



**2023 NATIONAL
RESEARCH CONFERENCE**
FOR THE PREVENTION OF
FIREARM-RELATED HARMS

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ORAL PRESENTATIONS**



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Session 1: Advancing prevention in healthcare settings

Erie, November 1, 9:00 AM - 10:30 AM

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1. Frequency and characteristics of Black and American Indian/Alaskan Native individuals who are screened for firearm access by health care providers

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Background: Firearms account for >50% of all suicide deaths, and access to a firearm increases risk for suicide. Secure firearm storage may help reduce risk for suicide. However, many firearm owners do not engage in secure storage. It is important to identify who owns firearms and reach them with secure storage messaging. Health care providers are well positioned to screen for firearm access and engage in conversations on secure storage. However, research indicates that health care providers rarely ask about firearms, and when they do, it is often among white individuals. The present study assesses the frequency at which Black and American Indian/Alaskan Native (AI/AN) individuals are screened for firearm access and determines factors that influence screening. **Methods:** Two probability-based samples were collected via IPSOS KnowledgePanel, and the data were weighted. The samples were comprised of Black (N = 3,015) and AI/AN (N = 527) individuals. Participants completed self-report measures on being screened for firearm access, suicide, health care, and demographics. **Results:** 13.1% of Black individuals reported being screened for firearm access. Screening most often occurred by mental health care providers (50.1%). A history of suicidal ideation (OR = 2.249 [1.756, 2.879]), a history of mental health treatment (OR = 3.378 [2.645, 4.314]), being younger (OR = .990 [.981, .998]), having access to a firearm (OR = 1.398 [1.095, 1.785]), and having children under the age of 18 in the home (OR = 1.395 [1.094, 1.778]) were associated with increased odds of being screened. There were no differences in terms of gender or marital status. 18.4% of AI/AN individuals reported being screened for firearm access. Screening most often occurred by primary care physicians (57.6%). A history of mental health treatment (OR = 4.134 [2.462, 6.942]) and identifying as female (OR = 1.631 [1.002, 2.657]) were associated with increased odds of being screened. **Conclusions:** Screening for firearms rarely occurs and happens less among those who identify as Black. Overall, mental health care providers are conducting most screenings. Mental health care providers are limited in their reach, and research indicates that the vast majority of those who die by suicide with a firearm never receive mental health care. Given the elevated firearm suicide rates among/within? the AI/AN community, and rising firearm suicide rates among/within? the Black community, all types of healthcare providers are encouraged to screen every client for firearm access and engage in discussions of secure firearm storage.

2. Excess VA healthcare costs associated with nonfatal firearm injuries among U.S. military Veterans, 2010-2019

Kathleen F. Carlson MS PhD¹, Tess A. Gilbert MHS¹, Elizabeth Hooker MS MPH¹, AnnaMarie O'Neill PhD¹, Sarah Shull PhD¹, Lauren Maxim PhD¹

¹VA Portland Healthcare System

Background: Fatal and nonfatal firearm injury (FAI) is a public health problem in the United States, with military Veterans being disproportionately affected. Beyond the human cost of FAIs, there are likely substantial financial costs of these injuries to healthcare systems. To help justify expenditures by healthcare systems toward FAI

prevention, this study examined excess costs from FAIs incurred by the Veterans Affairs (VA) Healthcare System among a cohort of VA-using Veterans. **Methods:** Using International Classification of Diseases (ICD) external cause-of-injury codes from VA administrative data, we identified Veterans with nonfatal FAI visits between 2010 and 2019. Veterans were then matched to two uninjured “controls” without a FAI visit, by index visit date, VA facility location, demographic data, previous outpatient healthcare use, and a prediction score of future healthcare costs. Veterans who died within the year after their index date or who did not match were excluded. Average VA healthcare costs were calculated for all Veterans in the year following their index date and compared between Veterans with and without FAIs. Costs were also calculated by Veterans’ depression, pain, post-traumatic stress disorder, traumatic brain injury (TBI), and substance use disorder diagnoses treated in the year prior to their index visit date. **Results:** The sample (N=21,054) consisted of Veterans with FAIs (n=7,018) and the matched comparison group of Veterans without FAIs (n=14,036). Average healthcare costs for Veterans with FAIs were 1.9 times higher than for uninjured Veterans (\$27,821; 95% CI: \$25,070-\$30,573 versus \$14,761; 95% CI: \$13,619-\$15,903, respectively), resulting in mean excess healthcare costs of \$13,060 per injured Veteran in the year following their index date. For the 10-year study period, the total excess costs for all FAIs exceeded \$91 million. Veterans with nonfatal FAIs had higher costs regardless of pre-existing diagnoses. However, those with both FAIs and comorbid diagnoses had higher costs than those with only a FAI or only a respective diagnosis. For example, among Veterans with TBI diagnoses, those with nonfatal FAIs had 2.9 times higher costs than those without FAIs, the highest 1-year cost on average (\$67,525; 95% CI: \$40,089-\$94,960) and the highest mean excess cost (\$44,099). **Conclusions:** Veterans with FAI visits had higher costs of annual VA healthcare, indicating that FAIs accounted for substantial cost differences independent of other diagnoses or potentially confounding characteristics. These findings highlight the likelihood of a substantial financial return on investment for VA-based prevention programs, in addition to lives saved and injuries prevented.

3. Racial and ethnic differences in prior-year emergency department (ED) visits among North Carolinians presenting to an ED for a firearm-related injury

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Background: The emergency department (ED) is an excellent resource for the prevention of violent injury, with patterns of prior ED utilization informing opportunities for targeted interventions. This study aimed (1) to characterize individuals presenting to EDs for firearm-related injuries by racial and ethnic classification (2) to investigate historical ED utilization among individuals presenting to the ED for a firearm-related injury; and (3) to characterize racial and ethnic differences in historical ED visit characteristics. **Methods:** North Carolina’s syndromic surveillance system (NC DETECT) was used to obtain ED visits from 1/1/2018-12/31/2021. Patients with a firearm-related injury were identified with V2 of the CDC’s all-intents case definition. Visits occurring up to 365 days before the patient’s most recent firearm-related visit (prior-year visits) to the same medical facility were collected using an internal tracking ID. Patient characteristics (age, sex, insurance status, rurality, injury disposition) were compared, stratified by racial and ethnic classification (restricted to non-Hispanic [NH] White, NH Black, NH American Indian, and Hispanic). Frequency of prior-year ED utilization was investigated and common ICD-10-CM codes were identified. **Results:** From 2019-2021, we identified the most recent firearm-related ED visit for 12801 North Carolinians, the majority of which were NH Black (63%). Patients classified as a racial or ethnic minority skewed younger than those classified as NH White. NH American Indian patients were primarily (82%) from non metro areas and had the highest percentage of firearm injuries resulting

in death in the ED at 7% (n=23). Prior-year ED visits were most frequent among NH American Indian (28%, n=97) and NH Black (23%, n=1859) patients. Prior-year firearm-related visits were uncommon for all groups, ranging from 2-4%. Nicotine dependence, long-term drug therapy, and hypertension were the most common ICD-10-CM codes across all racial and ethnic classifications. NH American Indian patients were the only group without an unintentional firearm injury code in the 10 most prevalent codes for prior-year visits. **Conclusions:** Almost 13,000 North Carolinians presented to an ED for a firearm-related injury from 2019-2021. Approximately 19-28% of those with a firearm-related ED visit had a visit to that same facility in the year prior to their injury. These earlier ED visits provide the potential for prevention, particularly among those who previously sustained firearm-related injuries, and common ICD-10-CM codes varied by the racial and ethnic classification of the patient. Further investigation of these prior-year ED visits may provide insight into factors related to repeat-firearm injury and firearm-related injury disparities.

4. Feasibility of integrating a bedside medical-legal partnership into firearm violence recovery: The Recovery Legal Care Program

Rhea J. Pillai MPH¹, Elizabeth L. Tung MD¹, Tanya L. Zakrison MD¹, Franklin Cosey-Gay PhD¹, Mona Elgindy JD², Christine Goggins MFA¹, Isaac Green JD², Carly Loughran JD², Nathan Muntz MD³, Ernestina Perez MPH¹, Selwyn Rogers MD MPH¹, Nisha Sen-Gupta MA¹, Bradley C. Stolbach PhD¹

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Background: Patients affected by firearm violence often have social and structural needs that adversely impact health and require legal solutions. These “health-harming legal needs (HHLNs)” include concerns related to income, housing, employment, legal status, and personal stability. Medical-Legal Partnerships (MLPs) have addressed these HHLNs in various practice settings, but not in conjunction with a hospital-based violence intervention program (HVIP). We explored the feasibility of implementing Recovery Legal Care, a bedside HVIP-MLP program, at an academic Level I trauma center in Chicago, where the most common mechanism of injury was firearm-related. **Methods:** We established a novel collaboration between our trauma center and Legal Aid Chicago, the largest provider of free civil legal services in Chicago. We used an iterative problem-solving model to structure program development and pilot testing. A legal screening assessment was developed to assess HHLNs among patients admitted after firearm injuries. Patients that screened positive for ≥ 1 HHLN were referred to an attorney for bedside legal assistance. Key feasibility measures included the acceptability of bedside screening, number and types of HHLNs, need for specific public benefits, and retention in legal care. **Results:** Between 11/2022-5/2023, 136 patients admitted for firearm injury were approached with 111 (81.6%) consenting to screening. Of the 111 who were screened, 106 (95.5%) screened positive for at least 1 HHLN and were referred to an attorney. Referred patients were predominantly male (79.3%) with median age 32 years (IQR 26-40); 16 (15.1%) reported only 1 HHLN, while 90 (84.9%) reported ≥ 1 HHLN. The most frequently reported HHLNs were related to income (92.5%), followed by housing (74.5%), and employment (67.0%). The largest gaps in received versus desired public benefits were in cash assistance (0.9% vs. 38.7%) and unemployment support (1.9% vs. 39.8%). A large proportion (80.2%) expressed desire to receive at least 1 public benefit of the 10 benefits in the assessment. Excluding health insurance, only 17 (16.0%) reported receiving any public benefit, of which all 17 reported having ≥ 1 barrier associated with accessing or receiving benefits in the past. The overall retention rate was 91.5%, with 149 legal cases opened for 97 patients. **Conclusions:** Our pilot demonstrated feasibility of a novel HVIP-MLP program for patients affected by firearm injury. Economic needs were the most commonly reported HHLN (92.5%), although very few patients (16%) had ever received public benefits in the

past. These gaps in access suggest a critical role for legal advocacy among marginalized populations with historical exclusion from economic entitlements.

5. Emergency medical services encounters for firearm injuries – 497 counties, United States, 2018 - 2022

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Background: Timely data on firearm injuries are essential for public health prevention and response. New data sources are being explored to monitor patterns in firearm injuries, including prehospital emergency medical services (EMS) encounter data. This study examined recent trends in firearm injury-related EMS encounters by patient- and county-level characteristics. **Methods:** Aggregated EMS encounter data from 497 counties in 21 states collected by biospatial, Inc. from January 2018 – December 2022 were analyzed. Annual trends in firearm injury-related EMS encounters per 100,000 EMS encounters were analyzed overall and by patient-level (i.e., age, sex, and race/ethnicity) and county-level characteristics where the incident occurred. County-level characteristics were analyzed using the 2023 County Health Rankings (i.e., unemployment rate, income inequality ratio, and rate of severe housing problems) and the 2013 National Center for Health Statistics Urban-Rural Classification Scheme (i.e., urbanicity). **Results:** Across the entire study period, 93,519 firearm injury-related EMS incidents were analyzed. The proportions of EMS encounters that were firearm injury-related were highest among males (190.1 per 100,000 encounters), non-Hispanic Black persons (129.3 per 100,000), and those aged 35-64 years (71.6 per 100,000); counties with the highest proportions of firearm injury-related EMS encounters were those with the highest rate of severe housing problems (168.5 per 100,000), the greatest income inequality (132.0 per 100,000), and large central metro counties (93.8 per 100,000). Compared with 2018, relative increases were observed in 2019 (+0.3%), 2020 (+32.8%), 2021 (+27.9%), and 2022 (+17.9%). By patient-level characteristics, groups with the greatest increases in 2020 relative to 2018 were Hispanic or Latino persons (+55.6%), non-Hispanic Black persons (+54.7%), and children aged 0-14 years (+54.1%). Counties with the greatest increases in 2020 relative to 2018 were large central metro counties (+43.5%), those with the highest unemployment rate (+40.7%), and those with the highest rate of severe housing problems (+36.4%). **Conclusions:** Annual proportions of EMS encounters that were firearm injury-related increased substantially throughout the COVID-19 pandemic, exacerbating underlying disparities. A comprehensive approach is needed to prevent and respond to firearm injuries and address the social and economic inequities that contribute to the risk for violence. The granular location information and timeliness of EMS data help fill a gap in understanding patterns in firearm injuries and the inequities that may exacerbate risk in certain groups. In this way, EMS data can complement emergency department data to enhance understanding of prehospital trends in firearm injuries and guide timely prevention and response efforts.

6. A model of comprehensive care for gun violence survivors at an adult Level I trauma center

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Background: Structural racism/discrimination (SRD) encompasses the societal structures and policies that reduce access to resources and opportunities for traditionally marginalized communities. While it is recognized that SRD is a fundamental determinant of health disparities, the relationships among the many community-level factors that influence the impact of SRD on health and wellness and how these factors intersect with individual

experiences are poorly understood. Milwaukee County is the most racially diverse and segregated metropolitan area in the United States and the first to recognize SRD as a public health issue. Health inequity in Milwaukee disproportionately affects Black community members, significantly impacting the health of the whole state. Additionally, firearm violence disproportionately affects Black Americans. The intersection of these two factors directly influences health disparities for patients receiving care at a Level 1 trauma center. The objective of this presentation is to advance our understanding of the interactions among community- and individual-level factors that promote risk and/or resilience to health outcomes for firearm violence survivors. **Methods:** Using the National Institute of Minority Health and Health Disparities (NIMHD) research framework based on the socio ecological model of health, pre-hospital factors at the individual and community level that lead to risk for firearm injury exposure and the resultant poor mental and physical health outcomes following injury will be presented. These significant factors include experiencing community violence, racial discrimination, and resource deprivation. **Conclusions:** Trauma centers are charged with addressing health disparities and this presentation will highlight social determinants of health that are relevant to firearm violence survivors for hospitals to consider when addressing health equity for this population.

Session 2: Examining intimate partner violence: Intersections and interventions

Main Ballroom, November 1, 10:45 AM - 12:15 PM

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1. Intimate partner homicide against older women: The role of firearms across age and relationship status

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Background: Limited research attention has examined intimate partner homicide (IPH) against older women. When older women are studied, they tend to be categorized into a single group in terms of both age and intimate relationship. This practice implies that older women are a homogenous group and likely masks important risk patterns including use of firearms. This study explores IPH against older women across specific age subgroups and relationship types. **Methods:** This study analyzes restricted-use data from the National Violent Death Reporting System (NVDRS) for 2017-19. While there is no commonly accepted age demarcation for “older adults”, several studies of intimate partner violence (IPV) against older women have used 50 to define postmenopausal women. This study measures “older women” starting at age 50 (n = 707) with decade categories (50-59, 60-69, 70-79, 80-89, and 90 plus) to identify subgroup patterns and minimize small cell/data privacy issues. This study uses four categories of intimates: current spouses, ex-spouses, current boyfriends, and ex-boyfriends. The small number of same-sex partner IPHs did not permit examination of these relationships. This descriptive study takes a mixed-method approach that incorporates information from NVDRS quantitative variables and abstractor narratives. Several incident characteristics are explored including use of firearms, ongoing IPV, murder-suicides, and health problems. **Results:** Disaggregating older women by relationship type and age identifies distinct IPH patterns. For relationships, about two-thirds of IPHs involve a current spouse and almost a quarter a current boyfriend. As women age, current spouses constitute an increasing percentage of IPH moving from 53.5% of women in their 50s to 86.3% of women in their 70s and almost all (98%) women 80 and older. These spousal IPHs increasingly involve firearms as women age (65.4% of women in their 50s to over 84% of women in their 70s and 80s). Almost all these firearms are handguns. A history of IPV is less likely to be found in IPH against women in the older age groups. As women age, they face an increased risk of spousal murder-suicide that is characterized by mental and physical illnesses (wife, husband, and both) and caregiving struggles by the husband. **Conclusions:** This study highlights different risks for firearm-involved IPH that older women face as they age. In particular, their increased risk for spousal murder-suicide involving a handgun and no prior IPV suggests the need for prevention strategies that consider caregiver support, suicide intervention, and removal of firearms from the home.

2. Developing gun violence prevention ecosystems

Shelli Lyons Egger JD¹, Amber Goodwin², Alicia Nichols LSW³

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Background: For far too long research, working groups, and funding has siloed the movements that represent gun violence, homicide and domestic violence work. Researchers have long established that in relationships where violence is present, abusers’ access to a gun significantly increases the risk of death for women. However, there is little research and practice on how the CVI and IPV best practices can and should work together to create

healthy gun violence prevention ecosystems. **Methods:** National data from the National Resource Center on Domestic Violence and Firearms, and real-life examples of data and evidence-based approaches to domestic violence gun violence prevention such as firearm surrender and high-risk task force teams that can be utilized in tandem to prevent community-based violence, will be shared. **Results:** The audience will be introduced to emerging best practices in the field of research and practice of the intersections of intimate partner violence or family violence, firearms, and community violence intervention. **Conclusion:** This presentation will start to unravel current challenges and future opportunities to connect the deadly but preventable intersections of domestic violence and community-based violence.

3. Racial disparities in orders to surrender firearms for civil Domestic Violence Protection Order cases

Julie M Kafka MPH PhD¹, Deirdre Bowen PhD², Alice Ellyson PhD¹, Avanti Adhia ScD¹, Sandra Shanahan MSW³, Kimberly Dalve MS¹, Ali Rowhani-Rahbar MD MPH PhD¹, Frederick Rivara MD MPH¹

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Background: Perpetrators of domestic violence (DV) use firearms to injure, scare, coerce, control, and sometimes kill intimate partners, family members, and people in the community. To reduce firearm-related harms, federal law prohibits firearm access for DV perpetrators in qualifying civil domestic violence protection order (DVPO) cases. Washington (WA) State goes further and allows courts to order a DVPO respondent (i.e., DV perpetrator) to surrender firearms and other weapons in their possession while a DVPO is in effect. Despite clear statutory guidance about when to order firearm surrender, judicial biases or other structural factors may influence which DVPO cases ultimately include a firearm surrender injunction. Historically, US laws and institutions have privileged white men with firearm access over people of color, but little is known about whether racial disparities exist in the implementation of DVPO firearm surrender provisions. **Methods:** We investigated racial disparities in DVPO firearm surrender provisions using a random sample of 3,543 granted DVPO cases from King County, WA (2014-2020). Cases were excluded if information about firearm surrender was not recorded, or if age was unknown (n=571 cases removed, final sample of n=2,991). We present crude and adjusted logistic regression models examining the association between respondent race/ethnicity with firearm surrender provisions, along with 95% confidence intervals. **Results:** DVPO respondents who were non-Hispanic White (70.3%, n=1006) or non-Hispanic Asian (70.4%, n=140) were ordered to surrender firearms less often than respondents who were Middle Eastern / North African (81.8%, n=18), Hispanic (80.2%, n=384), Native Hawaiian or Pacific Islander (80.0%, n=24), Black (76.5%, n=511), American Indian / Alaska Native (76.5%, n=26), 2+ races (75.8%. n=125), or whose race was unknown (76.2%, n=48). After controlling for respondent age and gender, certain racial disparities persisted; White non-Hispanic respondents had lower odds of being ordered to surrender firearms compared to respondents who were Hispanic (0.60, 95% CI: 0.45, 0.77) or Black non-Hispanic (0.75, 95% CI: 0.60, 0.94). **Conclusions:** Court systems may implicitly or explicitly privilege and protect firearm rights for White non-Hispanic DVPO respondents compared to respondents from Black and Hispanic communities. Considering that DV perpetrators pose a substantial risk for enacting violence in the home and in the community, DVPO firearm surrender should be implemented equitably and thoroughly, regardless of respondent race or ethnicity.

4. An analysis of Domestic Violence Restraining Order relinquishment laws and their associations with suicide and intimate partner homicide

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Background: While federal law prohibits firearm purchase and possession by people subject to domestic violence restraining orders (DVROs), it does not explicitly require respondents to surrender firearms they already own. Limited research has found that DVRO relinquishment laws are associated with decreased intimate partner homicide (IPH) at the state level; however, no study has examined the impact of relinquishment provisions on outcomes other than IPH and pregnancy-associated homicide. Our analysis builds on existing research by examining the effects of specific DVRO relinquishment characteristics on overall and firearm-stratified measures of suicide and IPH at the state level. **Methods:** We conducted legal research to obtain data on state relinquishment laws. Suicide and IPH data were obtained from CDC WONDER and a multiply-imputed and weighted Supplementary Homicide Reports dataset, respectively. We used negative binomial regression with two-way fixed effects and clustered standard errors to assess the differential impact of DVRO relinquishment policies relative to state laws that only restrict firearm purchase and possession. All regression analyses controlled for other firearm laws, a validated measure of state firearm ownership, and other relevant sociodemographic factors. We also used augmented synthetic control methods (ASCM) to obtain state-specific estimates of the impact of DVRO relinquishment law adoption on both sets of outcomes. ASCM estimates were pooled using inverse variance weighting to obtain an average treatment effect across adopting states. **Results:** States with greater firearm ownership experienced significantly higher rates of firearm suicide, firearm IPH, and overall IPH. Permit-to-purchase (PTP) laws were associated with reductions in firearm suicide (IRR=0.96, 95% CI: 0.93, 0.99) and overall IPH (IRR=0.906, 95% CI: 0.83, 0.99). We did not find evidence that DVRO relinquishment provisions had a differential effect on state-level IPH relative to laws that only restricted purchase and possession. DVRO relinquishment provisions were associated with significant reductions in firearm and overall suicide; however, significant reductions of similar magnitude were also noted for nonfirearm suicide. Pooled results from ASCM models estimated that DVRO relinquishment adoption was associated with nonsignificant reductions in firearm suicide (ATT=-0.28, 95% CI: -0.66, 0.10) and firearm IPH (ATT=-0.05, 95% CI: -0.11, 0.02). **Conclusions:** Challenges related to implementation and enforcement may limit the potential effectiveness of DVRO relinquishment laws to reduce firearm-related mortality. Despite the positive association of firearm prevalence with firearm suicide and IPH, our results suggest that policies that restrict firearm access by prohibited persons, such as PTP laws, contribute to state-level reductions in firearm violence.

