short-term outcomes. Qualitative data were gathered through interviews at 12 of the 13 organizations to examine implementation experiences and perspectives on their impact on participants, communities, and the broader CVI ecosystem. Observational data from statewide CVI Advisory Council meetings further documented how OCVIS fostered cross-sector collaboration and relationship building to advance statewide CVI efforts.

Results and Conclusions
Data analysis is currently underway and will be completed by the conference. The poster will present quantitative data on the projects' activities, outputs, and short-term outcomes (e.g. hours of service, total participants served, gun violence and physical violence interruptions). Findings from qualitative data will include facilitators and barriers to successful project implementation, ways in which project staff have seen participants and communities change, and impact of OCVIS programming on organizations. Observational data will highlight examples of relationship building and subsequent impact on community organizing, education, and outreach efforts within the CVI ecosystem.

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Characterizing Community and Collective Firearm-Related Homicides among Puerto Rican Men to Identify Opportunities for Intervention Development

Statement of Purpose
The WHO typology for delineating collective (e.g., organized crime) and community (e.g., interpersonal) violence has potential for informing firearm violence prevention, yet empirically operationalizing this typology remains a challenge. The distinct social context of Puerto Rico (PR), which also has among the highest homicide rates in the US, provides an opportunity for applying this typology. In collaboration with stakeholders in PR, this project seeks to develop and evaluate a scalable, data-driven approach to characterizing collective and community firearm-related homicides among Puerto Rican men.

Methods and Approach
Using NVDRS text narratives of homicide victims in PR and those born in PR in 9 mainland US sites from 2017-2023 (N=3,316), we developed a qualitative codebook grounded in the WHO violence typology. We manually annotated 250 narratives (double-coded; $\alpha = 0.79$). As a complement to manual annotation and to inform scalable classification of violence type, we used natural language processing tools to identify important and distinguishing terms. We compared these findings to those using only quantitative variables to classify violence type.

Results and Conclusions
Decedents were young (median age 28), and had a high school education or less (45%). Prevalence of collective violence was highest in PR (53%) and lowest in New York (2%) using quantitative variables. While narratives in the mainland US sites were longer than those in PR (100 vs. 55 words), the former were more likely to be classified as ‘undeterminable’ for violence type than those from PR (52.6% vs 15.3%; $p<0.0001$). Several terms distinguished collective vs. community violence (drug; trafficking vs. argument; revenge, respectively). Firearm type was not specified in 75% of narratives.

Innovation and Significance
Understanding the distinction between collective and community violence is critical to developing more effective and context-relevant violence prevention interventions.

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Identifying possible misclassification of suicide and homicide recording in vital records in Michigan: 2006 - 2024

Statement of Purpose
Suicides and homicides have been steadily increasing for several years. Michigan's suicide rate has increased by 32.4% over the past 2 decades. Suicides by race and ethnicity indicate that indigenous and White groups have the highest suicide rate compared to other racial groups. Black adults experience higher death-by-homicide rates (26.7 deaths/100,000) compared to their white counterparts (3.9 deaths/100,000). In Michigan in 2024, 65% of deaths were classified as suicides and 33% classified as homicides. Deaths may be misclassified due to inherent ambiguity with respect to sociodemographic factors (age, sex, and race/ethnicity).

Methods and Approach
Records for all deaths from intentional self-harm related causes were obtained from the Michigan Department of Health and Human Services (MDHHS) for years 2006 to 2020. These data include date and location of death, ICD codes for contributing factors and demographic information. We compared correlations of suicide and homicide counts at the county level and between demographic groups.

Results and Conclusions
There were 11,773 homicides and 23,774 suicides comprising 35,547 deaths. Males accounted for 80.6% and 79.4% of homicides and suicides, respectively. However, while 71.7% of homicide victims were Black, only 8.23% of suicides were in Black individuals. Correlations of homicide and suicide were weak and varied by county, but negative correlations were seen in highly populated counties. Suicides and homicides appear to be weakly and inversely correlated which may vary by county. This could suggest variable approaches to identifying and recording suicides.

Innovation and Significance
Possible misclassification of suicides as homicides could potentially contribute to observed disparities. This research contributes to the literature on equity on accurately recording causes of death between regions and demographic subgroups.

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Male patients using intimate partner violence: prevalence and associations of family medicine identification and response

Statement of Purpose
Intimate partner violence (IPV) perpetration or use is reported by one in five men in their lifetime, but few studies assess physician identification and response to male patient IPV use. The objective of this study is to determine prevalence and associations of family medicine physician identification and response to male patient IPV use.

Methods and Approach
We used the 2023 Council of Academic Family Medicine Educational Research Alliance general membership survey to obtain a national sample of clinically active family medicine physicians. We conducted a cross-sectional survey measuring identification and response to male patient IPV use, provider training, knowledge, preparation, and fears (PREMIS, 2006). We performed descriptive statistics and bivariate and multivariate logistic regression.

Results and Conclusions
Response rate was 15% (530/3598). Ever identifying and responding to male patient IPV use prevalence was 23% (119/530). Bivariate associations of ever identified and responded to male patient IPV use were prior training (OR 2.57, 95%CI 1.58-4.17), knowledge of identification (OR 2.83, 95%CI 1.63-4.90) and response (OR 3.74, 95%CI 2.05-6.80), and preparation (OR 4.95, 95%CI 2.56-9.59). Multivariate associations were female gender (AOR 1.65, 95%CI 1.02-2.65), prior training (AOR 2.25, 95%CI 1.28-3.94), and preparation (AOR 3.33, 95%CI 1.47-7.53).

Innovation and Significance
Nearly one in four clinically active family medicine physicians ever identified and responded to male patient IPV use. This prevalence shows missed opportunities to identify and respond. When controlling for years in practice, knowledge, and fears, only female gender, prior training, and preparation were associated with increased odds of identifying and responding to male patient IPV use. These findings show the importance of gender and training methods for family medicine physicians to identify and respond to male patient IPV use.

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Childhood Maltreatment and ACE in ACBD: Differential Behavioral Outcomes

Statement of Purpose
Recent papers using ABCD use widely disparate operationalizations of experiences classified broadly under early life adversity (ELA), ranging from 16% to 86% of the entire sample. Use of disparate operationalizations of ELA is not trivial. CM is an important inflection point for intervention, since that is a time when children are contacted and assessed for intervention needs by child protective services (CPS). The goal of the study is to compare CM, as identified by the Perkins Framework, with other operationalizations of ACE, trauma, and ELA using the ABCD dataset.

Methods and Approach
We identified six cohorts using previously published work on ELA, ACE, trauma, VE, and CM. Demographic risk factor models were calculated for each cohort using the general linear model, and model selection between cohorts was assessed with Akaike Information Criterion (AIC). Cohorts with a history of CM, trauma, ACE, and ELA were compared on outcomes of current baseline mental health and cognitive behavioral functioning with the linear model using controlling for the role of demographic risk. AIC were calculated for model selection.

Results and Conclusions
The KSADS-based operationalization of CM (~ 9%) was biased by demographic risks. The Perkins Framework (13%) had the best model fit for cognition. Trauma experiences were the best model fit for current sleep problems

Innovation and Significance
Using the KSADS without IPV results in a severe undercount, but the inclusion of IPV resulted in both an unrealistically small cohort and overemphasis on demographic risk factors, including single parenting, poverty, race, and parent mental health. Outcomes for all operationalizations were significantly predicted by poverty over and above the inclusion decisions, suggesting that poverty remains a significant risk factor for all ELA. Operationalization decisions are important for risk, protection, and outcome modeling.
Poor modeling leads to an overemphasis on demographic risk and failures of replicability.

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Observable Concussion Signs in Professional Slap Fighting Using Contact Sport Video Review Protocols

Statement of Purpose
Concussion is a common form of traumatic brain injury (TBI) with potentially significant short- and long-term neurological consequences. While public awareness of concussion has increased, recognition of objective, observable signs remains limited. Professional slap fighting—a combat sport involving repetitive, undefended head strikes—presents a unique context in which concussion signs are highly visible. Despite this, the sport has received minimal scientific investigation. The purpose of this study was to quantify the prevalence of observable signs of concussion in professional slap fighting and to evaluate whether pre-slap participant characteristics predict the likelihood of these signs.