5. **My Safety Steps: A digital firearm safety promotion intervention for women in abusive relationships**

Bushra Sabri PhD¹, Jacquelyn Campbell PhD¹

¹Johns Hopkins University

Background: Firearms are the leading cause of victimization of abused women by intimate partner homicide and intimate partner homicide-suicides in the US. This calls for evidence-based intervention strategies to prevent firearm-related injuries or mortality and address firearms-related safety needs of women in abusive relationships. My Safety Steps (MySteps) was designed to comprehensively assess for women's firearm related risks, current safety needs and to prevent women's harm from their abuser's access or ownership of a firearm through a digitally delivered firearm focused safety planning intervention. The intervention was developed based on formative qualitative work and input from service providers and survivors of intimate partner violence (IPV). This study presents findings on the feasibility, acceptability and preliminary evaluation of MySteps. **Methods:** Using a pretest posttest control group design, the pilot study was conducted with 108 participants with 54 assigned to the MySteps intervention arm and 54 to the standard safety planning control arm. Since the study

was conducted under the auspices of an ongoing NIH-funded project focusing on immigrant women in abusive relationships, eligible women were those who were foreign-born, with experiences of past year IPV and abusive partner's ownership and access to a firearm. The feasibility and acceptability outcomes were enrollment, intervention engagement, and perceptions of the intervention. The preliminary evaluation outcomes were trauma coping self-efficacy and safety related empowerment. Data were analyzed using descriptive statistics and population-average regression models with Generalized Estimate Equations approach to estimate group differences in outcomes from baseline to three months. **Results:** Findings suggested that the digital MySteps is feasible and acceptable. Overall, women reported satisfaction with MySteps and provided suggestions for further refinement. Women in MySteps showed significantly greater improvement in trauma coping self-efficacy (Mean change= $+3.9$ versus $+0.16$ in the control arm) and safety-related empowerment (Mean change= $+3.8$ versus 0.07 in the control arm) at 3 months follow up than those in the control arm ($p < .01$). **Conclusions:** The findings show that MySteps is a promising intervention for addressing safety needs of abused women with a partner who owns or has access to a firearm. Further refinement of mySteps and its evaluation in the future large-scale trial will result in an evidence-based mySteps that could be used in variety of settings to screen and intervene with survivors of IPV whose abusers own or have access to a firearm and can be useful for preventing firearm and IPV-related homicides in abusive homes.

6. Prevalence rates of nonfatal firearm-related intimate partner violence in adolescents

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Background: Homicide is the second leading cause of death for Black female youth between the ages of 15-24. Over half the deaths are perpetrated by an intimate partner, with firearms as the most common method. To move towards prevention, it is important to understand how intimate partner violence (IPV) involves the nonfatal use of firearms, which might precede firearm-related fatalities. Previous research has focused primarily on high-risk adult samples, significantly neglecting research on adolescents, who may be at the highest risk. The current study will report item content of a recently developed measure of nonfatal firearm IPV victimization and perpetration and provide lifetime prevalence rates of nonfatal firearm IPV in a sample of high school students. These rates will also be examined across gender, race/ethnicity, and grade level. **Methods:** Participants were 738 high school students in the southern U.S. who reported ever having a dating partner. The racial/ethnic background of the sample was 44% Black, 36.8% White, 5.2% Hispanic, and 14% Other, and 52.7% of the sample identified as a girl. Participants responded to items assessing nonfatal firearm IPV victimization and perpetration that were developed in a participatory process based on qualitative interviews with community members impacted by community and interpersonal violence. **Results:** Approximately 16% and 10% of participants endorsed at least one instance of nonfatal firearm IPV victimization and perpetration, respectively. The most frequently reported form of victimization was... having a partner threaten to shoot someone else when they were angry... (10.0%). The most frequently reported form of perpetration was... pointing at a partner like they had a gun to threaten them (9.0%). One-way ANOVAs indicated statistically significant differences between groups for racial/ethnic background and grade level for victimization, $F(4, 704) = 6.29, p < .01$; $F(3, 699) = 5.46, p < .01$, and perpetration, $F(4, 702) = 9.71, ps < .001$; $F(3, 698) = 6.18, p < .01$, respectively. Black adolescents reported higher instances of both victimization and perpetration compared to White adolescents ($ps < .02$). Twelfth-grade participants reported higher instances of perpetration compared to participants in all other grades

($p < .02$) and higher instances of victimization compared to eleventh-grade participants ($p = .04$). There were no significant gender differences in nonfatal firearm IPV victimization or perpetration rates. **Conclusions:** Nonfatal firearm IPV among adolescents was reported at an alarmingly high rate. These results highlight potential precursors to target in interventions focused on preventing firearm-related IPV homicides.

Session 3: Understanding and addressing disparities (Part I)

Sheraton I, November 1, 10:45 AM - 12:15 PM

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1. Firearm ownership and support for political violence: Findings from a nationally representative survey in the United States

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Background: Recent developments highlight the potential for political violence (PV) in the United States: striking increases in firearm violence and firearm purchasing, uncertainty about the stability of democracy here, increased expression of racist and extreme beliefs about American society, and support for violence to advance political objectives. This study explores associations between firearm ownership and risk for PV, using data from a recent large nationally representative survey. **Methods:** The survey was conducted in May-June 2022 of members of the Ipsos KnowledgePanel; the main sample was augmented by oversamples of firearm owners and others. The principal exposure was firearm ownership status: owner (FO), non-owner living with owner, non-owner with no firearms at home (NONOH). Primary outcomes included endorsement of PV, in general or to advance 17 specific political objectives (threshold: usually/always justified); willingness to engage in PV at 4 levels of severity and against 9 categories of people (threshold: very/completely willing); and perceived likelihood of future firearm use in a situation where the respondent considers PV to be justified (threshold: very/extremely likely). Findings are reported as weighted percentages with 95% confidence intervals (CIs); unadjusted and adjusted prevalence differences will be estimated using linear regression accounting for survey design. **Results:** The overall completion rate was 55.8%. The analytic sample comprised 11,773 respondents, including 5,533 (46.8%) FOs. In unadjusted analyses, FOs were not more likely than NONOHs to endorse PV “in general” (FO: 2.2%, 95% CI, 1.6%, 2.9%; NONOH: 3.3%, 95% CI 2.8%, 4.0%) or to advance most specific objectives. They were not more likely to endorse violence against categories of people or to report willingness “to injure a person” (FO: 2.7%, 95% CI, 2.1%, 3.5%; NONOH: 3.2%, 95% CI 2.5%, 4.0%) or “to kill a person” (FO: 2.7%, 95% CI, 2.1%, 3.4%; NONOH: 2.7%, 95% CI 2.2%, 3.4%). FOs were more likely to predict that “I will be armed with a gun” (FO: 17.8%, 95% CI, 16.4%, 19.3%; NONOH: 4.2%, 95% CI 3.6%, 5.0%) in a future situation where they considered PV to be justified but not more likely to predict that “I will threaten someone with a gun” or “I will shoot someone with a gun.” **Conclusions:** In unadjusted analyses, firearm owners are more likely than others to be armed in future situations where they consider PV to be justified but generally do not endorse PV more than others do and are not more willing than others to engage in PV.

2. Racial/ethnic disparities in the dose-response relationship between cumulative risk exposure and increased gun carrying odds among male US adolescents

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Background: Substance use, mental health, and victimization are risk exposures associated with gun carrying among male adolescents. It is unknown whether the risk of gun carrying among male adolescents increases as

risk exposures increases. **Methods:** Weighted multiple logistic regression models were used to assess the relationship between cumulative risk exposure and odds of gun carrying among male adolescents using 2017 YRBS data. A cumulative risk score was created summing the number of exposures (i.e., binge alcohol drinking, marijuana use, tobacco use, misuse of prescription pain medication, feeling sad/hopeless and victimization from dating violence, bullying, and threat/injury with a weapon). Participants were categorized with a score of one, two, three, or four or more risk exposures. Models controlled for age, sexual orientation, and race/ethnicity. Race/ethnicity interaction terms were tested; stratified models were estimated. Penalized maximum likelihood estimation regressions were tested to address potential estimate instability due to the outcome's rarity. **Results:** In fully adjusted models, there was a significant dose-response relationship between number of risk exposures and odds of gun carrying. Compared with male adolescents with none, the odds of gun carrying was more than twice as high among those with one (OR: 2.7, 95% CI: 1.8, 3.9), five times higher among those with two (OR: 5.5, 95% CI: 3.5, 8.4), ten times higher among those with three (OR: 10.8, 95% CI: 6.6, 17.4), and thirteen times higher among those with four or more risk exposures (OR: 13.8, 95% CI: 9.5, 20.0). Similar increasing, significant trends exist with stronger effects among Black and Hispanic males. Among Black males, there was an association between one (OR: 4.0, 95% CI: 1.9, 8.4), two (OR: 13.4, 95% CI: 5.1, 35.2), three (OR: 26.1, 95% CI: 10.4, 65.9), and four plus risk exposures (OR: 26.5, 95% CI: 11.4, 62.0). Among Hispanic males, there was an association between one (OR: 4.3, 95% CI: 1.8, 10.2), two (OR: 6.3, 95% CI: 2.6, 15.81), three (OR: 21.7, 95% CI: 10.4, 45.3), and four plus risk exposures (OR: 29.8, 95% CI: 14.9, 59.5). Trends were similar in the penalized maximum likelihood regressions. While the majority of adolescent male gun carriers do not binge drink or use tobacco, the 52% of them with risk factors account for 83.3% of carriers. **Conclusions:** The odds of gun carrying increased as risk increased. Better understanding gun carrying risk is essential to identify those at risk and develop interventions to reduce firearm carrying.

3. Mental distress as a mediator between racism experience and firearm behavior among Asian Americans

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Background: Despite the surge of racism acts against Asian Americans and increased firearm ownership within this community since the COVID-19 pandemic, there is limited research on how racism would link to firearm-related behavior and injury risk. The purpose of this study is to examine a mediation model of mental distress in the association between racism experiences and firearm behavior among Asian Americans. **Methods:** We use cross-sectional data from an online survey between December 2020 and February 2021 with 915 Asian Americans residing nationwide in the U.S.. Firearm behavior was measured as household firearm ownership, firearm purchase since the COVID-19 Pandemic, more frequent firearm carriage since the COVID-19 Pandemic, and unsafe firearm storage (unlocked or loaded). The firearm behaviors were recoded into a composite variable as a sum of the four binary responses (yes=1/no=0, range 0-4). Racism experienced since the Pandemic was measured with four indicators: racial discrimination, perceived cultural racism, anticipatory racism-related stress, and racial safety concern. Mental distress was measured using Patient Health Questionnaire-2 (PHQ-2) and Generalized Anxiety Disorder 2-item (GAD-2) scales. We first conduct the latent-factor structural equation modeling (SEM) to establish the link between racism experience and firearm behavior while controlling for sex, age, highest education, income, and ethnicity. We then add mental distress as the mediator in the SEM path analysis. Models were estimated using full information maximum likelihood estimation with robust SEs. **Results:** In the first model, we found a significant association between racism and firearm behavior ($b=0.09$, $p=0.01$) after

controlling for basic demographics (CFI= 0.94, TLI= 0.89, RMSEA= 0.06, SRMR= 0.04). In the mediation model, we found a significant indirect path from racism to mental distress ($b=0.37$, $p<0.01$) that in turn predicts firearm behavior ($b=0.12$, $p=0.01$), while the path between racism and firearm behavior became non-significant. The mediation model demonstrates improved model fit (CFI= 0.95, TLI= 0.93, RMSEA= 0.05, SRMR= 0.04). These results support a full mediation model of mental distress in the association between racism and firearm behavior. **Conclusions:** This is the first study to investigate the role of mental distress in firearm injury-related risk among Asian Americans. We found that higher levels of mental distress associated with racism may play a crucial role in increased firearm behavior, which supports further research. Addressing racism and preventing mental distress is essential in firearm injury prevention among Asian Americans.

4. Why Parkland, not Pulse? Racially disparate policy responses to mass shootings

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Background: This paper investigates differential policy responses to mass shootings, motivated by the contrasting reactions to the Parkland and Pulse shootings in Florida. This study aims to understand how victims' demographics, particularly victims' race and ethnicity, shape state-level gun policy responses. Drawing on research on latent racial biases among politically influential actors, the paper explores the influence of victims' racial and ethnic identities on demands for restrictive gun laws. **Methods:** The analysis utilizes a unique 30-year state panel dataset created using data from The Violence Project and the State Firearms Laws Project. Employing within-unit time-series analysis with two-way fixed effects, time-variant unit-specific controls, and state-linear time trends, the study examines the relationship between mass shooting fatalities and state gun policy. Robustness checks suggest results are not confounded by victims' age, the occurrence of the shooting in a school, and the median income of the neighborhood where the shooting took place.

In addition to examining the relationship between mass shooting fatalities and state gun policy, the study explores the role of elite responses in shaping policy outcomes. To this end, the study analyzes data from Follow the Money to assess lobbying activities by pro-gun control interest groups and Twitter data analysis along with natural language processing techniques to examine the rhetorical responses of state legislators to mass shootings. **Results:** The findings indicate that the implementation of restrictive firearm laws is significantly influenced by the race of the mass shooting victims. Specifically, ten White fatalities lead to the enactment of approximately 1.5 additional restrictive gun laws, while ten racial and ethnic minority fatalities do not have a statistically significant impact on state gun policy. The study also reveals that post-shooting responses by elites, including interest groups and legislators, exhibit racial biases. **Conclusions:** This research suggests that responses to mass shootings are racially biased on average. The study suggests that victims' race and ethnicity play a crucial role in shaping state-level gun policy. By examining the crisis response process, the paper expands on the existing literature on gun policy and exposes the influence of victims' racial and ethnic identities on legislative rhetoric, interest group lobbying, and state policy actions. The findings underscore the need to address racial biases in political decision-making and promote equitable representation in policy responses to disasters and crises.

5. **Short- and long-term associations between municipal spending and racial disparities in youth firearm violence**
Veronica Pear MPH PhD¹, Julia Lund MPH¹, Paul Reeping PhD¹

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Background: Sustained, meaningful reductions in firearm violence require addressing its root causes, which are themselves shaped by structural and sociohistorical forces. This study examined city-level government spending on public goods and services as a potentially modifiable structural determinant of racial disparities in youth firearm violence in the US. **Methods:** This was a time series study of 86 cities in 33 states, 2006-2018. We used standardized city-level spending data from the Lincoln Institute of Land Policy to account for differences in how overlaying governmental units allocate fiscal responsibilities. Annual per capita city spending was categorized by domain into policing, education, health, public welfare, parks & recreation, and housing & community development and each category was centered at the city-specific mean. Drawing on mortality data from the National Vital Statistics System, annual city-level racial disparities in youth firearm violence were measured as the excess rate of firearm homicide among Black youth aged 10-24 compared with non-Hispanic white youth of the same ages. We examined short- and long-term associations with lags of 0-10 years for each spending category using polynomial distributed lag linear models with city fixed effects. Models were adjusted for the other spending categories, year, and a range of hypothesized time-varying city-level confounders including demographic and socioeconomic characteristics, measures of structural racism and social capital, and number of nonprofit youth violence prevention organizations. **Results:** Median per capita spending ranged from \$97 (IQR: \$13, \$321) on public welfare to \$1,944 (IQR: \$1,620, \$2,279) on education. The median excess rate of firearm homicide in Black youth was 36.0 per 100,000 (IQR: 20.1, 57.1). Each \$25 increase in per capita police spending was associated with modest reductions in the excess rate of firearm homicide among Black youth at lags of 1, 2, and 3 years (RD_year1: -3.4, 95% CI: -5.9, -0.9; RD_year2: -3.3, 95% CI: -5.8, -0.9; RD_year3: -2.5, 95% CI: -4.6, -0.4). No other city spending category was significantly associated with disparities in youth firearm homicide. These results are from a preliminary complete-case analysis; the final analysis using imputed data will increase the number of included cities and years. **Conclusions:** City investment in policing may yield short-term reductions in the excess rate of firearm homicide among Black youth. However, policing practices can also be harmful to communities of color. Future work should investigate the specific mechanisms through which police spending is linked to reduced youth firearm homicide disparities.

6. **Measuring the effect of historical structural racism on community firearm violence in 500 US cities**

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Background: The community firearm violence epidemic, including intentional fatal and nonfatal shootings, in the United States (US) disproportionately affects racialized and minoritized groups. Despite comprising 14% of the population, nearly two-thirds of homicide victims are racialized as Black. Modern research suggests firearm violence is higher in communities where there are limited economic opportunities, relatively high concentrations of poverty, and residential instability. These factors are typically thought of as social determinants of health. However, factors upstream from these determinants, like structural racism, are theorized to be core etiologies of the disproportionate burden of firearm violence in communities with a majority of persons racialized as Black.

Minimal research has explored these structural pathways. This study examines contemporary patterns in community firearm violence in relation to historical structural racism in 500 major US cities. **Methods:** We constructed structural racism indicators across two historical periods for each city—Time 1: Pre-Civil Rights (1930-1945) and Time 2: Integration (1990). At Time 1, we identified cities that had a documented history of “redlining” (i.e., a racialized discriminatory mortgage lending policy) and/or being a sundown town (i.e., towns with the expectation that non-White individuals had to leave before sundown to avoid repercussions). For Time 2, we computed 1990 Black-White dissimilarity indices of residential segregation, poverty, incarceration, and owner-occupied units. We loaded items from Time 2 into a confirmatory factor analysis to compute a unidimensional latent variable. We used quasi-Poisson regression analyses to test the association between these two historical time periods and the total number of 2015-19 fatal and nonfatal interpersonal shootings per 10,000 population obtained from the Gun Violence Archive. **Results:** Between 2015-19, 133,381 shootings occurred. There were 238 cities with a documented history of redlining and/or being a sundown town. The rate of shootings per 10,000 population was 38% higher in cities with structural racism at Time 1 (95%CI: 1.14,1.67). Time 2 items accounted for 98% of the variance of a 1-Factor model. All items loaded adequately (residential segregation: -0.95, poverty: 0.91, incarceration: 0.64, and owner-occupied units: 1.00). For every one-unit increase in Time 2 structural racism, there was an 80% increase in the rate of shootings per 10,000 population (95%CI: 1.71,1.90). **Conclusions:** These findings reveal the impact of historical racism on contemporary community firearm violence in US cities. Dismantling structural racism will require a concerted effort over decades. Future research should explore pathways through which structural racism affects firearm violence and foci for intervention.

Session 4: Criminal justice and firearm crime

Sheraton III, November 1, 10:45 AM - 12:15 PM

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1. How crime fears and status threats shape gun attitudes and behaviors

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Background: In 2020, as the United States faced a global pandemic, economic instability, spiking homicide rates, and widespread civil unrest, gun buying surged. On average, in a given month between January 2020 and April 2021, approximately 1.9 million people bought firearms. While U.S. gun owners are more diverse than ever, their core concern remains protection. But protection from what? How do we reconcile spikes in gun purchasing for protection and the increased risk to individual safety that such guns present? **Methods:** Using survey data from a nationwide sample of 1,160 American adults collected in early 2023, this study explores sources of crime and victimization fears among Americans, and how such fears motivate gun behavior and attitudes, including openness to future gun ownership among persons who do not currently own a gun. Measures include crime-related fears, risk, and threats, as well as broader cultural anxiety and racial/gender status-related threats. A key innovation in this study—cultural anxiety—captures antagonism toward social and cultural change via statements like “The American way of life needs to be protected from foreign influence;” and “America is in danger of losing its identity.” These anxieties may not reflect concrete threats to physical safety, but they can be experienced as challenges to the security and stability of one’s relative social position. Such perceptions are distressing, spurring feelings of uncertainty and unpredictability, that — for some Americans — may be managed by knowing they have a (loaded) gun within easy reach. **Results:** Analyses reveal that fears about crime and victimization are connected to our personal experiences with physical threat – and these kinds of fears matter for protective gun ownership, gun carry, gun identity, unsafe gun storage, and even openness to future ownership among non-owners. However, these fears are also shaped by broader social, cultural, and economic anxieties that are experienced as threats to self- and group-identity. Further, it is these broad anxieties that matter as much—and in some cases more—than risks and threats to physical safety. **Conclusions:** Both immediate threats and abstract threats contribute to objective fear, and a sense of unease, instability, or unpredictability that can motivate one to seek out means for security, stability, and control. When we perceive guns as instrumental for reinforcing a sense of control, it becomes harder to see them as potentially dangerous.

2. Understanding the relationship between state gun law strength and homicide rates

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¹*Everytown for Gun Safety*

Background: State gun law strength often does not correlate with gun homicides. New Hampshire and Montana, for instance, have among the lowest gun homicide rates, but rank last on policy scores developed by multiple gun safety organizations. Conversely, Illinois and Maryland, have high gun homicide rates but lead the nation in gun safety policy. This study examines factors related to the disconnect between state gun law strength and homicide rates. **Methods:** We ranked states on a gun law score (3.0 in Mississippi to 86.5 in California) developed by Everytown for Gun Safety and on their gun homicide rate. We compared rankings and categorized states as having: 1) lower-than-expected homicide rates given weak laws; 2) low rates given strong laws; 3) high rates

given weak laws; and 4) higher-than-expected rates given strong laws. **Results:** Ten states with lower-than-expected gun homicide rates (mean 2 per 100,000 population) given weak laws (mean gun law score 12) were clustered in the Mountain/Midwest and New England regions. These states had lower-than-average rates of recovered crime guns (mean 74 vs. national average 130 per 100,000 population) and nearly all (9 of 10 states) had failing neighbors with respect to gun safety policies, while few (3 states) had neighboring leaders as categorized by Everytown. They also had higher-than-average rates of gun ownership (51% vs. 40%) and hunting licenses (55% vs. 36%), and lower-than-average population density (mean 42 vs. 207 per square mile). Illinois and Maryland were among fourteen states with higher-than-expected gun homicide rates (mean 6 per 100,000 population) given strong laws (mean gun law score 63). They had lower-than-average rates of recovered crime guns (mean 121), but the percentage originally purchased in other states was higher-than-average (41% vs. 31%). They were equally likely to have failing (8 states) and leading (9 states) neighbors on gun safety policies. Twenty-two states with high gun homicide rates given their weak laws were largely located in the south. They had higher rates of recovered crime guns (mean 171), the vast majority of which were purchased in-state. Despite constituting only half of the US population, these states supplied 70% of all recovered crime guns to other states, and not just to their neighbors. **Conclusions:** A complex network of inter- and intrastate gun policies, movement across state lines of guns later used in crimes, gun culture, and population density are among factors likely associated with homicide rates.

3. Predicting crime guns: A machine learning analysis of California firearm transaction records

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Background: The U.S. firearm homicide rate has surged in recent years, coinciding with record high firearm sales. Data on firearms recovered in crime also indicate an increasing percentage of legally purchased guns have moved quickly from sale to criminal use. The purpose of this study is to employ machine learning to predict which firearms end up used in crime shortly after purchase, and the transaction, purchaser, firearm and dealer characteristics most predictive of crime gun recovery. **Methods:** We assembled a unique dataset linking 7,818,362 individual-level firearm transaction records in California (2010-2020) to records for 381,213 crime guns from across the state (2010-2021). We employed machine learning, specifically, random forest, to predict the risk of recovery within a year of purchase. This short “time-to-crime” is commonly viewed as an indicator that a firearm was purchased with criminal intent. We generated and included a total of 81 purchaser, firearm, transaction, retailer, and community features. The algorithm was trained on a stratified (balanced) sample of 70% of the data; the remaining (unbalanced) 30% of data was used to evaluate the model. We estimated variable importance using permutation to calculate each predictors’ contributions to classification accuracy. We also calculated minority-class specific importance (using only minority-class observations). **Results:** A total of 15,945 firearms (0.2% of transactions) were recovered within a year of purchase. Algorithm AUC was 0.85; the default threshold of 0.50 resulted in a sensitivity of 0.63 and specificity of 0.87. Among transactions classified as the riskiest 5%, close to half (45%) were subsequently recovered within a year of purchase. The algorithm performed particularly well among the small number of transactions identified as extremely risky: for example, among transactions with a random forest score of 0.98 and above, 74% (35/47 in the test data) were recovered within a year. The most important feature overall was caliber size, followed by whether the purchaser had any prior drug arrest, the month of purchase, and transaction type (eg, sale, pawn redemption, voluntary registration). The most important minority-class specific feature was purchaser age, followed by race and transaction type.

Conclusions: This is the first study to employ machine learning to identify transactions at high risk of being recovered soon after purchase, and the features most predictive of recovery. The results suggest the potential utility of detailed transaction records in identifying risky sales and the risk factors associated with those firearms that end up in the hands of criminals.

4. **The impact of police-involved violence on violent crime in Milwaukee, Wisconsin**

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Background: Despite not being a new phenomenon, police-involved violence has posed a preeminent public health and political problem in the United States over the last decade. Following incidents, scholars posit a “pull-back” by both police departments and communities in engagement with one another. Several theorists contribute recent increases in violent crime to a wave of de-policing. **Methods:** We obtained data from the Milwaukee Police Department (MPD) on all reported homicides and nonfatal injurious shootings (hereinafter violent crimes) between 2006-2022. Data on incidents of police-involved violence (fatal interactions and nonfatal injurious shootings) were drawn on from Mapping Police Violence and the Gun Violence Archive between 2014-2022. We generated counts of violent crimes, stratified by victim race/ethnicity and age group. We will use negative binomial models to assess whether violent crime incidents increased following events of police-involved violence. Incident locations were geocoded. Using aggregated spatial intensity, we will assess differences in the spatial distribution of violent crimes before and after incidents of police-involved violence. **Results:** Between 2006-2022, there were 11,849 incidents of violent crime (18.4% homicides) in Milwaukee. A total of 49 incidents of police-involved violence involving MPD were identified between 2014-2022. Homicides and nonfatal injurious shootings were spatially concentrated in neighborhoods with the highest percentage Black and Hispanic residents. Preliminary results suggest that following higher-profile cases of police-involved violence that incidence of violent crime increased. **Conclusions:** This is the first study to examine the impact of multiple events of police-involved violence on violent crimes. Consistent with prior research, preliminary results suggest that cases that garner more public attention led to increased incidence of violent crime. As police departments and their leadership work to better relationships with the community, findings can be valuable when navigating the tense moments following an incident of police-involved violence.

5. **The impact of mandatory prison sentences for illegal possession of a firearm: The Chicago experience**

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Background: The 2004 National Academy of Sciences’ Firearms and Violence: A Critical Review report recommended “more rigorous study of firearm sentencing enhancement laws at the city level” (p.229) to determine if policies such as mandatory prison for illegal possession of a firearm impact crime. One weakness of many firearm sentencing enhancement policy evaluations is they focus more on the existence of the law, and less so on the actual implementation of the law in the pre-post designs. Also, much of the research has focused on mandatory prison when firearms are used in the commission of a violent crime (e.g., armed robbery with a firearm). This paper examines the implementation and impact of two specific policies in Illinois regarding firearm possession that had the stated policy goal of reducing firearm violence: 1) mandatory prison for felons in possession of a firearm (effective 2006), and 2) mandatory prison for anyone possessing a loaded, accessible

handgun in public/in a vehicle without a concealed carry permit (effective 2011). Although these were state laws, research found that they were primarily used/enforced in Cook County/Chicago, and primarily involved young black men from specific Chicago neighborhoods (Olson, et. al., 2021). **Methods/Results:** Using monthly data from 2001 through 2022, this paper will first answer the question of whether these policies actually increased the number of individuals from Chicago incarcerated for illegal possession of a firearm (i.e., implementation), and if so, which specific Chicago neighborhoods experienced this increase the most. Preliminary analyses indicate the answer to this question is yes, and it varied by neighborhood. The second question that will be answered is the degree to which the implementation of the policy influenced rates of fatal and non-fatal firearm violence in Chicago. To answer the later question, a series of interrupted time-series designs will be used. The first will include a single Bayesian structural-time series model of fatal and non-fatal violent crimes committed with a firearm over time in Chicago. The second will include a Bayesian Controlled-Interrupted Time Series (CITS) design where potential confounders, including weather conditions, the unemployment and/or inflation rate, interpolated population characteristics, a proxy for firearm acquisition, and broader crime measures can be accounted for. **Conclusions:** These designs estimate a counterfactual trend based on the pre-intervention period. It assumes that without the intervention (i.e., an increase in the incarceration rate of those convicted of firearm possession), the intervention trend would have remained the same.

6. Predicting violent crime among handgun purchasers in California using handgun purchase trends and criminal histories

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Background: Firearm purchasing records are a potentially critical and unexplored resource for the development of risk prediction tools to identify individuals at high risk for violence. In this study, we use machine learning methods to develop models to predict firearm violence among legal purchasers of handguns. **Methods:** Our data consists of all individuals with records of transaction in California's Dealer Record of Sale (DROS) database, from 1996 through 2020. We extract features to describe purchase history including age at first purchase, temporal purchase patterns, firearm caliber and price, and others. Purchaser information is linked to criminal records to identify firearm-related major violent crime (homicide, rape, burglary, aggravated assault), our primary outcome, as well as criminal history predictors. Using a gradient boosted regression model with Cox Proportional Hazards loss functions, we fit a validated predictive model of individual risk of violence. Handgun purchasing and criminal history features are included in the model as time-varying covariates summarizing the previous year and lifetime of the purchaser. The gradient boosted model is ideal for this application as it can efficiently identify the most important features, and interactions of features, for prediction as well as estimate non-linear temporal effects for time-varying features. **Results:** We observed 3,360,284 legal handgun purchasers with over 10,000,000 legal handgun purchases from 1996 through 2021. Among the legal handgun purchasers, 737,793 (22%) had arrest records and 59,847 (1.7%) had been arrested for a major violent crime. Drug and firearm offenses were the most influential arrests in prediction of arrest for a major violent crime. We also observed elevated risk of violence in the first year since the purchase of a handgun. Among purchasers estimated to have risk scores in the 99.9th percentile (N = 10,704), 17.7% were arrested for a major violent crime within 1 year of observing elevated risk, and 21.8% were arrested within 5 years. **Conclusions:** We demonstrate the utility of gun sale records in identifying higher risk handgun purchasers and relevant risk factors. Effective utilization of these data may help aid efforts to reduce firearm related death and injury.

Session 5: Examining gun culture and exploring international rates of firearm injury and death

Erie, November 1, 10:45 AM - 12:15 PM

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1. The leading causes of death in children and adolescents in Brazil, 2000-2020

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Background: Despite promising reductions in mortality from infectious diseases, premature death is a still major public health problem in Brazil. However, little is known about which diseases and injury mechanisms are the main causes of premature death. This paper aimed to detail trends in leading causes of death among children and adolescents in Brazil. **Methods:** Data were extracted from medical death certificates from the Brazilian Mortality Information System for children and adolescents aged 1 to 19 years for 2000 to 2020. The 10 leading causes of death for children and adolescents were defined using primary cause of death codes, grouped by death for diseases and mechanism for injury, according to the International Classification of Diseases, Tenth Revision. All analyses were completed in 2022. **Results:** From 2000 through to 2020, there was a total of 772,729 child and adolescent deaths in Brazil. Despite an overall 34% reduction in child and adolescent mortality from 2000 to 2020, improvements were less pronounced among injury-related deaths than for communicable diseases. As a result, by 2020 over half of deaths were from injury-related causes. Firearm-related injury was by far the leading cause, accounting for 21% of all deaths. There was a 38% reduction in firearm deaths in the last 4 years against a previously increasing trend, and homicide accounted for over 90% of all firearm deaths since suicide by firearm was rare. **Conclusions:** Injury-related deaths among children and adolescents are a growing concern in Brazil, and firearms are the current leading cause of child and adolescent death.

2. The contribution of firearm mortality to the changes in life expectancy on the northern border of Mexico

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Background: The increasing number of homicides in Mexico has placed the country as one of the most violent in the world. Most homicides in Mexico are committed with firearms. In 2018, almost 70% of the total male homicides and about 50% of the total female homicides were committed with a firearm. Additionally, the improvement in life expectancy experienced from 1950 to 2000 suffered a setback in the last two decades. This study focuses on assessing the contribution of firearm homicides to the changes in male and female life expectancy after 2000. **Methods:** Age-specific firearm mortality rates were estimated separately by sex with a Negative binomial generalized linear mixed model to shrink unstable rates to the overall homicide rate of the region. Abridged period life tables were constructed by sex using demographic methods from 2000 to 2019. From these, life expectancy was calculated. Changes in life expectancy during the period were decomposed by age and type of homicide using a continuous change model. Decomposition analysis separates life expectancy into components that contribute to their difference. These methods are used to disentangle age and type of homicide contributions to differences in life expectancy at each age. **Results:** Male firearm homicides accounted

for about 78% to 88% of the overall violent death contribution to life expectancy from 2000 to 2019. From 2007 to 2010, male firearm homicides accounted for 83% to 88% of the overall violent death contribution to life expectancy, while from 2016 to 2019, male firearm homicides accounted for almost 100% of the overall contribution to male life expectancy. The analyses suggest that the downward trend in male life expectancy observed may be the result of the increase in homicides, especially firearm homicides. **Conclusions:** Using a public health approach to violence prevention, particularly homicides by firearms is important to increasing the life expectancy of males in Mexico. The fact that firearm account for most homicides indicates that the reduction of the homicide rate depends on the reduction of firearm homicides. Research aimed at violence prevention, substance use, and firearm access are needed to change the course of the current homicide trends. Public health approaches that focus on voluntary disarmament and increasing educational and employment opportunities for youth may help reduce firearm availability and circulation and potentially firearm homicides.

3. Firearm manufacturing and imports in the U.S. and their association to firearm homicides in Central America and the Caribbean, 1991-2019

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Background: Firearm manufacturing and imports grew considerably in the United States during the mid-2000s. A majority of firearms recovered in Central America and the Caribbean can be traced back to the US, suggesting possible international impacts of increased US firearm production. We sought to quantify the association between US firearm manufacturing/imports and homicide rates in Central America (including Mexico) and the Caribbean. **Methods:** We used the Global Burden of Disease database to quantify firearm and non-firearm homicide rates in fifteen Central American and Caribbean countries from 1991 to 2019. We obtained US firearm manufacturing and imports from the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). We used two-way fixed effects regressions to estimate within-country changes in firearm and non-firearm homicides rates as related to US firearm manufacturing rates, controlling for domestic firearm imports and several SES measures. **Results:** Descriptive analysis showed large increases in firearm homicide rates in Central American and Caribbean countries beginning in 2004, increasing from 8.38 in 2004 to 17.55 in 2012 (109% increase) and remaining steady thereafter. Those increases coincided with increases in US firearm manufacturing/imports (increased from 4.99 million in 2004 to 13.12 million in 2012, a 163% increase). Non-firearm homicides remained roughly constant from 1991 to 2019. Adjusted analysis showed an increase of one million firearms manufactured or imported to the U.S. corresponded to an increase of 1.41 (95%CI: 0.68,2.14) firearm homicides per 100K population in Central American and Caribbean countries; the corresponding change for non-firearm homicides was -0.18 (95%CI: -1.36,1.00). We found country-to-country variability in these effects, with Honduras and El Salvador showing the largest associations. **Conclusions:** We found that U.S. firearms manufacturing/imports were associated with firearm homicide rates in Central American and Caribbean countries, but not associated with non-firearm homicides. The specificity of these results to firearm homicides suggests possible international effects of increased firearm manufacturing in the US.

4. Understanding characteristics of homicides committed with firearms in Ontario, Canada

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Background: For the past six years, shootings were the leading cause of death among homicide victims in Canada. The population-adjusted rate of firearm-related homicides in 2021 was the highest rate recorded since 1992 (Cotter, 2022). Despite this pressing public health issue, limited research on Canadian firearm-related homicides exists beyond statistical figures reported by Statistics Canada. The purpose of our study is to compare the characteristics of firearms-related and non-firearms-related homicides in Ontario, Canada. An examination of any existing similarities or differences between these two types of killings can inform more nuanced policy and prevention initiatives. **Methods:** The study utilized 38 years of homicide data from Ontario, Canada to examine bivariate associations among key characteristics and firearm-related homicide victimization. Cross-tabular analyses were used to investigate correlations that exist between the method of killing (non-firearm-related versus firearm-related method) and various independent variables that capture characteristics of the incidents and/or those involved. **Results:** Bivariate results found that homicides in which a male victim was killed by a male perpetrator were significantly more likely to be firearm-related. Non-intimate partner homicides were more likely to be firearm-related, and inversely, intimate partner homicides were less likely to be firearm-related. Victims of firearm-related homicides were generally younger and less likely to be using substances at the time of their death. When focusing on incident characteristics, there was a significant association between the population density of where the homicide occurred and the method of killing, with rural homicides more likely to be firearm-related. Firearm-related homicides were significantly more likely to involve two or more victims and to occur in a public space compared to non-firearm-related homicides. The perpetrator was more likely to attempt or commit suicide following the killing when it was committed with a firearm. Evidence of multiple use of methods to kill (or overkill) was significantly less likely to be found in firearm-related homicides. The patterns detailed above were statistically significant at the $p \leq .001$ level. **Conclusions:** These findings add to the understanding of the circumstances in which Canadian firearm-related homicides occur and provide a preliminary understanding of their contexts, such as the perpetrator and victim's gender and the victim-perpetrator relationship, among other individual and incident characteristics. The more we can learn about factors associated with the occurrence of homicides committed with firearms, the more opportunities we have to prevent them from happening in Canada.

5. Examining firearm ownership in Florida: Guns provide access to sources of life meaning

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Background: Firearm injury, mortality, and societal burden in the United States is considered a public health crisis. While it's clear the U.S. has a firearm violence problem, there is also a pervasive firearm culture independent of violence, meaning there is a strong cultural association of firearms with personal identity and national values. An underutilised approach to understanding the unique problem with firearm violence and firearm culture in the United States is to examine the problem through a sociological lens, focussing on understanding why firearms occupy such a prominent part of American culture. Examining attitudes to firearms symbolically and culturally, instead of as physical instruments, or weapons for ill-use, illuminates the hidden motivations for firearm ownership and carry, and the cultural environment which nurtures these views. **Methods:** A qualitative study using ethnographic methods was conducted in Mosby, a small city in Southwestern Florida, between May 2021 and April 2022. The analysis draws upon data from 18 semi-structured interviews, as well as participant observation of 19 core participants at a firearm range and store, and at a shooting club. **Results:** This research theorised that although many firearm enthusiasts explain their weapon in terms of it being

merely a tool for self-defence, the meaning the gun provided its carrier was far more valuable than any practical objectives. Using Baumeister, (1991) framework for a meaningful life (where meaning is accessed through purpose, value justification, self-efficacy, and self-worth), firearms provided enthusiasts a sense of life meaning in two broad areas; heroism and community togetherness. Enthusiasts found meaning in the ways they enacted masculine forms of heroism, by showing strength and by being a defender of American rights. However, meaning was not only found in strength, but also in tenderness – their firearm provided a community of like-minded people to share a connectedness with, in a country growing further disconnected from community. **Conclusions:** By investigating the upstream reasons and motivations for owning firearms, this research hopes to provide a deeper understanding of demand-side issues around firearm ownership which may improve the political feasibility of solutions to America’s firearm violence epidemic. By examining firearms ownership through a sociological lens – where the gun is viewed symbolically in terms of its history, culture, values, and meaning – this research hopes to add to the small but growing body of literature designed to contextualise the public health consequences of civilian owned firearms.

6. Stopping a bad guy with a gun: Differentiating a politics of fear

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Background: Public debates over gun violence vacillate between advocacy for and opposition to the gun itself, even as policy analysts sometimes contend that gun laws oftentimes have marginal relationship to scientific evidence. And while research on gun violence is finally resurging, only a small percentage focuses on the cultural dimensions of the gun or the relationship between gun ownership and policy. Even fewer study gun owners outside of the “typical” conservative faction of American gun culture. My research suggests what we might learn from the voices of liberal gun owners who are situated in the uneasy crosshairs of Second Amendment advocacy and pro-statist/collectivist politics. Their experiences and perspectives necessarily transform our understanding of gun ownership and gun culture and have the potential to push firearms policy in more productive and innovative ways. **Methods:** This qualitative, ethnographic project includes participant observation at gun ranges, gun club events, advocacy meetings, gun training classes, and in-depth interviews with self-identified liberal gun owners. It examines the lived experiences of a stigmatized population (disregarded by other liberals for owning guns and by conservatives for their political values) who constitute a growing and increasingly political group of gun owners. **Results:** This talk illuminates one aspect of the larger project, namely, the politics of fear and ethics. Responding to the popular NRA slogan that promotes gun ownership as a way of stopping the “bad guys,” this talk explores how liberal gun owners redefine “good guys” and “bad guys,” examining the cultural equation of gun ownership and morality. While the liberal gun owners in this study largely support Second Amendment rights to own a gun, they often define morality through a focus on structural violence rather than gun violence. For them the bad guy is not the violent, house-invading criminal, but the far-right, single-issue, pro-gun advocate who threatens democratic processes and marginalized Others. **Conclusions:** Through an underutilized methodological approach to gun studies, this research raises new questions about gun culture, offering access to more diverse understandings of the relationship between cultural values and gun practices. Recognizing that gun culture is not monolithic, and that policy operates through differently situated individuals whose experiences reflect their unique positions, this research reflects the potential to complicate polarized conversations about gun control and provide the space for an approach to violence reduction that incorporates individual and collective identities and needs into the equation.

Session 6: Examining hospital and emergency department firearm injury data

Sheraton I, November 1, 1:00 PM - 2:30 PM

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1. Outpatient care disparities in traumatically injured patients discharged to correctional facilities

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Background: Incarceration rates in the United States are among the highest in the world, and access to healthcare is poorly understood in individuals who are in custody. Many physicians are concerned these patients receive suboptimal care compared to the general population in part due to barriers in medical confidentiality, poor follow up, and lack of specialty care at correctional facilities (CF). Our study sought to characterize outpatient follow-up and emergency department (ED) utilization after traumatic injury for incarcerated individuals. We hypothesized that patients discharged to CFs would have higher rates of ED utilization and unplanned hospital readmissions, and lower rates of outpatient clinic follow-up. **Methods:** This was a retrospective electronic health record analysis of patients admitted after traumatic injury from 2015-2022. Patients who were discharged to CFs were propensity matched to a subset of patients discharged to home based on age, gender, race, mechanism of injury, and Injury Severity Scores. The primary outcomes included emergency department (ED) utilization and unplanned hospital readmissions. Secondary outcomes included appropriate outpatient follow-up, which was stratified into no follow up or suboptimal follow-up. Suboptimal follow-up was defined as missing a specialty appointment that was indicated on the discharge summary. Outcomes were compared between the two groups. **Results:** There were 392 matched pairs. Patients discharged to CFs were more likely to visit the ED (25% vs 18%, $p=0.03$). Of patients who visited the ED, home patients were more likely to have multiple ED visits (44% vs 26%, $p=0.02$). There were no differences in median days to first ED visit (7, IQR=8 vs 7, IQR=6, $p=0.92$), or in unplanned readmissions (6% vs 7%, $p=0.57$). Patients were often released from CFs without their hospital paperwork. Therefore, CF patients were more likely to visit to obtain their discharge prescriptions (19% vs 1%, $p<0.01$) or to arrange outpatient follow-up (13% vs 0%, $p<0.01$) compared to home patients. Regarding outpatient follow-up, 28% of CF patients had no outpatient trauma-related follow-up compared to 15% of home patients ($p<0.01$). **Conclusions:** Patients discharged to correctional facilities after traumatic injury face barriers to outpatient healthcare engagement. This includes lack of control over follow-up appointments and medication management. Increased collaboration with correctional facilities is necessary to optimize outpatient trauma care.