Methods and Approach
Three independent reviewers evaluated publicly available video footage from six professional slap fighting (Power Slap™) events. Observable signs of concussion were assessed using criteria derived from the NFL Concussion Protocol, World Rugby Head Injury Assessment, and International Consensus guidelines. Signs were recorded for each strike and aggregated across rounds, matches, events, and combatants. Mixed-effects logistic regression models were used to assess associations between pre-slap characteristics and the likelihood of observing a concussion sign.

Results and Conclusions
Sixty-three combatants (60 male, 3 female) competed across 62 matches. Of the 61 combatants who received a strike, 46 exhibited at least one observable sign of concussion. Overall, 29% (82/280) of strikes resulted in at least one observable sign, with protocol-specific estimates of 24% (66/280).

Innovation and Significance
Observable signs of concussion are frequent in professional slap fighting, highlighting substantial neurological risk and underscoring the need for standardized concussion assessment and management protocols. These findings also support the use of slap fighting as a visible model for public education on concussion recognition across athletic and societal settings.

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Using Natural Language Processing to Clarify Cause of Death in Injury Mortality Records, Michigan 2006–2025

Statement of Purpose
MDHHS records information for all decedents located in Michigan upon death, including ICD-10 codes and, in the case of injury-related deaths, cause of death descriptions (CDDs). In cases with multiple contributing conditions, up to 18 ICD-10 codes may be recorded, and the underlying mechanism or sequence of events leading to death is often ambiguous when relying on codes alone. This ambiguity can lead to misclassification of injury mechanisms and biased mortality estimates in injury research. The purpose of this study is to evaluate whether semantic modeling of CDDs can be used to assess the consistency of ICD-10 injury classifications and to identify dominant mechanisms and event sequences underlying injury-related deaths.

Methods and Approach
We obtained publicly available, de-identified death records for all Michigan decedents ranging from 2006-2025. Free-text cause-of-death descriptions were cleaned and standardized to reduce linguistic variability while preserving semantic content. We vectorized the remaining sentences to conduct analyses using both keyword-based and embedding-based approaches. In addition to hierarchical clustering, we compared semantic clustering from pre-trained and untrained models. Model outputs were evaluated in relation to ICD-10–based injury classifications to assess concordance and areas of divergence.

Results and Conclusions
The dataset includes over 1.3 million death records, of which a substantial subset reflects injury-related causes such as falls, motor vehicle incidents, occupational injuries, homicide, suicide, and substance-related deaths. Preliminary analyses indicate that semantic clustering of cause-of-death descriptions produces coherent groupings that align with major injury mechanisms while also revealing heterogeneity within ICD-10 categories. Both pre-trained and untrained “from scratch” models are able to organize death descriptions by semantic meaning and sentence structure. Models can assess chronology, and determine order of events leading to death.

Innovation and Significance
Vital records are a cornerstone of injury surveillance, yet reliance on ICD-10 codes alone may obscure injury mechanisms and pathways, particularly in complex or multi-factor deaths. This study demonstrates a scalable, reproducible strategy for incorporating free-text cause-of-death narratives into injury classification and validation efforts. Integrating semantic analysis with traditional coding systems has the potential to improve injury surveillance accuracy and strengthen downstream epidemiologic research.

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Leveraging the Ivy League-Big Ten Epidemiology of Concussion Study to Investigate Concussions in Sprint Football

Statement of Purpose
We aim to examine the temporality of sport-related concussion (SRC) incidence and common mechanisms of injury (MOI) within sprint football, a weight-limited form of American football, enabling time-to-event analytic approaches.

Methods and Approach
In a prospective cohort study, *The Ivy League-Big Ten Epidemiology of Concussion Study*, we examined SRCs within sprint football across the 2013/14 to 2024/25 academic years. Survival analyses and Kaplan-Meier curves determined the relative timing of SRC onset within each year. We described the temporality of SRC risk within each academic year using time-to-event analysis for repeated events. Descriptive statistics summarized the most frequent MOIs, which were coded into key characteristics from a descriptive narrative.

Results and Conclusions
Out of 1,321 sprint football athletes throughout the 2013/14 to 2024/25 seasons, 99 SRCs occurred. Analyses for the 2023/24 academic year indicated that SRCs occurred throughout the season, with the highest percentage in week 6 (31.2%). By the end of the 2023/24 academic year, 84.1% of athletes remained free from SRC. Analyses for all academic years, 2013/14 – 2024/25, are ongoing. The most common MOIs described were tackling to ground (19.2%), helmet-to-helmet (14.1%), blocking (12.1%), and unknown (11.1%).