2. Violence profiles among young adults presenting to four urban emergency departments

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Background: To use baseline data from a multi-site longitudinal study of violence to identify characteristic violence profiles (as aggressor) among young adults, and determine factors associated with different profiles. **Methods:** Recruiters approached patients aged 18-24 in two emergency departments (EDs) in Philadelphia, and

one ED each in Flint and Seattle. Following informed consent, participants completed a comprehensive survey containing validated measures of violence involvement, and several covariates, including social (peer/familial) influences and support, adverse childhood experiences (ACEs), substance use, mental health symptoms, externalizing symptoms (anger management; impulsivity), neighborhood features, and coping/resiliency. Focusing on violent aggression, we categorized violence into moderate (e.g., pushing/grabbing, slapping), severe (e.g., beating up, choking), and firearm-related (shooting, or threatening to shoot, someone) using a previously established taxonomy. We constructed violence profiles based on six aggression measurements: binary indicators of any moderate, severe, and firearm violence, measured separately for partner and non-partner violence. Latent class analysis (LCA) is a model-based clustering algorithm, which we used to identify groups of individuals with similar violence profiles, and subsequently compared those groups based on measured covariates. **Results:** Across sites, 1,506 young adults completed the baseline (40.9% Black; 61.6% female; mean age=21.3). With regard to past-six-month non-partner violence, 23.0%, 19.8%, and 3.2% reported moderate, severe, and firearm aggression, respectively. In contrast, 15.3%, 9.1%, and 1.4% reported moderate, severe, and firearm partner aggression in the prior six months. The LCA solution that minimized the Bayesian Information Criterion, and produced well-separated classes (relative entropy=0.93) contained four classes: no aggression (NA;67.4%), moderate/severe partner aggression (PA;8.7%), moderate/severe non-partner aggression (NPA;19.5%), and high-risk for all aggression types (HR;4.4%). Only NPA (7.1%) and HR (34.9%) had non-zero firearm aggression rates. The most severe group (HR) reported higher levels of community violence exposure, family conflict, externalizing symptoms, and negative peer influences than all other classes. Classes reporting more partner aggression (HR; PA) reported higher levels of alcohol misuse, PTSD, and ACEs than the group showing only non-partner aggression (NPA). Classes reporting more non-partner aggression (HR; NPA) were primarily distinguished from those reporting only partner violence (PA) by lower peer support and prosocial involvement. **Conclusions:** Violent aggression is common among youth presenting to urban EDs, and there is variation in the types of aggression displayed. That variation corresponds to different risk factor profiles, which would be obscured by aggregating violence types. Foci for ED-based violence prevention may be optimized by considering the type, and severity, of aggression under study.

3. Firearm flossing behaviors among high-risk emergency department youth and young adults with recent firearm carriage

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Background: Emergency department visits are an opportunity for identifying/intervening with at-risk youth/young adults (Y/YAs). Firearm flossing is a form of risky gunplay, ranging from spinning a firearm around a finger to firing it in the air, that is considered a precursor to more severe firearm behaviors. Prevalence of firearm flossing among Y/YAs, and factors associated with flossing, have not been previously described. In this analysis, we characterize the range of flossing behaviors and their association with other risk behaviors to inform prevention efforts. **Methods:** Y/YAs (age 16-30) receiving treatment (for any reason) in two urban EDs who reported past 3-month firearm carriage were enrolled in an ongoing randomized trial evaluating efficacy of a firearm safety intervention. Enrolled participants completed a baseline survey, including items characterizing firearm flossing. We descriptively characterize firearm flossing behaviors and examine relevant risk factors

among those engaged in flossing compared to those not engaged in flossing in this at-risk sample. **Results:** Of enrolled Y/YAs (n=81; mean age=23.4; 38.3%-male; 65.4%-Black, 60.5%-Public Assistance), 51 (63.0%) reported engaging in any firearm flossing behaviors. Flossing behaviors included: (a) spinning a firearm around their finger (19.6%); (b) cocking/uncocking a firearm multiple times in a row (47.1%); (c) loading/unloading a firearm multiple times (76.5%); (d) firing a gun/pulling the trigger without bullets (54.9%); (e) holding a firearm while taking a selfie/video (25.5%); and (f) showing someone a firearm to warn/scare them (15.7%). Compared to those not engaging in flossing, those reporting flossing behaviors were more likely male (49.0%-vs.-20.0%, OR=3.85) and more likely to have attitudes favoring aggressive firearm use (25.8%-vs.-21.0, OR=1.24). Y/YA's engaging in firearm flossing also had higher rates of community violence exposure (summary score mean 17.3-vs.-9.2, OR=1.15), recent firearm victimization (47.1%-vs.-10.0%; OR=8.00), other risky firearm behaviors (90.2%-vs.-53.3%; OR=1.61) and involvement in the criminal justice system (54.9%-vs.-26.7%; OR=3.35). No significant differences were noted in other socio-demographic variables (age, race), perceptions of the risks associated with having/using firearms, frequency of firearm carriage over the past 30-days, or rates of substance use and mental health symptoms. **Conclusions:** Among a high-risk sample of Y/YA's with firearm carriage, firearm flossing behaviors were common and associated with other risky firearm and violence behaviors. Primary prevention initiatives in healthcare settings should include an upstream focus on such behaviors, as they may be associated with increased injury risk.

4. Emergency department visits for pediatric firearm injuries, 2017-2022: A multicenter study

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Background: Firearm injuries among children increased during the COVID-19 pandemic, but recent and emerging trends in firearm injury emergency department (ED) visits have not been well described. We sought to assess how the pediatric firearm injury ED visit rate during the COVID-19 pandemic differed from expected pre-pandemic trends. **Methods:** We conducted a retrospective cross-sectional study of ED visits for firearm injuries by children under 18 years old at nine hospitals participating in the Pediatric Emergency Care Applied Research Network Registry from January 2017 to November 2022. We compared sociodemographic and clinical

characteristics of firearm injury ED visits before (January 2017-February 2020) and during (March 2020-November 2022) the pandemic. To estimate the expected ED visit rate per 30 days during the pandemic, we calculated prediction estimates and intervals from pre-pandemic ED visit data using multivariable Poisson regression models, accounting for seasonal, geographic, and temporal trends. We calculated the rate ratio (RR) of observed to expected firearm injury ED visits per 30 days, overall and stratified by sociodemographic characteristics. **Results:** During the study period, 1902 pediatric firearm injury ED visits occurred at participating hospitals (694 visits pre-pandemic; 1208 visits during the pandemic). Of these, 52.3% were 15-17 years old, 80.0% were male, and 63.5% were non-Hispanic Black. Triage category level 1 (highest acuity) visits increased from 38.5% pre-pandemic to 46.4% during the pandemic ($P=0.027$). The percentage of injured children who died in the ED or hospital increased from 3.1% pre-pandemic to 6.1% during the pandemic ($P=0.007$). Before the pandemic, there were 18.0 firearm injury ED visits per 30 days, which increased to 36.1 visits per 30 days during the pandemic, with an observed to expected RR of 2.09 (95% CI 1.63, 2.91). During the pandemic, firearm injury ED visits per 30 days were higher than expected for children 10-14 years old (RR 2.61, 95% CI 1.69, 5.71), 15-17 years old (RR 2.09, 95% CI 1.51, 3.38), males (RR 2.00, 95% CI 1.53, 2.86), females (RR 2.46, 95% CI 1.55, 6.00), Black non-Hispanic children (RR 1.88, 95% CI 1.34, 3.10), and Hispanic children (RR 2.30, 95% CI 1.30, 9.91). **Conclusions:** Firearm injury ED visit rates by children during the COVID-19 pandemic exceeded twice the rates predicted by pre-pandemic trends. Visit rates were higher than expected for Black and Hispanic children, widening injury disparities that preceded the pandemic. These findings may inform pediatric firearm injury prevention efforts, including during future public health emergencies.

5. Identifying children at risk of firearm injuries using exploratory spatial data analysis of 9-1-1 emergency medical services data in 50 states

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Background: Exploratory spatial data analysis (ESDA) is a potential tool to identify children at risk of firearm injury and to understand geospatial patterns of where children with firearm injuries live. We used ESDA and national 9-1-1 EMS response data to identify spatial clusters of children with firearm injuries living in high-risk ZIP Codes. **Methods:** We included 9-1-1 EMS responses in 50 states for children < 18 years, including ground and air ambulance transports, non-transports, and deaths at the scene from January 1, 2012 through December 31, 2022. We used children's home ZIP Code for geospatial analysis and separated children into 0-10 years (pre-adolescent) and 11-17 years (adolescent/teens). Children with firearm injuries were aggregated at the ZIP Code level and averaged over the number of years with 9-1-1 EMS data for each state. We began with descriptive choropleth mapping to visualize the spatial distribution of pediatric firearm injuries and then used local Moran's I statistic to identify local spatial clusters. When a given ZIP Code and its neighboring ZIP Codes had a statistically elevated number of firearm injuries, the geospatial area was considered a cluster. Neighborhood information from 4 public sources (American Community Survey, Child Opportunity Index, County Health Rankings, and Social Vulnerability Index) was matched by home ZIP Code to characterize home neighborhoods with and without clustering. **Results:** There were 12,038,712 children from 31,670 ZIP Codes across the US with a 9-1-1 EMS response, including 30,841 (0.26%) children with a firearm injury (4,316 [14.0%] in the 0-10 year group and

26,525 [86.0%] in the 11-17 year group). Among children 0-10 years, there were 732 ZIP Code clusters, including 1,712 of 4,316 (39.7%) firearm injuries. Among older children, there were 1,691 ZIP Code clusters, representing 13,974 of 26,525 (52.7%) firearm injuries. ZIP Codes with clustering had greater unemployment, non-white residents, single-parent households, low birthweight births, physical inactivity, chlamydia infections, teen births, children in poverty, violent crime, infant and child mortality, drug overdoses, motor vehicle crashes, preventable hospital stays, and HIV prevalence, and lower rates of health insurance, household income, mental health providers, and rural residents. **Conclusions:** ESDA of 9-1-1 EMS response data can identify neighborhoods where pediatric residents are at elevated risk of firearm injury. High-risk neighborhoods differed in population demographics, health, income, crime, and injury measures. These data could be used to guide community-based interventions and risk-reduction strategies for children.

6. Examining firearm injury intent in New York State (NYS) emergency department and hospitalization data
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Background: The International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) allows for the identification of firearm injuries within hospital discharge data. However, this system of classification may fail to accurately capture intent, where guidelines require default to unintentional when intent is unclear in clinical records. This may lead to inaccuracies in the assessment of firearm assaults in magnitude and identification of populations that are most affected. **Methods:** The New York State (NYS) emergency department (ED) and hospitalization data was used to characterize firearm injuries from 2016-2020 by intent. Logistic regression was used to estimate the odds ratio (OR) of classification as unintentional or assault intent. **Results:** During 2016-2020, there were 13,472 firearm injuries treated in NYS hospitals. Among these, 51% were classified as assault and 41% were classified as unintentional. When restricted to ED treated injuries, 43% of firearm injuries were classified as assault and 48% of firearm injuries were classified as unintentional. Age and race were significantly associated with higher odds of being classified as unintentional firearm injury. Those 65+ years old were more likely to be categorized as unintentional, compared to those who were 15-19 years old (OR=4.3[3.1,5.8]). Individuals who were 0-14 years old were more likely to be classified as unintentional, compared to those who were 15-19 years old (OR=2.6[1.6,4.2]). Compared to Black non-Hispanic New Yorkers, White non-Hispanic New Yorkers were more likely to be classified as experiencing an unintentional firearm injury (OR=2.6[2.3,2.9]). Additionally, Hispanic New Yorkers were more likely to be classified as unintentional firearm injury compared to Black non-Hispanic New Yorkers (OR=1.2[1.1,1.3]). NYS hospitalization intent data may be more accurately classified than ED data. Some demographic groups were more likely to be classified as having experienced an unintentional firearm injury, though true population frequencies and proportions are unknown. The accurate and comprehensive classification of firearm injuries is crucial for public health surveillance, research, and policy-making. While future ICD systems may default to assault when intent is not stated, states should keep intent classification concerns in mind when sharing current data. It may be beneficial to combine intent categories for data reporting. **Conclusions:** Our findings suggest that intent misclassification may vary by level of treatment and that some groups may experience more misclassification of firearm injury intent than others. This is important to keep in mind for policy development and resource allocation that uses ED and hospitalization data as an evidence base.

Session 7: Assessing risk and implementing evidence-based solutions to prevent suicide (Part I)

Sheraton III, November 1, 1:00 PM - 2:30 PM

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1. Investigating clinical and mental health characteristics preceding youth suicide

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Background: Suicide is the third leading cause of death among U.S. youth. Although mental health (MH) conditions are associated with youth suicide, several precipitating circumstances may contribute to suicide risk. We compare clinical characteristics and precipitating circumstances of youth suicides by presence and absence of a known MH condition. **Methods:** Retrospective cohort study of suicides by youth ages 10-24 years from 2010-2020 in the CDC NVDRS. Multi-variable logistic regression models estimated the odds of having a known MH condition documented, adjusted for sociodemographic characteristics, and stratified by age. MH condition includes decedents identified as having any of the following: current MH problem, MH diagnosis, or receiving MH treatment. **Results:** 34,393 youth suicides were evaluated. The most common mechanism was firearms (46.1%); majority were White (76.4%), non-Hispanic (86.7%), aged 20-24 years (57.9%), male (79.3%) youth. MH condition was documented in 40.4% of cases. Having a known MH condition was less likely in American Indian/Alaska Native (aOR 0.53, 95% CI 0.46-0.61), Asian/Pacific Islander (aOR 0.74, 95% CI 0.66-0.83), and Black youth (aOR 0.64, 95% CI 0.60-0.68) compared to White youth and in Hispanic (aOR 0.85, 95% CI 0.79-0.90) compared to non-Hispanic youth; ages 10-14 years (aOR 0.75, 95% CI 0.69-0.82) compared to 20-24 years; and males compared to females (aOR 0.51, 95% CI 0.49-0.55). Youth who died by firearm suicide had a lower odds of MH condition compared to poisonings (aOR 0.35, 95% CI 0.32-0.38) or hanging/strangulation/suffocation (aOR 0.58, 95% CI 0.55-0.61). Regarding precipitating circumstances: youth suicide decedents with a MH condition were more likely to have family relationship problems (aOR 1.34, 95% CI 1.25-1.44), been victim of child abuse (aOR 3.35, 95% CI 2.87-3.92), or had school problems (aOR 1.37, 95% CI 1.26-1.44) in comparison to those without a MH condition. Youth with a MH condition were less likely to have intimate partner problem (aOR 0.87, 95% CI 0.82-0.91). **Conclusions:** Most youth suicide decedents did not have a documented MH condition. Youth who died by firearm suicide, the most common mechanism, had the lowest rate of known MH condition, highlighting the importance of universal lethal means counseling. Social inequities may contribute to differences in MH diagnoses and care. These findings underscore the critical need to embed universal MH screening and services in non-traditional settings with a population-based approach for youth suicide prevention. Family/life stressors may play a critical role in youth suicide and should be addressed in concert with mental health.

2. Domestic violence and suicide death among individuals released from jail in King County, WA

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Background: Involvement in the legal system is a risk factor for suicide, particularly for individuals incarcerated for a violent crime. However, individuals charged with domestic violence (DV)-related offenses have not been separately examined despite shared risk factors for perpetration of DV and suicide. Intimate partner homicide-suicides are noted to be associated with legal problems; however, there is limited information on suicide overall. The current study examined the association of history of DV-related offenses and suicide, including firearm suicide, among individuals released from jail in King County, WA. **Methods:** Using a retrospective cohort design, records from 282,246 individuals released from King County Adult Detention Facilities (i.e., jail) from 1999-2018 were linked to death records from Washington State Department of Health from 1999-2020. We compared suicide death and firearm suicide death of individuals released from jail with a history of DV-related offenses to those without a history of DV-related offenses, and an age, sex, race and ethnicity matched population of King County. Additionally, we used survival analysis to compare individuals released from jail with a history of DV-related offenses to individuals released from jail without a history of DV-related offenses adjusting for demographic and other criminal history factors. **Results:** Almost one-quarter (22.2%) of individuals released from jail in King County had been charged with at least one DV-related offense. The mean follow-up was 13.6 (SD:6.1) years. The standardized mortality ratio (SMR) for suicide death was 1.80 (95% CI: 1.61-2.01) among individuals released from jail with a history of DV-related offenses compared to King County residents; SMR for firearm suicide was 1.30 (95% CI: 1.05-1.58). In survival analysis among individuals released from jail, having a history of DV-related offenses was associated with 1.31 (95% CI: 1.14-1.49) times the risk of suicide death after adjusting for demographic and criminal history factors. Having a history of DV-related offenses was associated with 1.40 times the risk of firearm suicide (95% CI: 1.10-1.79). **Conclusions:** We found that individuals released from jail with a history of DV-related offenses are at elevated risk for suicide death compared to the general population as well as compared to non-DV offenders released from jail. Future research should evaluate how suicide interventions such as screening and brief safety planning interventions (including lethal means access) can be used in jail and after release to reduce the risk of suicide, including homicide-suicides, among perpetrators of DV.

3. Relationships between firearm behaviors and suicide risk in a longitudinal sample

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Background: Firearms account for more than half of of suicides in the United States, totaling 26,328 deaths in 2020. Firearm ownership is at an all-time high, with 40% of U.S. households possessing guns. The presence of a firearm in the home is associated with a three times greater likelihood of death by suicide. The impact of specific

firearm behaviors, such as safe storage practices, on the risk of suicide is less clear. A recent study of suicide decedents in the US Army identified behaviors such as storing a gun loaded or carrying a firearm outside the home to be associated with an increased risk of suicide. The STARRS-LS data set creates an opportunity to examine relationships between self-reported firearm behaviors and suicide risk in service members. **Methods:** We examined data obtained from STARRS-LS between 2018 and 2019 (n = 12,023). Specific survey responses assessed number of firearms in the home, storage and carrying practices, and self-reported suicidal ideation and attempts. Univariate and multivariate logistic regression models predicted suicide attempt and ideation (12m, and lifetime). Among gun owners (n=6561), multivariate logistic regression examined the relationship between suicide ideation and attempt and gun storage, gun carrying, and weapon carrying habits, controlling for demographics, history of mental diagnosis from the military record and lifetime interpersonal violence. **Results:** Soldiers and Veterans who reported storing a gun loaded and unlocked (unsafe storage) were more likely to report a suicide attempt in the past year (OR = 4.9 [95% CI = (1.8, 13.5)]) and in their lifetime (OR = 1.6 [95% CI = (1.0, 2.3)]). Carrying a weapon other than a gun was associated with increased risk of a suicide attempt in the past year (OR = 16.5 [95% CI = (4.9, 55.5)]) and lifetime (OR = 1.7 [95% CI = (1.1, 2.6)]). Service members who reported storing a gun loaded and unlocked were more likely to report suicide ideation in the past month (OR = 1.7 [95% CI = (1.3, 2.3)]) in the past year (OR = 1.6 [95% CI = (1.2, 2.2)]) and in their lifetime (OR = 1.4 [95% CI = (1.1, 1.7)]). **Conclusions:** Unsafe firearm storage and carry a weapon other than a gun were associated with significantly increased odds of suicide attempt and ideation. These findings suggest that safe storage interventions may alter suicide risk among Army soldiers and Veterans with personal firearms in their homes.

4. Demographic patterns of Black and White gun ownership and firearm suicide

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Background: Compared to White adults, Black adults are less likely to die by firearm and overall suicide. A prior study using data from the early 2000s compared survey-based demographic patterns of household gun ownership among Black and White adults with demographic patterns of firearm and overall suicide and found that while survey-based estimates of White adult gun ownership “explained” White firearm suicide patterns, the same was not true for Black adults. We use data from 2021 to update these findings. **Methods:** Data on gun ownership come from the National Firearms Survey 2021, a web-based survey of over 19,000 US adults of whom approximately 6000 reported that they personally owned at least one working firearm. Data on firearm and total suicide rates (per 100,000) and the percentage of total suicides using a firearm come from 2021 mortality data. Demographics from both data sources include race, age, sex, census region and metropolitan/non-metropolitan residence. **Results:** The demographic patterns of gun ownership of Black and White adults are quite similar: Gun ownership is higher in older adults, among males and residents in non-metropolitan areas, and lowest in the Northeast. White firearm (and overall) suicide patterns largely follow survey-based gun ownership patterns. The same is not true for Black adults. Most significantly, Black firearm suicide rates fall with age. Indeed, Black firearm suicide rates are three times higher among 18-29 year olds than among those aged 60+, even though older Black adults are more than twice as likely to report personally owning a gun. **Conclusions:** While Black suicide rates are lower than White suicide rates for the population as a whole, suicide rates among young Black men are close to those of young White men. Why these patterns pertain is poorly understood. Our finding that age patterns of gun ownership reported in surveys and rates of suicide are positively associated for Whites, but are negatively associated for Blacks, raises additional questions. Some possible explanations – all requiring

further exploration -- include 1) Black young adult exposure to firearms is not through household firearms, 2) Household surveys do not provide a good measure of household firearm ownership for many Black Americans, and 3) There are protective factors for suicide among older Black gun owners that are not present for younger Black adults.

5. "Are you worried that someone in your household is at risk of suicide?": Screening to reduce quick access to firearms in rural and remote Alaska homes

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Background: Suicide is a major and rising public health problem in rural America. In Alaska, suicide rates are consistently triple the national rate. There, 60% of the suicide fatalities are due to firearms. In rural Alaska Native (AN) communities, virtually all homes have multiple guns for subsistence hunting, which increases suicide risk significantly. Our study developed a 'family-focused' screening to identify households with firearms and self-assessed suicide risk (i.e. households where someone is experiencing mental health struggles) that could benefit from an intervention designed to reducing quick access to firearms in people's homes, thus lessening household environmental risk for suicide. **Methods:** Our central hypothesis is that by supporting adult family members in firearm lethal means reduction, we can reduce key environmental risk factors that contribute to youth suicidal behavior. This shift from targeting individuals to engaging adult family members, is a potentially important innovation, particularly in collectivist AN populations, who prioritize family and community (rather than 'the self' individually). Our Family Safety Net (FSN) pilot study (n=30) was iteratively developed over three waves of pilot implementation. Each wave included (1) a family-focused screening to identify households where members may be struggling, (2) a brief firearms lethal means reduction intervention, (3) resources for preventative action (trigger/cable locks, medication and ammo boxes), and (4) tailored text messages to reinforce and affirm safety behaviors. Follow-up surveys and interviews assessed participants satisfaction, probed for ways to improve, and the next wave integrated learnings from the last. Our randomly assigned control group (n=7) was only implemented in the first wave, and was discontinued because of ethical concerns of the research team when implementing it. **Results:** Overall, the FSN intervention was acceptable to and appreciated by participants who entered the study. Over the three waves, our recruitment strategies were refined and resulted in a two-item, family-focused screening that was endorsed about 30% of the time. There are signals of impact related to participants' perceived firearm risk and their motivations to take safety precautions (our mechanisms of change). Importantly, many participants took action to secure their household firearms and medications to reduce quick access. **Conclusions:** These promising preliminary results suggest a feasible innovation to screening protocols that can enhance safety and prevent suicide deaths by engaging adult family members in creating safer environments within their homes. Further research is needed to test the efficacy of this novel intervention.