This study describes the temporality of concussion, SRC incidence, and common MOIs in sprint football to guide prevention and safety efforts. Our findings from this study show that SRC incidence is increased in sprint football athletes than traditional football.

Innovation and Significance
Research on sprint football remains scarce, yet SRC incidence is substantial. Sprint football follows traditional football rules but enforces a strict 178-pound weight limit. Athletes may engage in rapid weight-cutting behaviors, which are associated with dehydration and concussion symptoms. Additionally, MOIs and SRC risk profiles may differ from traditional football due to smaller athlete size and faster play. These findings underscore the need for evidence-based prevention initiatives in underrepresented sports.

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Concussions in Collegiate Ice Hockey: Findings from the Ivy League-Big Ten Epidemiology of Concussion Study

Statement of Purpose
To describe and compare sport-related concussion (SRC) clinical incidence between men's and women's collegiate ice hockey from 2013-14 to 2023-24, and to identify mechanisms of injury (MOI).

Methods and Approach
The Ivy League-Big Ten Epidemiology of Concussion Study is a prospective cohort study initiated in 2013-14. We compared clinical incidence of men's and women's ice hockey SRC (concussions per 100-athletes, 95% confidence intervals [95%CI]) via clinical incidence ratios (CIR; 95%CI encompassing 1 indicates null finding). We classified patterns of MOI via proportions: injury activity (e.g., practice, competition), head impact object (e.g., Boards, Ice), and coded descriptive narratives of how SRC was sustained. Clusters within MOI was also explored.

Results and Conclusions
SRC (n=334) clinical incidence for Women's (9.97/100-athletes, 95%CI: 8.49-11.63) and Men's ice hockey (9.93/100-athletes, 95%CI: 8.59-11.39) did not significantly differ (CIR: 1.01, 95%CI: 0.81-1.26). Men's competition (6.75/100-athletes, 95%CI: 5.64-8.00) SRC clinical incidence was significantly higher than practice (2.58/100-athletes, 95%CI:1.90-3.40; CIR: 2.62, 95%CI: 1.86-3.75). Women's SRC clinical incidence was significantly higher in competition (6.15/100-athletes, 95%CI: 4.98-7.51) than practice (3.49/100-athletes, 95%CI: 2.61-4.56; CIR: 1.76, 95%CI: 1.24-2.54). Men and women did not differ on competition (CIR: 0.91, 95%CI: 0.69-1.21) nor practice (CIR: 1.35, 95%CI: 0.89-2.05) SRC clinical incidence. For women, the most common SRC MOI was collision (n=55, 36.9%) and for men, being bodychecked (n=75, 40.5%). Person (n=37, 67.3%) and Ice (n=9, 16.4%) were most reported impact objects for collisions as MOI in Women, and Person (n=34, 45.3%) and Boards (n=25, 33.3%) were most commonly reported for bodychecked as MOI in Men.

Innovation and Significance
Men's and women's ice hockey players had similar clinical incidences over the past ten years, and games yield higher SRC clinical incidences than practices. Men and women differ on common MOI for SRC. This study may inform potential prevention efforts tailored to SRC in men's and women's ice hockey.

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Virtual-Testing with Parametric THUMS for Whiplash Injury Assessment

Statement of Purpose
Whiplash is a common transportation-related injury and can be persistent, yet its mechanisms remain incompletely understood. Key unresolved questions include why females experience higher injury risk than males and why risk varies across age groups. Progress has been limited in part because only a small number of human body models are available across sex and body size, and many models do not incorporate detailed cervical spine geometry. In this project, we will generate a family of parametric occupant models and conduct simulations to study whiplash mechanisms across a diverse population.

Methods and Approach
Cervical spine CT-scans will be segmented using AI-based tools and morphed into homologous meshes to enable statistical shape modeling. Using these data, we will develop predictive models of cervical geometry as a function of age, stature, BMI, and sex, and integrate the predicted, subject-specific spines into UMTRI's parametric human body models. Seated posture targets will be studied by volunteer posture data, and we will perform sensitivity studies to quantify how occupant-specific anatomy and seat design factors influence cervical alignment and dynamic response in rear-impact loading.

Results and Conclusions
Preliminary analyses suggest that age and stature are major contributors to cervical spine geometry, and incorporating these factors into human-models produces meaningful individual differences in spinal alignment. In initial simulations, females exhibited larger neck motion than males under unfavorable head restraint conditions. Outputs include head relative motion, vertebrae-specific strains, and established whiplash-related injury metrics.

Innovation and Significance
This framework integrates detailed 3D cervical spine personalization into full-body human-body-model simulations with realistic seated alignment, enabling evaluation beyond a small set of standard occupants. By linking kinematic outcomes to established injury measures, this framework will help identify the underlying drivers of whiplash risk and provide actionable guidance for seat and head restraint design to improve protection across sex and age groups.

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Mapping Michigan’s School Cellphone Policies: Implications for Youth Wellbeing and Injury Prevention

Statement of Purpose
Cellphone use is linked to youth disengagement from school, poor mental health, and increased risk of violence. In response, school districts nationwide have adopted regulatory cellphone policies, yet little empirical evidence exists on policy impact on youth outcomes.

Methods and Approach
In the initial phase of this mixed-methods statewide study, we used digital landscape methods to identify and characterize cellphone policies across Michigan’s 889 school districts.

Results and Conclusions
Preliminary findings represent 696 (78.3%) districts. Most (95.3%, n=663) reported a district-wide specified cellphone policy; 2.7% (n=19) required schools to set policies but did not specify characteristics, and 2.0% had no mandate or specified policy. Among districts with specified policies, 48.0% (n=317) distinguished different policies by grade, while 52.0% (n=344) had a uniform policy for all grades. “Bell-to-bell” (prohibiting phone use throughout the school day) was most prevalent and adopted by 77.8% of districts with a policy. This restriction was most common in middle (61.0%) and elementary (98.3%) school policies among districts with grade-varying policies. At the high school level, school-based restrictions dominated (75.8%), typically allowing phone use during lunch or between classes. The primary implementation strategy expected students to keep phones out of sight (possession permitted, but visible phone use prohibited). Additional common strategies included requiring phones to remain in lockers or at home. Notably, for districts with varying policies by grade, centralized phone collection by teachers, where students deposit phones at the start and retrieve them at the end of class, was among the top three strategies for middle and high schools. While nearly all Michigan districts mandate cellphone policies, the specific characteristics and implementation strategies vary.

Innovation and Significance
As cellphones affect youth wellbeing, it’s critical that this study assesses policy effectiveness and explores differential impacts by policy type and implementation.

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Does Daily Symptom Monitoring Hamper Concussion Recovery? A Comparison of Ecological Momentary Assessment and Traditional Reporting Methods

Statement of Purpose
Test whether recovery differed between collegiate athletes who reported concussion symptoms during two in-person research visits, reflecting traditional in-clinic symptom reporting, compared to daily throughout recovery using mobile ecological momentary assessment (EMA), which may be more convenient yet may plausibly exacerbate symptoms.

Methods and Approach
As part of ongoing enrollment, we leveraged data from 121 collegiate athletes with a concussion within 5 days post-injury (i.e., T1). All athletes completed demographic and injury information, and the Sport Concussion Assessment Tool6 (SCAT6) symptom checklist (0-6 Likert scale; possible score range=0-132). For 36 athletes (μage=20.36±1.25 years), SCAT6 symptoms were reported once daily throughout recovery via survey text messages administered with the Recovering Concussion Update on Progression of Symptoms (ReCoUPS) platform. Other athletes (n=85, μage=21.01±2.47 years) completed the same assessments without additional EMA. EMA continued until ≤48 hours post-full authorized medical clearance (i.e., T2) when both groups completed a final SCAT6 symptom assessment and recovery information. Mann-Whitney U tests compared group differences in symptom severity at each timepoint. Kaplan-Meier curves with log-rank tests compared days to symptom resolution and medical clearance between groups ($p<0.05$).