6. Families and partners efforts to reduce firearm access when their loved one is at risk of harming themselves or others

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Background: Family members and intimate partners are in a unique position to reduce firearm access when an adult is at risk of harming themselves or others and thereby prevent firearm injury. But we do not know how or when families and partners are doing so, and if these efforts are safe and legal. The purpose of this study was two-fold: identify and characterize how families and partners reduced firearm access when their loved one was at risk of harming themselves and others and determine the most influential demographic and incident factors in predicting these efforts. **Methods:** A content analysis was conducted using police reports from events that precipitated police filing an Extreme Risk Protection Order (ERPO) petition (called the precipitating event or PE). The content analysis identified and characterized the ways families tried to reduce firearm access at two time points: during the PE and after police arrived at the PE. Next, supervised machine learning models determined which demographic and PE characteristics were the most influential in predicting whether families reduced firearm access after police arrived. **Results:** Fifteen percent of reports included that families and partners tried to keep firearms away from the respondent during the PE. Families and partners hid firearms (sometimes where others could access them), asked the respondent for the firearms, and used physical force to try to take firearms. Just over a quarter (26.5%) of reports included that families and partners reduced firearm access after police officers arrived at the PE. Families and partners gave officers consent and access to search for and remove firearms, asked police for help removing firearms, gave police firearms, and told officers they would continue to prevent firearm access after officers left the scene, including by temporarily storing firearms outside of the home. In the supervised machine learning models, two of the most influential PE factors predicting families and partners' reducing access after police arrived were if the respondent was taken for an involuntary examination (which allows officers to remove firearms) and if officers told someone at the scene about ERPOs. **Conclusions:** When trying to reduce the respondent's firearm access, families sometimes put themselves and others at risk for injury. Additionally, ERPO respondents and their families and partners temporarily transferred firearms to others, which is legal in Florida, but may not be legal in other states with universal background checks. Police officers may be influential partners in firearm safety messaging.

Session 8: Exploring the impact of place on firearm injury and prevention (Part I)

Erie, November 1, 1:00 PM - 2:30 PM

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1. Street construction projects and firearm violence: A natural experiment in New York City

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Background: Firearm violence is a major cause of injury and death in the United States. Previous studies have shown that place-based interventions are associated with a decrease in firearm violence. These include interventions that address blighted environments and access to green space, such as greening vacant lots and remediating abandoned buildings. Several theoretical mechanisms could explain the impacts of place-based interventions on firearm violence, including increasing collective efficacy, removing visual cues that disorder is socially acceptable, and increasing guardianship by encouraging more people to use physical places. These mechanisms suggest that major public works projects, such as street reconstruction projects, could also reduce firearm violence within local areas. The objective of this study was to conduct a natural experiment using high resolution space-time data for street construction projects and intentional interpersonal fatal and nonfatal shootings. **Methods:** This staggered difference-in-difference analysis used data for 4,126 street segments in New York City partitioned into years for 2006-2019, for an overall sample of 57,764 street-years. Street segments were eligible for inclusion if they were scheduled to receive a major street reconstruction project during any year of the study period (e.g., road resurfacing: n=679, sidewalk reconstruction: n=565, and road reconstruction: n=1,610). Intervention street-years were those with completed projects; control streets were those where projects were not completed. Firearm violence was operationalized using a registry of shooting incidents from the New York Police Department, and street-years were assigned a dichotomous variable for the presence or absence of any shooting. Fixed effects logistic regression models estimated the association between street reconstruction projects and firearm violence while controlling for temporal trends and systematic differences between intervention and control street-years. **Results:** There were 1,212 (2.1%) street-years with any firearm violence incidents. Reconstruction projects were completed on 2,380 streets during the study period. The fixed effects model detected no association between street reconstruction project completion and firearm violence [OR = 0.96, 95% CI: (0.41 – 2.3)]. **Conclusions:** Major street reconstruction projects were not associated with firearm violence incidence in this analysis. Possible explanations include that the theoretical mechanisms that connect other place-based interventions to firearm violence do not extend to street reconstructions, effects are small and not detectable with our sample, or model or variable specification problems obscured the association. This research does not support street reconstruction projects as an intervention to reduce firearm violence, although corroboration in other settings and testing other intervention types is essential.

2. The epidemiology of fatal and nonfatal firearm injuries occurring in gun establishments in the United States, 2015 to 2022

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Background: Recently, the U.S. has experienced a surge in firearm purchasing accompanied by increased exploration of injury prevention measures within gun establishments (e.g., temporary storage programs). Gun establishments are settings where firearms are purchased, sold, traded, or used. To implement effective prevention efforts in gun establishments, it is crucial to assess the associated injury risks. This study describes the epidemiology of fatal and nonfatal firearm injuries in these environments from 2015 to 2022. **Methods:** Utilizing the Gun Violence Archive, firearm injuries reported in gun establishments between 2015 and 2022 were analyzed. Data on incident location, injury and fatality counts, victim demographics, shooting intent, and establishment type were examined. Counts were analyzed across intent (suicide/suicide attempt, murder/assault, unintentional, or undetermined) and establishment type (gun shops with or without ranges, private and public shooting ranges, law enforcement/military ranges, pawn shops, and gun shows). To obtain estimates of injury rates per capita, denominators were derived from data retrieved from WISQRS and matched accordingly by year. **Results:** From 2015 to 2022, a total of 401 non-fatal injuries occurred in 368 gun establishments, while 185 fatal injuries occurred in 172 gun establishments. Non-fatal incidents were primarily reported in private ranges without retail (28%), retail shops with ranges (21%), and police/military ranges (20%). Among non-fatal cases, the majority (89%) were unintentional, followed by assault-related incidents (5%) and suicide attempts (4%). Fatal events were more common in retail shops with ranges (52%) and private ranges without retail (25%). Suicides accounted for 52% of the fatal cases, while unintentional deaths constituted 25% and homicides 15% of the total deaths. Privately operated ranges had higher injury rates, both fatal and non-fatal, compared to publicly operated ranges. Overall, firearm injury rates in gun establishments decreased over the study period, with fatal injury rates consistently surpassing non-fatal rates, except in 2015 (e.g., fatal: 66.2 per 100,000 injuries in 2015 vs 44.2 in 2020; non-fatal: 89.4 in 2015 vs 21.7 in 2020). **Conclusions:** Despite the positive trend of decreasing firearm injuries in gun establishments, specific patterns of injury occurrence underscore the significance and potential of targeted firearm safety promotion campaigns tailored to different types of these establishments. The high prevalence of unintentional, non-fatal injuries emphasizes the necessity for enhanced efforts in promoting firearm safe handling. Moreover, considering that over half of the fatal shootings in these environments are attributed to suicides, implementing suicide prevention interventions in these spaces becomes imperative.

3. The intersection of physical disinvestment and firearm shootings in Toledo: A spatial case-control analysis

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Background: Firearm shootings are not equally distributed across space and are heavily influenced by nearby physical environment. Higher rates of firearm violence have been found in areas with enduring disinvestment such as historically redlined neighborhoods, and remediation of abandoned buildings or housing repairs are associated with reduced risk of shootings post-intervention. This study leverages small-scale, novel parcel condition data to examine the risk of firearm shootings by various measures of physical disinvestment in the City of Toledo, OH. **Methods:** This case-control study investigates the association between location of firearm shooting incidents, obtained from the Toledo PD for late-2021 to early-2023, and nearby physical disinvestment. Disinvestment data are from a comprehensive foot audit of all Toledo parcels conducted by the Lucas County LandBank in mid-2021. Shooting locations were matched to controls 1:4 on street midpoint/intersection,

major/minor roadway, zoning, and poverty. Disinvestment was measured in three ways using a 6-item survey of structure conditions by aggregating parcels within 5-minute walking buffers of each case and control point: 1) average parcel disinvestment severity score; 2) percent of parcels with any visual disrepair; and 3) presence of any abandoned structure. Each exposure was evaluated using logistic regression, including all matching variables as covariates and a spatial thin plate spline to adjust for potential spatial autocorrelation. **Results:** There were 281 reports of injurious firearm assault (n=222) or homicide (n=59) in Toledo from 10/7/21 – 2/22/23. A one unit increase in average disinvestment severity score, which translates to one additional disrepair condition for the average parcel within the 5-minute walking buffer, was associated with 2.24 (95%CI:1.52, 3.28) higher odds of being a shooting location. A 10% increase in nearby parcels with any physical disrepair was associated with 1.36 (1.26, 1.46) higher odds of being a shooting location. Abandoned buildings were associated with 2.60 (95%CI:1.88, 3.66) higher odds of being a shooting location prior to the inclusion of the spatial thin plate spline but were attenuated to 1.49 (95%CI:0.98, 2.25) after accounting for spatial autocorrelation. This suggests that abandoned buildings were highly clustered and some of the increased risk may not be distinguishable from the neighborhood effect. **Conclusions:** Shooting locations were more likely to be located in areas with physical disinvestment, and this increased risk was found both when there were many parcels with any visual disrepair, even minor disrepair, as well severe disrepair or abandonment, even after accounting for poverty and spatial autocorrelation.

4. The end of hotspots? Spatial de-concentration of firearm violence in Boston, MA, 2007-2021

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Background: It is considered a “law” of criminology that urban crime chronically recurs at the same microplaces (i.e., street segments and intersections). An influential study by Braga and colleagues found that a small subset of microplaces accounted for time trends in firearm violence in Boston, MA from 1980-2008. Such findings on microplace “hotspots” have guided place-based violence prevention strategies, especially among police agencies. The current study assessed whether strong spatial concentration in firearm violence has persisted over recent decades despite important changes, e.g., the role of social media and evolving group structures. **Methods:** Following Braga and colleagues, we used data from Boston, MA. We operationalized spatial concentration as the probability that for any given shooting, another shooting at the same microplace would appear in our dataset. Shootings were fatal and nonfatal shooting incidents with one or more victims, from January 2007 through September 2021, provided by the Boston Police Department. Microplaces were intersections and street segments in Boston (n = 32,267). We matched shootings to microplaces, then conducted logistic regressions to estimate spatial concentration as a function of time. As an additional check on uncertainty, we used Monte Carlo simulations, which randomly reshuffled shooting locations and shooting dates. To probe results further, we conducted secondary analyses stratified by microplace type (i.e., street segment vs. intersection). **Results:** 3,340 shootings occurred during the study period. Annual shootings incidence decreased over the study period, except for a spike in 2020. Spatial concentration of shootings declined from 62% in 2007 to 55% in 2021. We estimated that spatial concentration declined by 3.7% per year (95% CI [-2.1, -5.2], p < 0.001). This trend was approximately linear and monotonic. None of the 10,000 Monte Carlo simulations yielded a time trend of equal magnitude in any direction (p < 0.0001). Shootings at intersections declined more steeply than shootings on street segments during the study period. **Conclusions:** We found that spatial concentration has modestly but steadily declined since the period that Braga and colleagues studied and that street corners are

disproportionately safer. Possible factors include (1) social media, which facilitates pre-planned interactions occurring in a wider range of places; and (2) a shift from larger, traditional gangs towards smaller groups contesting more territorial boundaries. If the importance of microplace “hotspots” is waning, community-level violence interventions may need to focus more on interpersonal dynamics (including online) and place-based strategies at higher ecological levels (e.g., neighborhoods).

5. Off-premises alcohol outlets and socioeconomic status predict firearm-related injury in Milwaukee, WI

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Background: Previous work has shown socioenvironmental factors (i.e., socioeconomic context and alcohol availability) can influence firearm injury. Milwaukee, WI is a diverse midwestern city with historic disinvestment in marginalized communities yielding stark segregation along racial and ethnic lines. In recent years, firearm violence in Milwaukee has increased. This study explored the intersection of socioenvironmental factors that may affect patterns of firearm injury in Milwaukee County. **Methods:** Data from the regional Level I trauma center’s trauma registry was used to identify patients who experienced a firearm-related injury in 2022 (N=430). Firearm injury density was calculated (counts per size of census tract in mi²) using patient residence addresses. To measure neighborhood disadvantage, the four Social Vulnerability Index (SVI) domains (i.e., socioeconomic status (SES), household characteristics, racial and ethnic minority status, housing type and transportation) were extracted from the Centers for Disease Control and Prevention for each census tract. Alcohol licenses and permits approved for 2022 in Milwaukee County were geocoded. Alcohol outlet density for on- and off-premises alcohol outlets was calculated separately. Population per census tract was derived from the 2020 decennial census and included as a covariate to account for variations in population density by census tract. Moran’s I was calculated to evaluate spatial autocorrelation. One spatially lagged regression model tested the associations between each SVI domain and alcohol outlet types with firearm injury density while controlling for population. **Results:** Firearm injury and socioenvironmental factors were geographically clustered in the county (Moran’s I; firearm injury = .41, SES = .64, household characteristics = .40, racial and ethnic minority status = .64, housing type and transportation = .20; on-premises alcohol outlets = .51, off-premises outlets = .34). Most patients who sustained firearm injuries lived in census tracts with greater neighborhood disadvantage (SVI total; M = .67, SD = .28). Results of the regression model show that off-premises alcohol outlets (B = .28, p = .001), SES (B = 4.40, p = .008), and population density (B = .0001, p = .02) were significantly related to firearm injury density. Census tracts with greater off-premises alcohol outlet density and lower SES were associated with greater firearm injury density. These findings replicate previous work suggesting off-premises alcohol outlets may confer risk for injury and violence. Further, these results affirm the association of neighborhood disadvantage and violence. **Conclusions:** Results of the current analysis suggest specific socioenvironmental factors to target for intervention and prevention of firearm injury.

6. Investigating firearm robbery from an intersectionality perspective: Firearm robbery as an intersectional paradox

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Background: There is scant research on firearm robbery within the injury prevention field, especially firearm robbery research from an intersectionality perspective. Intersectional research studies examining the relationship between structural racism and other forms of firearm violence have demonstrated that neighborhoods that experience the most structural racism tend to have the highest firearm violence rates. In this study, we perform quantitative intersectional analyses to determine whether this trend holds for firearm robbery. **Methods:** We performed an ecological cross-sectional study of 149 census tracts in Baltimore from 2015-2019. For each tract, we determined scores for two forms of structural racism 1) historical redlining grade and 2) contemporary racialized economic segregation. The redlining and segregation scores were dichotomized into binary variables with two categories signifying the tracts' level of disadvantage or advantage. These binary variables were combined to create four intersectional groups. We geocoded and aggregated individual incidents of firearm robbery to the tract level. We identified average firearm robbery rates for intersectional groups and conducted additive interaction calculations to determine referent disparities for redlining and segregation. **Results:** Contemporary advantaged tracts (tracts that were historically redlined but experienced contemporary socioeconomic advantage) had the highest rates of firearm robbery at 66 robberies a year per 10,000 residents. Moreover, our referent redlining results suggest that historical redlining drives much of the firearm robbery disparities. Contemporary advantaged tracts had, on average, 36 more robberies a year per 10,000 residents compared to sustained advantaged tracts (tracts were not historically redlined and experienced contemporary socioeconomic advantage). Furthermore, we found that the interaction of redlining and segregation was not linked to firearm robbery disparities. **Conclusions:** Contrary to other forms of firearm violence, firearm robbery presents an intersectional paradox. The contemporary advantaged intersectional group, which contains tracts singly marginalized with respect to historical redlining, has higher rates of firearm violence compared to the "doubly-disadvantaged" intersectional group, which contains tracts with multiple forms of structural racism. Our findings suggest that more research is needed to understand what factors (e.g., built & social environment, land use, demographics, geography, gentrification) are driving this intersectional paradox. Moreover, careful strategizing by a range of stakeholders can assist in determining 1) firearm robbery prevention approaches to implement while holding on to the central intersectionality principles of power, equity, and social justice and 2) where and how to equitably allocate and implement resources that address firearm robbery prevention.

Session 9: Examining the economic impact and solutions of firearm injury

Sheraton I, November 1, 4:30 PM - 6:00 PM

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1. Unconditional cash transfer and guaranteed basic income for survivors of firearm violence: Experiences from two pilot studies in urban centers

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Background: Poverty is not only a key driver of violent injury, but also a risk factor for suboptimal recovery after injury. Meeting basic needs is a challenge for many participants in hospital-based violence intervention programs (HVIPs). Economic needs limit the ability to engage program participants in treatment and trauma-healing activities. While federal and state assistance is sometimes available, applications are burdensome. Direct financial assistance has the potential to alleviate financial strain and improve recovery. **Methods:** The HVIP coalition in Philadelphia Pennsylvania, is conducting a feasibility study for guaranteed income to survivors of firearm violence, recruiting fifty HVIP participants to provide \$500 a month for 6 months. Quality of life measures are conducted at baseline, at the completion of the fund disbursement, and in follow up (9-12 months). Qualitative interviews will be conducted at month five. The Yale New Haven HVIP, in collaboration with a local non-profit organization (4CT), has initiated an unconditional cash transfer pilot for victims of firearm injury. Participants are provided with two \$500 cash transfers: at the time of program enrollment and approximately 60 days following injury. Additionally, families of victims of homicide are eligible for a \$1,000 cash transfer. The pilot will enroll 100 participants. A mixed-methods study will be conducted to further understand the pressing financial needs of survivors of firearm injury, as well as the impact of unconditional cash aid on aspects of program engagement. **Results:** The feasibility of providing a short-term guaranteed income for survivors of violence requires a range of critical partnerships to avoid the "benefits cliff", an understanding of best practices from the science of guaranteed income, and a careful selection of primary outcomes. Early findings indicate that there is a significant financial need among HVIP participants and that, with appropriate linkages to benefits counseling and disbursement partners well-versed in supporting individuals at high economic risk, short-term support can be provided through a public/private partnership. Both pilots have been launched successfully, with ~50 participants enrolled in the Yale HVIP program and nine patients enrolled in the Philadelphia HVIP program. **Conclusions:** Early lessons from these pilots demonstrate that interventions that address poverty can successfully be partnered with the receipt of HVIP services. These pilots will provide novel information regarding developing and implementing an unconditional cash aid program as part of an HVIP. Future work aims to understand how addressing social determinants of health impacts well-being, HVIP participation, and future exposure to violence.

2. State earned income tax credit policies and firearm suicides

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Background: Earned Income Tax Credits (EITCs) have been shown to reduce poverty, increase employment, and improve mental and physical health. It is plausible that state EITCs would address the underlying determinants of firearm suicide and thus lead to a reduction in its rates. **Methods:** We evaluated the impact of the presence and generosity of state EITC policies on state-level firearm suicides rates in all 50 states and the District of Columbia from 1981-2019. We used a fixed-effects difference-in-difference (DID) regression model and compared states with and without an EITC policy. We used stacked DID regression models to address staggered timing of policy adaptation and examined EITC generosity as a continuous exposure measured by percentage of the federal EITC a state offered each year. All models adjusted for maximum Temporary Assistance for Needy Families benefits of three, state minimum wage, whether the state expanded Medicaid under the Affordable Care Act, whether the state offered paid family leave, gross state product, percentage of population with a high school degree, firearm ownership, percentage of the population living in a metropolitan statistical area, permit to purchase gun laws, percentage of the population 15 to 24 years of age, percentage of the population already married, percentage of the populations that are Veterans, and percentage of people that adheres to a religion. **Results:** A total of 25 states had an EITC during the study period, with implementation year ranging from 1989 to 2017. When using EITC as a binary exposure, states with an EITC had a crude reduction in state-level suicide rates of -0.35 per 100,000 people (95%CI: -0.55, -0.16), and an adjusted reduction of -0.26 per 100,000 people (95%CI: -0.43, -0.08). When assessing EITC generosity and accounting for staggered implementation, we found that with each percentage-point increase in generosity, there was a crude reduction in state-level suicide rates of -1.71 per 100,000 people (95%CI: -2.92, -0.50), and an adjusted reduction of -1.17 per 100,000 people (95%CI: -2.54, 0.21). **Conclusions:** We found that the status and generosity of EITCs are associated with a reduction in state-level firearm suicide rates. State-level economic policies that address the underlying determinants of firearm suicide and provide financial stability may reduce its rates.

3. Bargaining for life: The impact of economic empowerment on intimate partner femicide

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Background: Non-cooperative intra-household bargaining models predict labor market opportunities that benefit women improve their bargaining power within relationships and lead to lower levels of intimate partner violence against them. However, while female empowerment can lower the risk of violence, specific risk factors such as presence of firearms can shift the balance of power back in the abuser's favor. Therefore, we posit that an abuser's access to firearms can erode the protective effect of victims' bargaining power. Building on this framework, we test the impact of macro-economic factors on IPV femicide in the United States. **Methods:** Recognizing that sex segregation within industries is an important driver of the gender gap, we exploit exogenous variation in macro-economic factors is utilized to establish a causal relationship between IPV femicide and gender specific labor market opportunities. Utilizing data from the National Incident Based Reporting System (NIBRS) from 2004 to 2019, we construct a longitudinal panel of IPV femicides distinguishing between incidents that involved firearms and those that did not and employ a mixed effects Poisson model to estimate the effect of changes in gender wage gap on fatal IPV. **Results:** Our empirical analysis provides robust evidence that

narrowing the gender wage gap leads to a statistically significant decline in non-firearm femicides. However, it has no discernible impact on firearm homicides, indicating that presence of firearms does indeed erode the protective effect of bargaining power. **Conclusions:** The findings highlight both the utility and limitations of female empowerment. They demonstrate that gender wage parity, although an effective protective mechanism in low-risk situations, is not a panacea. Our results emphasize the importance of supplementing economic empowerment with interventions that address extreme risk factors in IPV situations.