Results and Conclusions
There was no significant difference between groups in symptom severity at T1 (ReCoUPS median(IQR)=36(18,51.5), range=0-100; No ReCoUPS median(IQR)=28(12,44), range=0-102; U=1277.5, z=-1.43, p=0.153) or T2 (ReCoUPS median(IQR)=0(0,2.5), range=0-39; No ReCoUPS median(IQR)=0(0,1), range=0-31; U=1452, z=-0.55, p=0.578). There were no significant differences between groups in days to full symptom resolution (p=0.980) or full medical clearance (p=0.591).

Innovation and Significance
In this ongoing study, findings indicated no differences in recovery outcomes based on a subset of participants receiving an additional EMA intervention, suggesting that frequent symptom tracking does not negatively affect recovery. This warrants additional research to determine if EMA is beneficial and offers additional insights into recovery and the temporal, dynamic nature of symptoms.

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Learning Safety by Doing: A Pilot STEM & Injury Prevention Program for Underserved Youth at Mcity

Statement of Purpose
Unintentional injuries, including traffic and bicycle-related incidents, remain a leading cause of morbidity and mortality among children. Pop-Up Safety Town at Mcity is an immersive traffic safety and science program for 5th- and 6th-grade students. The objective of this pilot was to promote safe transportation behaviors and increase interest in Science, Technology, Engineering, and Mathematics (STEM) and higher education among students from underserved rural and urban communities using an experiential learning approach.

Methods and Approach
The program was delivered at the University of Michigan's Mcity mobility research complex to students from a rural school district and an urban inner-city school. An interdisciplinary team (pediatric injury prevention, emergency medicine, engineering, and public safety) led a 3-hour structured rotation. Activities included helmet fitting and supervised scooter riding, pedestrian and distracted driving safety demonstrations, and STEM lessons on vehicle safety and engineering design. All participants received a fitted helmet, bicycle light, and safety backpack. Anonymous post-event surveys assessed safety resources/behaviors, STEM interest, and college aspirations; descriptive statistics summarized results.

Results and Conclusions
A total of 129 students participated; 118 (91%) completed surveys. Most had limited exposure to higher education (66% never visited the University of Michigan; 44% never visited a college campus). Safety resource gaps were common: 39% did not own a helmet and 62% did not own a bike light, despite 62% riding a bike or scooter at least weekly. After the program, 40% reported increased interest in science and 48% increased interest in attending college.

Innovation and Significance
Pop-Up Safety Town at Mcity delivered hands-on injury prevention and STEM education in a real-world engineering environment to underserved rural and urban youth. Providing safety equipment and reinforcing protective behaviors may help address resource gaps while supporting STEM and higher education interests at a critical developmental stage.

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Exploring the Links between Depressive Symptoms, Functional Limitations, and Social Disconnectedness as Predictors of Fall Risk among Older Adults: Evidence from the Health and Retirement Study

Statement of Purpose

Nearly 1 in 4 adults aged 65+ reported falling in the United States in 2020. Predicting and preventing falls is challenging due to the complex interplay of multiple, interacting risk factors. This study focuses on better understanding how three prevalent and correlated risk factors influence fall risk: functional limitations, depressive symptoms, and social disconnectedness. Study aims include (1) assessing the associations between each risk factor and future fall risk, (2) exploring the interrelationships between these three risk factors, and (3) assessing whether the structure of interrelationships is also predictive of future fall risk.

Methods and Approach

Data came from the Health and Retirement Study. The analytical sample included 3,796 adults aged 65+ without an injurious fall at baseline (2014/2016) who were followed for 6-8 years. Logistic regression was used to assess the association of these risk factors with incident injurious fall. Network analysis was used to visualize and quantify the linkages between functional limitation (i.e., ADLs), social disconnectedness (i.e., loneliness), and depressive symptoms (i.e., CESD). The ability of these networks to predict injurious falls was evaluated using the Network Comparison Test (NCT).

Results and Conclusions

Individually, indicators of all three risk factors were associated with incident falls (OR ranging from 0.99 to 1.16). Network analysis showed that depressive symptoms are the primary bridges linking functional limitation and social disconnectedness. The NCT indicated no significant difference in network structure between injurious and non-injurious fall groups. Although the three risk factors were interrelated, the structure of the interrelationship did not predict incident falls.

Innovation and Significance

This study paired logistics regression models with network analysis to provide a more comprehensive picture of how social, psychological, and physical aspects of health both related to each other and to injurious fall risk among older adults. The results yielded meaningful implications for research and fall prevention programs.

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