4. Summer youth employment programs for violence prevention: Costs and key components

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Background: Summer Youth Employment Programs (SYEPs) offer an evidence-informed gun violence prevention strategy. SYEPs work by providing young people with positive developmental opportunities during a period when violence is typically at its highest and they may lack routine structure and support. Multiple studies demonstrate that when implemented intentionally, SYEPs can effectively reduce violence, crime, and justice system involvement among participating youth. This paper provides a detailed cost analysis of SYEPs with the goals of equipping cities to implement them effectively and researchers to study their cost-benefits. **Methods:** An ingredients-based costing approach was utilized to establish a program cost. Interviews and reviews of process evaluations informed the following base assumptions about an SYEP serving a mid-sized city: 3 years of programming, 3,000 youth served, 6 providers, \$12.50/hour youth stipends for 24 hours/week and 6 weeks. Salary costs were estimated using average salaries for public-sector local employees; youth stipends were entered as a factor of the minimum wage; and a 3.6% inflation factor was included. Assumptions are adaptable through a costing workbook, which allows cities to calculate specific costs informed by their own resources and needs. Efforts to tailor the SYEP toward the goal of violence prevention are also assumed, including explicit inclusion of young people who live in high crime neighborhoods; trauma-informed support and training; and connections to wraparound services. **Results:** Violence prevention-focused SYEPs cost on average \$10 million each year—or approximately \$3,338 per young person. Costs to support the youth comprise the biggest budget component, followed by costs for SYEP providers and then costs for lead city agencies. Stipends for the young people in particular account for 54% of this cost. The remainder of the budget covers program staffing and activities such as outreach in at-risk neighborhoods, youth mentoring and training, outcome tracking, and more. Up-front costs are minimal, with increases amounting to less than 1% annually. **Conclusions:** By factoring SYEP costs into their budgets, cities can reduce gun violence and reinvest in the communities most impacted by it. Researchers can build upon this work in the future with analyses that address the savings associated with reduced deaths, injuries, and justice system involvement. As a whole, SYEP investments stand to break systemic barriers to meaningful employment, offer safe spaces, and provide mentors to a group of young people who stand to benefit the most from these programs.

5. Using crime victim compensation for structural reparations

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Background: The Crime Victim Compensation (CVC) program in Illinois, administered by the Attorney General's Office, offers financial assistance to violence survivors and families for costs related to their victimization, up to

\$45,000. Most Illinois residents do not apply for this program, especially after firearm violence, with only 6% of victims of crime receiving minimal compensation. These barriers exacerbate survivors' trauma and hinder their ability to recover financially and emotionally. The purpose of this study is to elevate the need for CVC as a form of reparations given the government's failure to equitably protect its citizens from firearm violence. **Methods:** Our research focuses on culturally vibrant and diverse communities on the South Side of Chicago, with significant ties to African-American and Latinx heritage and history. However, generations of structural racism and disinvestment have contributed to the erosion of the social, economic, and health-promoting infrastructure necessary to adequately meet these communities' needs. We began our research by conducting a novel expert listening exercise with key stakeholders in the field of CVC including government officials, community and activist leaders committed to the field of victim compensation. Interviews were conducted via Zoom (recorded and analyzed for recurrent themes using Constructivist Grounded Theory approach) or in-person (recorded via note-taking). Participants were identified using a snowballing-sampling technique. There were no limitations in the geographic location of participants. **Results:** Over 8 months, we conducted roughly 50 interviews with key stakeholders. Interviewees included civil rights attorneys, the Illinois Attorney General's Office, The National Director for the OVC VOCA Center, community activists, and academicians. Zoom and in-person meetings ranged between 55 and 110 minutes. Emergent themes from these data helped us understand participants' awareness of the program and the processes that serve as facilitators or barriers to eligibility and compensation outcomes. Administrative burdens, including those unique to Illinois, were the dominant theme highlighted across interviews. These included descriptions of the timeliness of compensation, the reimbursement vs. compensation model, the necessity of "court-of-claims" processing, police department obstructionism, and adequacy of perceived reparations. **Conclusions:** Participant stories emboldened our aim to secure expedited compensation as reparations. Removing barriers to economic entitlement is vital to make CVC more accessible to survivors and families from disinvested communities to promote healing and prevent re-injury. Implications from this research can serve as an example of how existing initiatives can provide opportunities for structural reparations when equity and community agency are prioritized.

6. Calculating the costs of gun-related victimizations using integrated data systems

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Background: Many methods of calculating costs of gun-related crime victimization rely on administrative medical records that are identified through ICD10 diagnostic codes. Although diagnosis codes exist that specifically identify firearm injuries related to assault, these codes are not often used by practitioners, who often err on the side of caution and diagnose firearm injuries as unintentional or of unknown intent. This presents a challenge as many gun-related victimizations may appear in medical records as accidental firearm injuries. **Methods:** This paper describes relevant findings from an FY2020 National Institute of Justice-funded study that is developing new methods to estimate the harms from crime victimization. The study combined integrated administrative data from two municipal jurisdictions in Pennsylvania and New Jersey. These integrated data systems combine criminal justice and health data that link court or police-identified victims to medical utilization records and claims data with firearm-related diagnoses. From this sample we estimated gun-related victimization medical costs. Importantly, by using victim identifiers from police/court data, we more precisely estimate costs for actual crime victims as compared to relying on identifying gun-related crime victims from diagnoses alone. **Results:** Our analyses show that there is variation in the medical costs associated with gun-related violent victimization. Our

gun-related victimizations were mostly aggravated assaults and robberies with robberies having a slightly higher median costs in the first year compared to aggravated assaults. Interestingly, the type of firearm injury diagnosis varied as well. Less than half of the aggravated assault cases had diagnoses that indicated a firearm assault injury and were instead classified as unintentional firearm injuries. Most of the robbery cases also had diagnoses indicative of an unintentional firearm injury. **Conclusions:** Our study results suggest that there is more nuance needed to properly identify and categorize gun-related victimizations. Although ICD10 diagnoses can be used to identify assaults from firearms, our results suggest that these codes are not used as often as they should be. We also show that costs differ based on both the type of crime and the type of firearm injury diagnosis, suggesting that cost estimates of gun-related victimizations identified strictly from diagnosis codes are missing critical information. Our study highlights the utility of integrated data systems for victim cost calculations. The methods of estimating costs related to crime victimization developed as part of the larger study will be of interest both to researchers and policymakers.

Session 10: Understanding Extreme Risk Protection Order (ERPO) policies

Sheraton III, November 1, 4:30 PM - 6:00 PM

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1. Implementation of Extreme Risk Protection Orders in Colorado: Firearm relinquishment and return

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Background: Extreme Risk Protection Orders (ERPOs) are civil restraining orders that intend to reduce firearm deaths by temporarily removing firearms from individuals who are threatening violence to themselves or others. Currently, 21 states and the District of Columbia have passed ERPO laws, including Colorado (CO); enacted them in January 2020. Little is known about specific implementation of ERPOs, including renewals and firearm relinquishment or return. **Methods:** We obtained court records for all petitions ERPO filed in Colorado between January 1, 2020, and December 31, 2022. Data elements were abstracted by trained staff using a standardized guide. We assessed the proportion of petitions that were granted or denied/dismissed, petition renewals, and examined information on firearm relinquishment and return upon ERPO expiration. **Results:** From 2020-2022 there were 353 unique ERPO petitions filed in Colorado, an average of 117.7 per year or 2.02 per 100,000 people; 84.4% of respondents were male and 84% were white. We found 22 duplicate cases including the same petitioner, respondent, and case information. Two-thirds (238; 67.8%) of petitions were granted temporary two-week ERPOs; of those, 167 (70.1%) were subsequently granted full 365-day ERPOs. Of all granted full ERPOs, 16 (9.5%) had a renewal request (100% granted). Of all granted petitions that were granted, 146 (87.4%) noted that the respondent had immediate access to firearms; of these, only 66 (39.5%) had documentation of firearms being relinquished (average number firearms relinquished: 1.8). Petitions filed by Law enforcement were more likely to have documentation of firearm relinquishment compared to petitions filed by non-LE (48.8% vs 25.0% p=0.04). Only one respondent refused to relinquish their firearms which resulted in law enforcement seeking a search warrant to retrieve them. One-tenth of granted ERPOs that expired had documentation of firearms being returned upon expiration. **Conclusions:** Results from these analyses shed light on data gaps surrounding ERPO implementation, especially documenting the relinquishment of firearms when orders are granted and returning them when orders expire or are lifted. Differences in LE vs non-LE petition documentation suggest a need for additional training/education for judicial officials. While ERPOs efficacy is still under evaluation, they are not capable of being effective if Respondents maintain access to firearms while they are in place. The lack of documentation around firearm relinquishment in the majority of cases highlights the need for comprehensive documentation on the removal of firearms to prevent firearm injury and death as ERPOs intended.

2. ERPO data is essential for studying the use and effectiveness of extreme risk laws

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¹Everytown for Gun Safety,

Background: Those in danger of harming themselves or others often exhibit warning signs. Extreme Risk laws allow key community members to act on those signs by petitioning the courts to temporarily remove access to firearms for a person in crisis. Although 21 states and the District of Columbia have enacted Extreme Risk laws,

lack of data has severely hampered study of their implementation and impact. Our paper examines where states and counties are using these laws and how usage has changed over time. We also look more closely at New York state, where implementation expanded greatly in 2022, to understand the scope of change and factors driving it. **Methods:** Data on the number of Extreme Risk Protection Orders (ERPOs) by state and county starting from the year the state's law went into effect were obtained from state government offices through records requests and publicly available datasets, with some additional data obtained through news reports. **Results:** Between 1997 and 2022, there were over 33,500 instances of ERPO use across the country. Across the 13 states for which we obtained 2022 data, we found ERPO use increased in nine states since 2021, stayed the same in Hawaii, and decreased in three states, with a total of over 11,000 additional ERPO uses in 2022 alone. County-level data show immense state-to-state variation, with 100 percent of counties in Connecticut and Maryland reporting at least one petition filed since their law was enacted to other states, such as New Mexico, experiencing ERPO use in less than one-third of counties. Full data are still being obtained for the remaining six states. Among states for which data were available, New York experienced the largest increase in ERPO use in 2022, specifically following the May 2022 mass shooting in Buffalo and subsequent changes to the state's ERPO law. **Conclusions:** Across most states, ERPO usage continues to increase each year, although certain states and counties use ERPOs significantly more than others. Research on this issue is hampered by the lack of data availability, as well as the lack of comparable data across states, underscoring the need for more accessible and robust datasets on ERPOs.

3. Oregon's Extreme Risk Protection Order law: Utilization and implementation gaps, 2018-2022

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Background: Extreme Risk Protection Order (ERPO) laws are effective tools for preventing firearm suicide and homicide, including mass shootings. Oregon's ERPO law, which took effect in 2018, allows family and household members, or law enforcement officers, to petition a civil court for an order to temporarily restrict a person's access to firearms when at imminent risk of harming themselves or others. Data on Oregon's ERPO utilization provides insight into who is using the law and potential implementation gaps. **Methods:** Court records containing ERPO petitions were obtained from the Oregon Judicial Department. Data were abstracted from ERPO petitions for the 5-year period (2018-2022) after implementation of the law. A 20% random sample of records was double-coded and interrater agreement was >90% for all key variables. A cross-sectional descriptive analysis was conducted. **Results:** During the study period, there were 649 ERPO petitions filed and 509 (78%) initially approved. Results showed that the number of ERPO petitions filed increased each year, while the proportion of petitions approved remained similar over time (range: 78%-84%). Petitions filed across Oregon's 36 counties ranged from 0-105 (median: 11). Among the petitions filed, 547 (84%) cited threats of assault, 408 (63%) cited threats of self-harm, and 327 (50%) cited both threats; 72 (11%) cited threats of mass violence. Most petitioners were law enforcement officers (LEOs) and petitions filed by LEOs were more likely to be approved than those filed by other petitioners. Insufficient evidence was the primary reason for petition denial, followed by an unqualified petitioner-respondent relationship. While it appeared that some judges tried to facilitate use of the law, the law also often required them to deny petitions due to a lack of standing, although the petitioner was clearly at risk of harm (e.g., ex-spouse, ex-intimate partner, co-worker). **Conclusions:** Findings suggest that Oregon's ERPO law is being used as intended to address firearm injury risk, but that implementation gaps exist. Given that fewer petitioners were family or household members, and that petitions among family/household

members were less likely to be approved, targeted efforts to increase awareness and facilitate filing may improve use of the law. The variability in the number of petitions filed across counties also points to the need for targeted educational efforts but may reflect ideological opposition to the law in some counties. Further research is needed on barriers to implementation of Oregon's ERPO law, and mechanisms to improve its use for firearm injury prevention.

4. Trends in New York State utilization of Extreme Risk Protection Orders: Examining initial uptake and implementation

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Background: Enactment of Extreme Risk Protection Order laws (ERPOs) has rapidly increased across the US in recent years. New York State (NYS) enacted an ERPO law in 2019 permitting law enforcement, family members, and school administrators to seek a court order temporarily prohibiting a person who may be at risk of harming themselves or others, from possessing or attempting to purchase a firearm. In 2022, NYS further expanded the law to enable healthcare providers to file ERPO petitions. To improve policy implementation and inform targeted educational efforts for petitioners, we examined demographic and temporal patterns associated with ERPO utilization in NYS. **Methods:** Utilizing publicly available ERPO data provided by the New York State Unified Court System, we analyzed demographic, temporal and geographic trends in ERPO petitions from 2019-2023. Standard descriptive statistics were used to report frequencies for age, gender, and county. **Results:** From August 2019-May 2023, 5,598 ERPO applications were filed across NYS, yielding 5,341 distinct Temporary Extreme Risk Protection Orders (TERPOs) and final ERPOs. New York City (NYC) petitions contributed minimally to the overall number of ERPOs during this period (1.3%, n=71). The counties with the greatest number of ERPOs ordered were: Suffolk (n= 1,612), Erie (n=273), Orange (n=270), Dutchess (n=236) and Rockland (n=227). Suffolk accounted for 30.18% of all ERPOs issued during the study period. Based on data availability, demographic information was inclusive of both TERPOs and ERPOs, resulting in non-distinct counts of gender and age. Overall, 73.72% were males (n= 7,437), 18.31% were females (n=1,847), and 7.97% were unknown gender (n=804). The average age of ERPO respondent was 37.62 years and those aged 18-24 accounted for the greatest number of ERPO petitions (n=2,530). **Conclusions:** ERPO utilization in NYS is varied and geographically diverse. Suffolk accounted for the greatest number of ERPOs ordered, while NYC contributed little to overall numbers. The majority of respondents were male. Over a quarter of respondents were between ages 18-24. Exploring barriers and facilitators to implementation among counties with highest and lowest levels of utilization will help determine best practices and opportunities for improved adoption statewide. Future research should examine ERPO utilization patterns by petitioner type (law enforcement, healthcare, schools, and family), racial demographics, and precipitating factors since current data does not disaggregate beyond county, age and gender.

5. When politics and risk of violence collide: Extreme Risk Protection Orders in Colorado's Second Amendment sanctuary counties

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Background: Extreme Risk Protection Orders (ERPOs) are civil restraining orders that temporarily prohibit individuals determined by a judge to be at extreme risk of violence (“Respondents”), from legally purchasing or possessing firearms. General population surveys indicate high levels of support for ERPOs. However, opposition in various jurisdictions has manifested as “Second Amendment Sanctuary” (2A Sanctuary) declarations, including in 37 of Colorado’s 64 counties. These declarations do not prohibit petitioning/granting ERPOs, and many Colorado 2A Sanctuary counties have done so. This suggests the existence of a poorly-defined risk threshold where opposition to ERPOs is overcome by concerns about violence. Circumstances which overcome this threshold have not been characterized; doing so may shed light on situations in which ERPOs are especially acceptable as a violence prevention tool. **Methods:** Trained abstractors extracted data elements defined a-priori from all Colorado ERPO petitions and court documents between 1/1/2020 and 12/31/2022. For those filed in 2A Sanctuaries, we described Respondent and Petitioner characteristics and case circumstances. **Results:** During the study period 130 (36.8%) of all 353 ERPOs filed in Colorado occurred in 20 of the state’s 37 2A Sanctuary Counties. 66 of these 2A petitions were granted emergency orders, and 43 were granted full 1-year ERPOs. Forty four (33.8%) were petitioned for by law enforcement. Aggravating risk characteristics in cases where ERPOs were granted included Respondents’ experiencing hallucinations and/or history of interaction with police. ERPOs have been granted in 2A Sanctuaries against individuals for threats of suicide only (8%), targeted violence against family members or law enforcement (92%), of these 18% were for threatening mass violence. **Conclusions:** Regardless of the resolutions and declarations passed, sanctuary counties in Colorado are legally allowed to petition for and grant ERPOs when a high risk of violence is clearly evident, and more than half (20 of 37) Cases in which petitions have been approved in sanctuary areas resemble those in non-2A Sanctuaries, with cases in which the Respondent experiences hallucinations or has a history of police interaction are represented in this group, as are cases with threats of mass violence, domestic violence, violence towards law enforcement, and risk of suicide (without threatening others) all represented. The proportion of petitions coming from law enforcement as well as those with “suicide only” threats are lower in 2A Sanctuaries than has been observed in other reports. These findings suggest that despite opposition to the premise of ERPOs, high-risk situations can overcome this opposition.

6. Gun talk: Identifying the facilitators and barriers to provider-initiated conversations regarding securing firearms

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Background: This study will fill a significant gap in understanding why healthcare providers initiate conversations about secure storage and/or Extreme Risk Protective Orders (ERPOs). Given that firearm injury risk can vary across the life course, we seek to discover ways to involve healthcare providers (“provider(s)”) across three primary care physician (PCP) specialties, which will include obstetricians and gynecologists (Ob/Gyn, who provide treatment in the prenatal phase to both fetus and mother as well as maternal postnatal care), pediatricians (who provide treatment throughout childhood), and general practitioners (GP, who provide treatment to both children’s caregivers and directly to children as they mature). There is a unique role for providers in both secure storage and ERPO implementation as both interventions may be more effective with engagement from healthcare providers, “trusted messengers,” that may be able to effectively communicate about firearm practices in a way that resonates with the firearm owner. **Methods:** We employ qualitative interviewing to have in-depth conversations with 36 New Jersey providers. Participants were randomly selected from two provider-panels

(including physicians, PAs and APRNs) and screened for specialty (GP or internist n=12, pediatrics n=12, and obstetrics/gynecology n=12), practice setting (not hospital based), and time spent on direct patient care (80% +). In order to capture the diverse political and social contexts in which PCPs practice, the sample was stratified at the county-level by voter registration with half of participants selected from counties with majority Republican voters and the other half selected from counties with Democratic or Independent majorities. **Results:** This project is currently in process with approximately 2/3 of the interviews remaining. Thus far, we see many of the same provider barriers identified in our prior work (2020) with GPs, including inadequate screening mechanisms to trigger conversations, physician perceptions of who is at risk for firearm injury, time pressures, concerns about patient receptivity, and a need for training. Preliminary data also indicates diversity of facilitators and barriers by provider specialty, with Ob/Gyns responding differently than pediatricians and GPs. **Conclusions:** Prior to focusing on how to have conversations about firearm safety, interventions designed to increase the incidence of physician-initiated guidance need to address the structural issues of why those conversations typically do not take place. Findings from this study can inform future intervention development, screening tools and practice, as well as provider education as to who is at risk for gun injury and how to best approach firearm safety conversations.

Session 11: Understanding risk & protective factors

Erie, November 1, 4:30 PM - 6:00 PM

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1. Perceptions of risks associated with personal firearms on a US military installation

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Background: Firearm suicide remains a leading cause of death in the US military. Firearms at home increase the risk of death from firearm suicide, as well as firearm-related injury and death from interpersonal violence or unintentional shootings. This study assessed the perceived risks of home firearms, along with firearm ownership and storage practices, among active-duty military personnel and civilians embedded in military units. **Methods:** This study analyzed baseline data from a larger study examining the effects of an implemented firearm injury prevention program at a military installation. Eligible individuals were adult (18+) active-duty Service members or embedded civilians at a single U.S. Air Force and Space Force installation. A voluntary survey was emailed by installation leadership to all Service members and embedded civilians in the 8 squadrons participating in the larger intervention study (approximately 713 personnel). Perceived risks around firearm access and firearm storage related to suicide, others' suicide, interpersonal violence, and unintentional shootings were each analyzed using logistic regression models; predictors included firearm ownership, age, gender, race, ethnicity, and living alone vs. with others. **Results:** Among survey respondents, five did not respond to the question about firearm ownership and were excluded from the analysis. Most respondents (N=324) identified as male (66.5%), White (76.4%), and non-Hispanic/Latino (88.5%). Half of the respondents (50.5%) had 1+ firearm at home. Regarding the perceived risk of firearm access, respondents with firearms at home (vs. those without) were less likely to agree that there is a risk of suicide for self (6.0% vs. 16.6%, $p < 0.001$) or others (7.8% vs. 21.8%, $p < 0.001$), interpersonal violence (16.4% vs. 26.9%, $p < 0.001$), or unintentional shootings (27.9% vs. 42.3%, $p < 0.001$). After adjusting for age, gender, race, ethnicity, and living alone, respondents with firearms at home (vs. those without) were significantly less likely to agree that firearm access increased the risk of suicide for self (0.20, $p < 0.001$) or others (0.19, $p < 0.001$), interpersonal violence (0.25, $p < 0.001$), or unintentional shootings (0.22, $p < 0.001$). **Conclusions:** Most research has examined the behaviors and beliefs of civilian firearm owners, despite the high suicide rates across military populations. Service members and embedded civilians who had firearms at home were less likely to perceive those firearms as an increased risk of injury or death, highlighting clear knowledge gaps. Our findings can identify opportunities for strengthening messaging to help Service members understand and actualize risks surrounding firearms in the home, as well as promote safe storage practices.

2. Understanding the clustering of firearm carrying and discharge behaviors using network analysis: Implications for violence risk

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Background: To explore clustering of firearm-related (carrying; discharge) behaviors and determine which behaviors are most associated with violence using baseline data from a multi-site prospective longitudinal study (Project SPARK). **Methods:** Research staff approached individuals aged 18-24 presenting to four Emergency Departments (EDs) in Flint, Seattle, and Philadelphia. Individuals completed a baseline assessment measuring validated scales of firearm behaviors, violence exposure, peer/family relationships, social/community characteristics, anger, impulsivity, and mental health symptoms. We conducted regularized partial tetrachoric correlation network analysis of 19 firearm-related behavioral indicators (11 firearm carrying behaviors; 8 firearm discharge behaviors) to identify how such behaviors cluster. We analyzed factors associated with higher risk behavioral clusters among those reporting firearm carriage using logistic regression. **Results:** SPARK enrolled 1,506 participants (40.9% Black; 33.0% White; 61.6% female), with 157 participants (10.4%) reporting past six-month firearm carriage. Of those reporting carriage, 71.4% reported carrying while in need of protection, 72.7% in a strange area or at night, and 66.2% while target shooting. Participants most commonly reported discharging firearms with friends (29.7%). Network analysis revealed five firearm-related behavior clusters: protective carriage (e.g., carriage in a strange area), recreational carriage (e.g., hunting), moderate-risk behaviors (e.g., discharge with friends, drug/alcohol use while carrying/discharge), crime-related carriage (e.g., carriage while buying/selling drugs), and other high-risk behaviors (e.g., discharge while fighting). These clusters were largely disconnected, though moderate-risk behaviors often acted as a bridge between clusters; e.g., those who report carriage while drinking often reported several crime-related carriage behaviors, and those reporting discharge with friends often reported other recreational carriage or protective carriage behaviors. Those reporting only protective and recreational carriage had similar rates of past 6-month violence (50.0%, 51.6%, respectively) to non-firearm carriers (47.3%). Those reporting moderate-risk behaviors, high-risk behaviors, or crime-related carriage reported elevated past 6-month violence rates: 71.8%, 80.9%, and 100%, respectively. Those reporting moderate-risk behaviors, high-risk behaviors, and/or crime-related carriage (~64.1% of firearm carriers) had higher rates of substance misuse, firearm violence, depression, PTSD, negative peer behaviors, community violence, anger, and impulsivity, and had lower rates of positive peer behavior, and parental support than all other firearm carriers ($p < 0.05$). **Conclusions:** A significant number of youth presenting to urban EDs report firearm carriage and a majority of those reported firearm-related behaviors strongly associated with increased violence. Firearm-carrying youth reporting substance misuse, depression, PTSD, and high anger or impulsivity may warrant firearm and violence prevention services to reduce engagement in risky firearm behaviors and mitigate violence risk.

3. A latent class analysis of firearm possession examining risk and protective factors among emergency department youth and young adult patients

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Purpose: Firearms are the leading cause of death for youth/young adults (Y/YA). The emergency department (ED) provides an important opportunity for education and intervention. It is important to recognize that firearm

possessors are a diverse group of individuals. We utilized latent class analysis (LCA) to describe firearm possession in a Y/YA ED sample to inform prevention efforts. **Methods:** Computerized surveys were conducted for Y/YAs (age=16-29; n=1,311) seeking ED treatment at a single urban ED. LCA was performed for those owning or carrying firearms (n=223) in the past 3 months using five variables: risky firearm behaviors (RFBs), carriage with peers, carriage frequency, ownership for protection, and recreational ownership. Descriptive statistics were examined. **Results:** In this sample, 17% reported having firearms (Mage 22.7; 48.0% male; 49.3% Black), including 75.3% possessing handgun(s) and 38.6% possessing long-gun(s). The primary motivations for possession included: protection (71.2%), hunting/sporting (26.9%), holding it for another person (4.9%), job-related (2.2%), peer influence (1.3%), revenge (0.9%), selling it (0.9%) and other (4.5%). The LCA identified four classes: (1) recreational ownership/carriage (22.9%); (2) carriage for protection with high RFBs (16.1%); (3) carriage for protection with low RFBs (34.1%); and (4) possession for protection without carriage (26.9%). Class 1 (recreational) were younger with low exposure to firearm victimization (7.8%) and community violence (Mscore=7.1). Further, 51.0% reported binge drinking, 62.7% reported long-gun possession, 66.7% had firearm training, and 92.2% stored firearms locked. Classes 2 and 3 endorsed carriage for protection, possessed handguns (91.7%(2), 97.4%(3)) with class 2 engaging in RFBs. Both classes had similar socio-demographics and high community violence exposure (Mscore=19.9(2); Mscore=14.7(3)) and family/friend firearm victimization (77.8%(2); 73.7%(3)); however, class 2 had higher marijuana misuse, mental health symptoms (anxiety 58.3% vs. 18.4%, PTSD 30.6% vs. 11.7%), and victimization (69.4% vs. 18.4% firearm victimization; 25.0% vs. 13.2% in ED for violent injury). Those possessing for protection without carriage (Class 4) were more likely female (66.7%), had children (61.7%), and while experiencing lower rates of firearm victimization than classes 2&3 (15.0%), reported high rates of violence exposure (community Mscore=11.6; friends/family firearm victimization 60%). About two-thirds (68.3%) possessed a handgun and 38.3% possessed long-guns. Nearly 20% reported storing their firearm unlocked. **Conclusions:** Among an urban ED sample of youth and young adults, four distinct firearm possession classes emerged, with different patterns of firearm possession. Understanding differences in firearm behaviors and risk/protective factor patterns is critical to tailoring interventions to meet individual needs and reduce injury risk.

4. Association between living in homes with handguns and risk of violent death among children

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Background: Rates of firearm death among children and teens increased by 46% between 2019 and 2021. The number of children living in homes with a gun has also risen sharply, from 23 million in 2015 to 30 million in 2021. Few studies have examined the relationship between children's household exposure to firearms and their risk of firearm-related mortality. **Methods:** This case-control study used individual-level data on California residents, including official firearm purchasing records, that were assembled for the Longitudinal Study of Handgun Ownership and Transfer (LongSHOT), and estimated the risks of firearm-related mortality among children associated with living in a home with one or more firearms. Cases consisted of all residents under age 18 in California who died by suicide, homicide, or firearm-related accidents between 2005 and 2021. Controls consisted of minor residents of California who died of malignancies during the same time period. We used multivariate logistic regression to estimate the odds of firearm-related death. The predictor of interest was

whether the child resided in a home in which one or more adult gun owners resided. Independent variables included the child's sex, race and age and the rurality socio-economic level, crime rate, and unemployment rate for the minor's residence. **Results:** [Analyses completed to date focus on a single year in the study period, which constitutes approximately 1/17 of the total sample size; analyses will be completed by the conference date, and the full sample size with substantially narrow confidence intervals and allow for parsing of the estimates according to firearm and non-firearm causes of death.] The one-year analytic sample comprised 348 cases (mean age 12.5 years, 27% white, 71% male) and 302 controls (mean age 10.0 years, 31% white, 57% male). The adjusted odds of firearm-related death were 1.33 times larger among children living in homes with firearms [95% Confidence Interval, 0.56 to 3.12]. **Conclusions:** [Anticipated conclusions, if findings from the 16 additional years track those from 2008]. Children living in a home with a gun face elevated risks of firearm-related mortality. Greater awareness of these risks could motivate passage of more legislation like California's AB 452, which requires schools to notify caregivers about safe storage laws. At the same time, knowledge of the increased risk of death could motivate some gun owners to store their weapons more safely or potentially divest themselves of their guns while discouraging some non-gun-owners who are considering a purchase.

5. Contextual influences, drug/alcohol use, and assault-related injury among men hospitalized for re-assault by firearm in Baltimore, MD

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Background: Black men are nearly 10.5 times more likely to experience a firearm homicide than white men. Non-fatal firearm injuries occur at twice the rate of firearm deaths. Socioeconomic status, racial residential segregation, and greater access to alcohol and illicit drug markets are known community level predictors for firearm assault. The purpose of this study is to describe perceptions of contextual influences (factors impacting physical and social environments) among Black men recovering from recent firearm assault. **Methods:** Nine adult Black men were recruited from a Level I Trauma Center in Baltimore, MD if they reported drug or alcohol use and were hospitalized for a re-assault by firearm. Each participant completed one semi-structured individual interview. The interview guide included questions about their assault-related injury experiences, drug/alcohol use, and perceptions about their community environment. Interview data were managed in ATLAS.ti and analyzed by two study team members using content analysis. **Results:** Participants described contextual influences that impact their physical and social community environments at multiple ecological levels (societal, community, and relationships). Four themes describing contextual influences were identified: (1) Inequitable distribution of resources: "no places...to sign-up for drug treatment", (2) Inequitable distribution of risks: "Every Black neighborhood got alcohol everywhere", (3) Burden of exposure to community violence: "Shootings, and robbing, and beating on people", and (4) Decreased community social connectedness: "People is all for theirself". Participants described the relationship between drug/alcohol use and assault-related injury from two risk perspectives: 1) Increased risk for using violence: "not knowing how to control their anger or their emotions at the time...leads them to do stuff that they wouldn't normally do if they was sober" and 2) Increased risk for experiencing violence: "...you having tunnel vision. You don't really notice what's going on". **Conclusions:** Participants' descriptions of contextual influences that shape drug/alcohol use and assault-related injuries highlighted the effects of structural and institutional racism. These findings reinforce the need for upstream,

targeted, and community-centered substance use and violence prevention interventions. Research-based policy must also be directed at eliminating structural factors that lead to racial disparities in firearm assault. Qualitative research provides unique insights critical to advancing firearm injury research and informing policy and prevention strategies.

6. Predicting risk of firearm injuries in children using national emergency medical services records and publicly available data sources

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Background: There are effective hospital-based violence interventions, but few scalable tools to optimize allocation of those resources. We used machine learning to develop a risk prediction tool for firearm injury among children transported by ambulance that would require only basic demographic information and home ZIP Code. **Methods:** We included children transported by ambulance to an acute care hospital in 50 states from January 1, 2012 through December 31, 2022. We matched public data sources to EMS records using the patient's home ZIP Code. There were 81 predictors from 5 data sources: EMS (6 patient-level demographic variables), American Community Survey (9 variables), Child Opportunity Index (COI, 4 variables), County Health Rankings (37 variables), and Social Vulnerability Index (25 variables). We separated children into 0-10 years (pre-adolescent) and 11-17 years (adolescent/teen). We used machine learning methods to identify the ideal model type, to develop the risk prediction model, and to select high-prediction variables. We used threshold shifting (modification of accuracy targets) and Bayesian conditional probability to select high-specificity models that minimized false positive children and could serve as platforms to identify high-risk children for future ED- and hospital-based interventions. **Results:** There were 8,390,753 children transported by ambulance during the 11-year study period, including 28,837 (0.34%) with firearm injuries. There were 4,271,448 children 0-10 years (3,833 [0.09%] with firearm injuries) and 4,119,305 children 11-17 years (25,004 [0.61%] with firearm injuries). Among children 0-10 years, a model with 95% specificity identified children with 0.43% risk of firearm injury (a 4.8x increase in risk from the 0.09% baseline incidence). Among older children, a high-specificity model raised risk prediction to 4.38% (a 7.2x increase in risk from the 0.61% baseline incidence). Models limited to high-performance predictors preserved risk prediction among children 0-10 years (20 of the 81 variables, AUC=0.708) and 11-17 years (25 of 81 variables, AUC 0.793). There were 15 high-yield predictors common to both age groups: patient demographics (age, sex, race) and multiple neighborhood measures (household income, COI metrics, teen birth rate, homicide rate, % children in poverty, low birthweight rate, % children in single-parent households, infant and child mortality rates, and % children eligible for free or reduced-price lunch). **Conclusions:** Among children transported by ambulance, basic demographic information and publicly available neighborhood measures can identify children at elevated risk of firearm injury. Community measures of income, health, crime, and family structure were the strongest place-based predictors of firearm injury risk.

Session 12: Examination of firearm policies and their effects on firearm injuries (Part I)

Sheraton III, November 2, 8:00 AM - 9:30 AM

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1. Variance in state mental health firearm prohibition laws: A 50-state analysis

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Background: Heterogeneity may exist among state laws regarding mental health reporting guidelines for the purpose of preventing firearm acquisition for certain individuals prohibited from owning firearms because of a mental health event. Each state develops its own rules regarding mental health reporting requirements and when/if that information is provided to the FBI's National Instant Criminal Background Check System ("NICS") that was created to prevent certain individuals with mental health incidents from acquiring firearms. This study's purpose is to review state mental health firearm prohibition laws, comparing whether or when a state requires reporting and who must report, to whom, and under what circumstances and to determine the level of heterogeneity that may exist. **Methods:** Using Thomson Reuters Westlaw, we performed primary legislative research to characterize mental health firearm prohibition laws enacted in states by the end of the 2021 legislative session. We created a database that categorized whether state law requires reporting to NICS based on mental health. We collected data on what circumstances create reporting obligations, who must report, about which individuals, when, and to whom. **Results:** Forty-two states require reporting of information to NICS about individuals who, under state law, are prohibited from accessing firearms based on certain mental health events. Five states allow (but do not require) such reporting to the NICS database, while three states do not permit NICS reporting and allow reporting only to state-specific databases. All states, at a minimum, require reporting on individuals who have been involuntarily committed to a mental health institution; beyond this baseline obligation, heterogeneity amongst states is substantial on all other factors analyzed. States vary on whether reporting is required for mandated outpatient treatment; court-determined guardianship due to lack of mental capacity; voluntary treatment in lieu of certified incapacitation; or a court finding of incompetent to stand trial or adjudicated not guilty by reason of insanity. **Conclusions:** Lack of uniformity in mental health reporting requirements may create confusion among mandated reporters and thereby lessen the effectiveness of NICS as a tool for prohibiting access to firearms. This database provides insight on how far-reaching the variation is amongst states in determining when mental health-related events require reporting, by whom and to whom. Each state develops its own rules regarding mental health reporting requirements and when/if that information is provided to the FBI's NICS; it was created as a tool to prevent certain individuals with mental health incidents from acquiring firearms.

2. Firearm hospitalizations and permit-to-purchase laws: Longitudinal evaluation of state-level firearm licensure requirement on firearm violence

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¹Johns Hopkins Center for Gun Violence Solutions

Background: Permit-to-purchase (PTP) laws require individuals to obtain a permit from a law enforcement agency before purchasing a firearm. Research shows that these laws reduce various forms of firearm violence including homicides, death by suicides, and mass shootings. Our study aims to estimate the impact of these laws on firearm inpatient hospitalization rates. **Methods:** We employed multiple Difference-in-Difference (DiD) inference approaches, including Doubly Robust DiD (DRDiD), two-stage DiD (DiD2s), and Stacked DiD, to analyze the simple effect and the event-study effect of removing PTP laws in Missouri (2007) and Michigan (2012) and adopting a PTP law in Maryland (2013) on firearm hospitalizations. We utilized RAND's publicly available healthcare cost and utilization project (HCUP)-based dataset from 2000-2016, which estimates mean rates of firearm hospitalization across 850 state-year indices using State Inpatient Databases from HCUP. Where possible, we examined effect differences across unadjusted and adjusted models and by the presence or absence of population weights. Adjusted models included time-vary covariates as well as dichotomous firearm policy variables. **Results:** Across DiD approaches, the adoption of a PTP law in Maryland was significantly associated with lower rates of firearm hospitalizations. This was true in unadjusted and adjusted models as well as models with and without population weights. In our simple DiD models, PTP repeal was not associated with an impact on firearm hospitalization rates. For PTP adoption, event-study results suggest a steady effect across implementation years. Event-study models suggest PTP repeal may be associated with increased firearm hospitalization rates in Missouri, with effects increasing over-time. **Conclusions:** The results suggest that adopting a PTP law likely decreased mean firearm inpatient hospitalization rates. This finding aligns with existing literature that suggests PTP laws as a means to address firearm violence. Event-study analyses suggest that the absence of significant findings in our simple DiD models examining PTP repeal may be attributed to a lack of significant association in Michigan. This disparity could be due to unaccounted for underlying trends in Michigan's firearm hospitalizations, or small post-treatment period. State-specific analyses are needed to further examine the impact of PTP repeal on firearm hospitalization rates. States without PTP laws should consider adopting this measure to reduce inpatient firearm hospitalizations.

3. Armed and dangerous? The effect of concealed carry permitting on gun-related health outcomes

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Background: The recent adoption of bills formalizing the right to carry a concealed firearm without a permit, also known as "Constitutional Carry," has reinvigorated debate concerning the tradeoffs of weapons in public. Proponents of expanding the right to carry a concealed firearm argue that the practice is protected by the Second Amendment, allows individuals to defend themselves, and creates a public good. Opponents argue the widespread carrying of concealed weapons increases gun-related injuries due to the risk of violence and accidental shootings. We explore the negative consequences of widespread concealed carry and demonstrate that many of the proponents' arguments are, on average, wrong. **Methods:** Using an ecological approach, we explore a potentially causal relationship between concealed carry permits and multiple health outcomes using data from the state of Pennsylvania. To do so, we combine data from several sources: concealed carry permit counts (permits issued in a given year) and handgun sales are from the Pennsylvania State Police's Firearms Annual Report (2012-2020), population and death data from the Centers for Disease Control and Prevention, and injury data (including length of stay and injury type) is from the Pennsylvania Health Care Cost Containment Council (PHC4). All of our data is county level and for each health outcome. With these data, we estimate the relationship (using causal and non-causal methods) between concealed carry permits and fatal gun accidents,

gun homicides, gun suicides, non-fatal gun accidents, and non-fatal gun assaults. As a “placebo,” we also estimate the relationship between concealed carry permits non-gun homicides, non-gun suicides, and transportation-related fatalities. **Results:** We find a significant and positive relationship between concealed carry permits and nearly all of the gun-related health outcomes. We find little to no relationship between concealed carry permits and non-gun-related fatalities. This is usually true for both causal and non-causal approaches and suggests a causal link between concealed carry permitting and adverse health outcomes. **Conclusions:** Our results point to a positive relationship between concealed carry permitting and adverse health outcomes and suggest that the increase in gun deaths in the United States will not be abated significantly anytime in the near future.

4. Effects of implementing permissive campus carry laws on rates of major violence at public colleges and universities

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Background: Following the Supreme Court’s decision in Bruen, laws restricting the public carrying of firearms in “sensitive places”, like college campuses, have received increasing attention. However, there is little quasi-experimental evidence for whether permissive campus carry policies increase firearm violence or, via a deterrence hypothesis, reduce general violence on campus. To test the deterrence hypothesis, we estimated the effect of implementing state laws explicitly allowing the carry of firearms on college or university campuses on rates of violent crime. **Methods:** Public institutions with on-site student housing were eligible for inclusion in the study. Colorado, Georgia, and Texas implemented permissive campus carry laws in 2012, 2017, and 2016, respectively (n=105 institutions). Control institutions were all those in states that did not allow the carry of firearms on college campuses for the entire study period (2007-2021) (n=265 institutions, 16 states). The rate of major violence (murder, rape, robbery, and aggravated assault) per 1,000 enrolled students was obtained from the Office of Postsecondary Education Campus Safety and Security Statistics website. Reporting to this database is required for all institutions that receive Title IV funding. Due to the staggered timing of policy implementation, we used a modified difference-in-differences approach that accounts for variation in treatment timing (Callaway and Sant’Anna, 2021). We present average effect estimates for each state and over time along with 95% confidence intervals calculated using bootstrap-based standard errors and adjusted for multiple testing. **Results:** Tests of trend in the pre-treatment periods did not provide evidence that the parallel trends assumption was violated. The group-specific estimates for Georgia and Texas were close to zero (average treatment effect on the treated (ATT)= 0.10, 95% CI=-0.087, 0.287 and ATT=0.07 (-0.259, 0.127)). Estimates for Colorado were larger but estimated with less precision (ATT=0.97; 95% CI=-1.550, 3.496). Violence rates trended upward in institutions in treated states at longer lengths of exposure to permissive campus carry policies, but these differences were not consistently distinguished from the null. **Conclusions:** The deterrence hypothesis posits that the potential threat of armed students on campus deters people from engaging in violence in that setting. Under this hypothesis, we would expect to observe decreases in the rates of violence following the passage of permissive campus carry laws. This study does not provide evidence in support of a deterrence hypothesis.

5. Understanding the prevalence of Second Amendment sanctuary laws

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Background: Statements, resolutions, ordinances, and laws explicitly protecting the Second Amendment have been gaining popularity across the United States. For example, the Second Amendment Preservation Act (SAPA) was signed into law in Missouri to safeguard an individual’s right to keep and bear arms, establishing a ‘Second Amendment Sanctuary State.’ Although recently declared unconstitutional, this legislation is just one example of how local and state jurisdictions are attempting to “protect” gun rights. However, the breadth of these activities has not been previously quantified. **Methods:** For each state, we conducted a thorough analysis to identify pro-Second Amendment actions by legislative bodies at the local, county, and state levels. We identified the year in which the activity occurred, news articles and press releases, and the exact text of the statement, resolution, ordinance, or policy. Then, we identified and categorized these actions to make comparisons across jurisdictions. For example, “Second Amendment Sanctuary City,” “Reaffirming Support for the Second Amendment,” or exemptions for certain types of firearms or accessories. **Results:** All but five states took a local or state action related to protecting the Second Amendment. Connecticut, Delaware, Hawaii, Massachusetts, New Hampshire, and the District of Columbia have not imposed any Second Amendment preservation activities. The vast majority have been passed or released since 2020. In addition to state-level policies and statements, actions have been taken in more than 1,300 cities and counties across the country. The vast majority of which declare the jurisdiction as a sanctuary for the Second Amendment. Others reaffirm support for the Constitution broadly or gun rights specifically. **Conclusions:** Activities to protect against perceived infringement of the Second Amendment are becoming increasingly common throughout the country. Gun violence is a national, state, and local problem in the United States. Solutions to gun violence need to function across each of these levels. It is necessary to understand the context and perceptions around the Second Amendment across jurisdictions. These findings are informative for researchers, policymakers, advocates, or others who are working to address gun violence.

6. The impact of Massachusetts’ Safe and Successful Youth Initiative (SSYI) on reducing urban gun violence

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Background: Massachusetts’ Safe and Successful Youth Initiative (SSYI) is a multifaceted, community-based strategy that uses a public health approach, in partnership with law enforcement, to eliminate lethal and nonlethal violence among young people who have already committed, and often been the victim of, gun and gang violence (i.e., proven-risk youth). SSYI operates in 14 cities across the state, serving nearly 2,000 clients ages 17 to 24. Since SSYI’s inception, the American Institutes for Research (AIR) and WestEd have conducted independent evaluations of the initiative and explored Massachusetts’ unique statewide approach to gun violence prevention. **Methods:** Since 2013, the AIR/WestEd team’s evaluations have employed various methodological approaches to examining the impact of SSYI including regression discontinuity designs, interrupted time series designs with control groups, propensity score matching, latent class analysis, structural equation modeling, survival analysis, and other repeated observation methodologies. **Results:** Results from the AIR/WestEd team’s evaluations have demonstrated persistent, statistically significant positive impacts of SSYI on community and individual gun violence. For example, an examination of community-level violent crime trends from 2007 to 2017 found that cities receiving SSYI funds saw annual violent offenses decrease by as many as 2.2 offenses per 1,000 and annual violent crime victimizations decrease by almost 3.2 victimizations per 1,000. Cost-benefit analyses showed that an annual decrease of more than 800 violent crime victims across SSYI cities equated to more than \$38 million in crime-related cost savings and a greater than \$5 return on investment for

every \$1 spent on SSYI. Analysis of SSYI client court history data revealed that, after 2012, clients enrolled in SSYI had 36% fewer violent offenses, including 50% fewer weapon-related offenses, than did young men identified for the program who never enrolled. These and other findings resulted in SSYI being added as a Promising Practice to the National Institute of Justice CrimeSolutions and the Office of Juvenile Justice and Delinquency Prevention Model Programs Guide in 2021. **Conclusions:** Within the environment of SSYI's success, Massachusetts is actively exploring ways to develop cross-initiative evaluation strategies across programs like the Department of Public Safety's Shannon Community Safety Initiative targeting secondary risk populations and the Department of Public Health's Child and Youth Violence Prevention Services initiative. The commonwealth's investment in this expanded approach to violence prevention across a risk continuum, from primary to tertiary risk populations, has also pioneered the way for other states to develop comprehensive statewide approaches to violence prevention.

Session 13: Understanding community violence: Indicators and best-practices

Erie, November 2, 8:00 AM - 9:30 AM

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1. Attributes of firearm violence among youth and potential “alternative” non-violent trajectories with similar attributes: Results of formative research

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Background: To address high rates of firearm violence in the District of Columbia, the George Washington University Milken Institute School of Public Health (GWSPH), together with a coalition of neighborhood organizations in the intervention community of Washington Highlands and several DC agencies/organizations, are collaborating to finalize, implement and evaluate a unique, community-level youth firearms prevention intervention funded by the National Institutes of Health as part of a consortium. This paper presents the methods and results to date of our Phase One formative research. **Methods:** The intervention addresses connections between structural factors, youth identity development, and violence, where structural factors in some communities may limit adolescent beliefs about potential life-trajectories (“possible selves”), and foreground potential trajectories that include violence as integral. The intervention seeks to counter that dynamic by implementing selected alternative trajectories that offer attributes recognized by community youth and then creating/disseminating multiple media products featuring narratives about these alternative, non-violent identity trajectories. The goal is to change the calculation of possible selves among community adolescents during the identity development stage, thus reducing violence involvement. In Phase One, we are completing formative research to identify attributes, alternative non-violent trajectories, and determine intervention elements, among other data, and to develop/pilot test evaluation instruments and protocols. Phase Two involves implementation and evaluation. Phase One methods include key informant interviews (adults, n=20), and six focus groups with youth ages 12-16 (n=48), recruited via purposive and snowball sampling. Interviews and focus groups are recorded, transcribed, and analyzed for major themes using QSR NVIVO software. **Results:** Complete Phase One results will be available at the time of the conference. Thus far, key informant interviews have reinforced two key motivators for carrying/using firearms: 1) It is often seen as necessary to maintain a local identity characterized by power, material gain, personal efficacy, and style; 2) It is necessary for protection in an environment where potential victimization is viewed as imminent, and threats to person and reputation are common. In addition, low expectations about any change in these circumstances are prevalent. Moreover, the increased reliance on social media for communication, heightened during the pandemic, may have exacerbated this dynamic by ramping up the speed by which conflict interaction escalates and is disseminated. **Conclusions:** The results are providing initial validation to the overall intervention premise, a set of possible alternative non-violent trajectories and their necessary attributes, and additional mediators to assess (e.g., sense of purpose, fatalism).

2. Enhancing academic-community partnerships to implement effective firearm injury prevention strategies

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¹Firearm Injury Prevention Initiative, University of Colorado Anschutz Medical Campus, ²Hand in Hand Multicultural Center, Springfield, MO, ³Gang Rescue and Support Project (GRASP), ⁴Bristlecone Shooting

Background: Firearm injury prevention research has increased significantly over the past three years following federal funding and ongoing foundation investments, resulting in gains in knowledge and understanding of policy and practices that can reduce firearm-related harms in the U.S. However, there is less investment in bidirectional knowledge transfer and infrastructural support (such as networking, technical assistance, and training) needed for practitioners and communities to implement strategies and programs that prevent and reduce injuries and deaths resulting from firearms in their local communities. **Methods:** This presentation will provide a case study of an academic-community partnership between firearm injury prevention researchers at the University of Colorado Firearm Injury Prevention Initiative and the Hand in Hand Multicultural Center which provides health, legal, and educational support and services to immigrant and refugee populations in Springfield, MO. The academic-community partnership focuses on assessing community readiness and identifying opportunities for future initiatives addressing local concerns about firearm injury and violence experienced by these underserved populations. **Results:** This presentation will outline opportunities for developing academic-community partnerships to translate firearm injury prevention research to community organizations that serve as trusted messengers to groups at-risk for firearm injuries and death. The presentation will provide a case study of an academic-community partnership highlighting: ways in which they have partnered together in assessment and implementation efforts, bidirectional learning that has occurred because of their partnership, and the overarching benefits of their partnership that can be applied to future national efforts to enhance academic-community partnerships focused on translating firearm injury prevention research to action. **Conclusions:** Academic-community partnerships are essential to address the gap of translating research and providing technical assistance and training to communities to implement effective and culturally relevant firearm injury prevention strategies.

3. Tracking the temporal dynamics of the proportion of firearm homicide decedents fatally shot in their residential neighborhood

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Background: Community-based interventions like street outreach are designed to connect with high-risk individuals in the areas where they live and where they might be victims of firearm violence. However, little work has examined the extent to which an individual's residential neighborhood and neighborhood of victimization represent the same areas, which poses a barrier to optimal allocation of street outreach resources. In this case-only analysis, we examine the extent to which unmeasured, time-varying factors may have influenced the proportion of firearm homicides that occur in the neighborhood where the decedent lived. **Methods:** Data were downloaded from the Cook County Medical Examiner's Case Archive. Criteria for case inclusion were: Year of death was 2015-2023; location of fatal injury was Chicago, IL; manner of death was homicide; type of death was gunshot injury. Information for each case included age, sex, and race/ethnicity. The proportion of cases in which the zip codes of fatal injury incident and residence were the same was determined annually, and a Cochran-Armitage Trend Test was performed overall and by sex, age group, and racial/ethnic group to determine whether proportions of home-neighborhood victimization increased or decreased over time. **Results:** The final dataset contained 5016 cases. The mean/median age was 29.2/27.0 years, with a standard deviation of 11.2. By race/ethnicity, 80.8% were NH Black, 15.9% were Hispanic/Latino, and 3.3% were NH White. Males comprised

91.5% of cases, females 8.6%. Incident and residence zip codes were the same in 39.4% of cases. Overall, this home-neighborhood victimization proportion decreased over time, from 53.6% in 2015 to 35.5% in 2022 ($p < 0.01$). Over that same time period, the proportion decreased among males (54.4% to 34.7% [$p < 0.01$]), NH Black victims (55.5% to 33.1% [$p < 0.01$]), 15-19 year-olds (59.2% to 40.0% [$p < 0.01$]), 20-24 year-olds (49.6% to 26.1 [$p < 0.01$]), and 25-34 year-olds (52.3% to 28.3% [$p < 0.01$]). When restricting the dataset to NH Black males the proportional change was amplified, decreasing from 55.8% to 32.6% ($p < 0.01$). By age group, the results among NH Black males followed the same pattern as when all cases were included, but again were more pronounced. **Conclusions:** Firearm homicide victims in Chicago, Illinois are decreasingly likely to be shot in their home neighborhoods, potentially signaling changes either in the daily activity patterns of victims or in the dynamics contributing to the place where violence occurs. These results run counter to the expectation that the COVID-19 pandemic might have restricted mobility to areas closer to home.

4. A national algorithm to predict firearm assault: The firearm violence vulnerability index (FVVI)

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Background: A core principle of firearm injury prevention is understanding populations at risk, yet accessing accurate and comprehensive data to characterize this risk is challenging. In other areas of public health, standardized deprivation indices have been developed to identify and prepare at-risk populations for times of crisis. To date, no such tool exists for firearm violence. Therefore, we sought to develop a novel machine learning algorithm, named the Firearm Violence Vulnerability Index (FVVI), that forecasts community risk for firearm assault and can augment ongoing prevention planning and research efforts. **Methods:** We obtained national fatal and non-fatal shooting incident data for 2018-2022 from the Gun Violence Archive (GVA). We chose 30 population characteristics from the 2020 American Community Survey and Opportunity Atlas to create the FVVI, which encompasses various social and structural determinants of health. Shooting incidents and population characteristics were merged by census tract and randomly split into training (80%) and test (20%) sets. We used XGBoost, a decision tree-based machine learning algorithm, to create the FVVI model, which predicts shootings per 1,000 people in a census tract. Permutation feature importance and Shapley Additive Explanations (SHAP) were used to demonstrate how each population characteristic was used in the algorithm's decision-making. FVVI performance was evaluated using mean Poisson deviance and deviance goodness of fit (D^2). **Results:** In total, 206,082 shooting incidents in 84,122 census tracts were used to create the FVVI. It had strong predictive power in the test set with a mean Poisson deviance of 0.66 and D^2 of 0.70. The five population characteristics that most influenced a prediction of high shooting rates within a census tract were: fewer available jobs per capita, low 3rd grade math scores of adults 30 years old during our study timeframe, a large percentage of this same population's parents incarcerated during childhood, more households lacking access to a vehicle, and a large population requiring food stamps within the last year. **Conclusions:** Since U.S. firearm violence continues to rise, innovative methods to inform prevention are critical. To our knowledge, FVVI is the first model of its kind and is highly accurate. The FVVI could be a powerful and practical tool for firearm violence prevention by targeting interventions to the most vulnerable communities (even in places where shooting data is not readily available), identifying population-level factors on which to focus these efforts, and offering a more systematic approach to research and resource allocation in this field.

5. “Too far gone?": A PAR study of gun-violence prevention workers' most challenging participants

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Background: Community violence interventions (CVIs) target at-risk youth and young adults with outreach and use violence interruption to reduce gun violence in vulnerable, inner-city communities. One prominent CVI is the Cure Violence (CV) public health model. CV utilizes street teams consisting of “credible messengers” who seek to identify and engage at-risk youth and young adults to mentor them away from the streets and mediate conflicts. CV has been the subject of numerous outcome evaluations that suggests that CV can be effective in reducing violence at the community level. Yet little is known about the landscape of CV engagement with high-risk populations—what are the characteristics of the engaged participants, and who do CV outreach workers miss when doing this work? This ongoing PAR project seeks to understand the characteristics of those individuals that are difficult to engage and how those differ from participants who are successfully engaged in CV programming.

Methods: This ongoing research is shaped by the principles of participatory action research (PAR). The first component focused on hard-to-reach individuals with known involvement in street violence. We trained CV outreach workers (N=3) to recruit and conduct semi-structured interviews. The outreach workers interviewed people on the streets (N=10) who are not engaged in CV but known to the outreach workers as individuals actively involved in street violence. The research team conducted narrative analysis and developed auto-biographical narratives of the non-engaged and hard-to-reach individuals.

Results: Interviews and analysis suggest that in contrast to engaged CV participants, the non-CV engaged and hard-to-reach individuals are part of tight networks, often involved in "thrill" shootings, tends to be younger (15 to 19 years old), and seems to primarily engage in proactive violence.

Conclusions: This research has important implications for improving outreach activities and extending the reach of CV and similar outreach and peer-mentoring interventions. Understanding the psychology of individuals who refuse to engage with CV and are involved in shootings is critical for tailored and effective interventions.

Session 14: Assessing risk and implementing evidence-based solutions to prevent suicide (Part II)

Sheraton I, November 2, 9:45 AM - 11:15 AM

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1. Lock and protect, reducing access to adolescent means of suicide: An emergency department feasibility cohort pilot study

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Background: Firearm suicide makes up over one-third of all youth gun deaths and nearly half of suicides among young people. Emergency department (ED) visits for adolescent suicidal ideation or attempts have doubled in recent decades and providing lethal means counseling to caregivers in EDs is a promising method to prevent adolescent suicide attempts and death. Our multi-disciplinary clinical and investigative team systematically developed Lock and Protect, a novel lethal means restriction decision aid for caregivers presenting to EDs with their adolescent. Lock and Protect is a web-based decision aid, using a non-judgmental, self-directed approach to offer a range of options to reduce access to firearms and medications. We tested the acceptability and feasibility of implementing the Lock and Protect decision aid and the feasibility of conducting a future trial in the ED among caregivers of adolescents presenting for suicidal thoughts and behaviors. **Methods:** We conducted a prospective cohort study of caregivers and adolescents. Caregivers received the Lock and Protect intervention during ED evaluation of their child. We included English speaking caregivers and their adolescents ages 13-17 years presenting to the ED for suicidal ideation, suicide attempt, or non-suicidal self-injury. Caregivers completed the Feasibility and Acceptability of Intervention Measure(s) and the Ottawa Acceptability Scale after using the Lock and Protect decision aid. We used standard descriptive statistics with appropriate distribution measures to summarize outcomes. **Results:** Caregivers (N=40) were enrolled; 52.5% Latine, 42.5% White, and 30% Black. Among caregivers, most found Lock and Protect to be respectful of their family values about medications and firearms (100% and 97.5% respectively), with 92.5% reporting the length and amount of information in Lock and Protect was “just right.” All caregivers would recommend the tool to others in a similar situation, and 93.3% found the options presented were realistic. 97.5% of caregivers found the tool useful for changing home access to firearms and medications. All caregivers completed the tool, using it for an average of 9.5 minutes. Follow up procedures were completed for 71% of caregivers and adolescents, with 70.9% of caregivers increasing safe home storage of medications. **Conclusions:** Lock and Protect, a web-based lethal means counseling decision aid, is feasible to implement in the pediatric ED and acceptable to caregivers of adolescents presenting to a single, urban ED for suicidal thoughts and behaviors.

2. Dementia and firearms: Experiences of caregivers enrolled in a national trial

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Background: Dementia is a progressive neurodegenerative condition that poses significant challenges for individuals and their caregivers, including increased suicide risk in people with dementia (PWD). Firearm access in dementia can increase the risk of death by suicide or accident. Caregivers for PWD play a crucial role in managing the complexities associated with dementia and gun access, but little is known about their experiences. The “Safe at Home” study seeks to test an online firearm safety decision aid for dementia caregivers. Here, we explore the experiences of caregivers concerning firearm access and suicide risk. **Methods:** This ongoing study is enrolling adult, English- or Spanish-speaking caregivers of community-dwelling PWD with firearm access (goal N=500). Participants are randomized to view a firearm decision aid versus an NIA Home Safety Checklist control website; all complete baseline and follow-up online surveys. Recruitment of caregivers nationwide is through varied ad methods, including social media, online, and organizational newsletters. **Results:** Of 227 enrolled caregivers to date, 49.8% identified as women; 48.9% as Black; 11.6% as Hispanic. A significant majority (n=165, 72.7%) reported that the PWD personally owns a firearm, with 82.4% of those PWD (n=136) living with the caregiver. Most PWD who own firearms and live with their caregiver had 1 (36.8%) or 2-5 (54.4%); 5.1% owned ≥ 6 . The same caregivers (n=136) reported the most common reason(s) for PWD owning firearms as personal protection (29.4%), hunting (19.5%), collection (15.0%), sports shooting (12.3%), and work (3.6%). 33.8% of caregivers reported firearms being both loaded and securely locked, while 14.0% reported firearms being loaded but not locked and 37.5% reported firearms being unloaded but securely locked. When asked about suicide ideation/attempt (SI/SA), 14.2% of caregivers reported the PWD had a history of SI/SA, with 69.2% indicating the SI/SA occurred in the week prior to joining the study. Nearly 1 in 10 (9.3%) caregivers reported negative verbal interactions between themselves and the PWD when addressing firearm safety. **Conclusions:** The coexistence of dementia and guns presents a potentially dangerous situation that necessitates specialized support for caregivers. Many caregivers reported SI/SA in the PWD, highlighting a potentially high-risk situation. Our findings may have the potential to benefit future studies by providing behavioral insights of caregivers and PWD, including whether a firearm safety decision aid is useful. By understanding the risks and complexities involved, policymakers and healthcare professionals can develop innovative strategies to ensure the safety and well-being of both caregivers and PWD.

3. Survey results from Colorado Gun Shop Project: Firearm business owners, employees and customers

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Background: Gun Shop Projects (GSPs) are community-driven suicide prevention partnerships between the firearms community (e.g., firearm retailers and ranges) and local public or community health agencies. GSPs use trusted messengers in the firearms community to educate firearm businesses on the increased risk of suicide for firearm owners. While GSPs are being implemented in 21 states in the U.S., studies evaluating GSPs are limited. Research is needed to evaluate the effectiveness GSP approaches to increase suicide prevention awareness, attitudes, and behaviors (e.g., denying a sale of a firearm to a person suspected of being in crisis). **Methods:** We administered a survey prior to and after the implementation of GSP to owners/managers, employees and customers of firearm businesses who participated in Colorado’s GSP evaluation between 2022 and 2023. Researchers focused on surveying one owner/manager, up to three employees and ten customers from each establishment. The survey included measures to understand GSP implementation, business characteristics, business practices (including denying sales), and individuals’ demographics. The analyses focus on the pretest survey data. One-way ANOVA and post-hoc pairwise comparisons (i.e., Tukey Contrasts) were conducted to

examine differences in suicide prevention awareness, attitudes, and self-reported behaviors between owners/managers, employees, and customers. **Results:** Twenty-seven owners/managers, 49 employees, and 173 customers participated in the survey prior to implementing GSP (total n=249) (response rates=100%, 89%,67%). Most GSP establishments were in urban counties (82%) versus rural counties. Twenty-two percent of the participants were Veterans. Employees were more likely to answer suicide prevention questions correctly (32%) followed by customers (28%) and owners/managers (24%). Attitudes favorable toward suicide prevention and safe storage were significantly different between customers (mean=2.1) and employees (mean=1.9) ($p<.04$). No other significant differences were found. **Conclusions:** The initial findings indicate that less than a third of firearm establishment owners/managers, employees and customers are knowledgeable about suicide prevention, an important first step toward changing attitudes and behaviors. This information can be used to improve GSP implementation practices aimed at the firearm business community to prevent suicide.

4. Military spouse and partner views on lethal means safety messaging

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Background: Suicide remains a leading cause of death in the U.S. military. Personally owned firearms account for approximately 88% of military firearm suicides. Existing Time-Based Prevention and Lethal Means Safety (LMS) interventions often utilize methods to promote an understanding of how reducing access to firearms during times of risk reduces the likelihood of injury or death. There is little research on the role Active-Duty service members' (ADSM) partners and spouses play in promoting secure storage practices among the ADSM population. This project examined military spouse/partner perspectives on existing LMS within the military and sought to understand the existing role they play in home firearm storage practices and whether their unique outlook should be leveraged when promoting secure practices. **Methods:** Interested parties were invited to participate in 60-minute In-Depth Interviews and 90-minute Focus Group Discussions which were conducted between August 2022 and April 2023 through Zoom and were audio recorded and transcribed verbatim. MAXQDA 2022 was employed to facilitate qualitative data management and analysis. Themes were identified through a hybrid inductive-deductive content analysis approach. All transcripts were coded by two researchers and code application disparities were addressed through adjudication meetings. Military spouse participants represented various branches and individuals were recruited nationwide via convenience sampling. **Results:** Analysis revealed that individuals were supportive on the concept of LMS but believe current approaches "miss the mark." Participants raised questions related to the autonomy of gun ownership, expressing concerns around sensitive language and verbiage that resonates with military culture and recognizing that lethal means safety includes securing objects other than firearms. Storage practices were generally mixed, however factors such as living with children did contribute to more protective practices like the utilization of locking devices and storage containers. Overall, participants largely saw the value in the spouse/partner role as an intervention resource, but it was suggested they receive proper training prior to intervening. **Conclusions:** Additional research can facilitate improved messaging and training strategies related to LMS within military populations. This approach can help foster a collaborative environment where individuals are more likely to engage with and adopt secure storage practices willingly. Mixed approaches utilized in firearm storage practices indicate a need for clearer guidance and education on secure storage methods. Further research can help develop comprehensive guidelines around the importance of secure storage and provide further

recommendations to promote consistent and responsible firearm storage practices due reduce the risk of injury and death.

5. Extending the firearm suicide proxy for household gun ownership

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Background: Levels of gun ownership and lethal violence in the U.S. far surpass those in any other developed country, and yet there is little known about the origins of these trends due to a lack of historical data on the prevalence of gun ownership. To fill this gap, this study extends an existing proxy for household gun ownership rates—the rate of firearm suicide divided by suicide (FSS)—from 1949 to 2020, including new coverage for the 1949 to 1972 period. **Methods:** A novel approach was developed to validate the FSS proxy for household gun ownership rates during a period that lacks firearm ownership measures conventionally used to validate firearm proxies. Historical data were compiled that should be strongly associated with gun ownership trends to test the strength and consistency of the relationship with FSS between 1949 to 2020. **Results:** The FSS proxy increased by 45 percent between 1949 and 1990, the latter representing the U.S.'s peak FSS year. Over half of that increase occurred between 1949 and 1972, the period that previously lacked systematic data on gun prevalence rates. FSS can be used as a proxy for the prevalence of guns among U.S. households at the state level between 1949 to 1972. **Conclusions:** Unlike most gun prevalence measures that are representative at the national or regional level, this proxy represents household gun ownership trends at the state level and is not reliant on self-reported data that are prone to social desirability bias. This extended proxy represents the longest-ranging dataset of state-level gun ownership rates to date.

6. Self-inflicted and assaultive injuries by firearms treated in a Level I trauma center on the rise following statewide waiting period law repeal

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Background: Firearm-related injuries are a major public health issue. There were 48,830 firearm-related deaths in 2021, a record high for the country. In Wisconsin, suicide is the 10th leading cause of death among all ages in the state, with nearly half of all suicides resulting from firearms. Wisconsin has the 34th highest rate of gun violence in the US.

In June 2015, Wisconsin repealed a law requiring a 48-hour waiting period before taking possession of a firearm after purchase. Studies have shown that states with waiting period laws have lower firearm suicides and homicides. In Wisconsin, studies have shown that firearm suicide rates significantly increased, particularly among people of color and residents in urban counties, after the policy repeal. **Methods:** Data was obtained from the Froedtert Hospital Trauma Registry and included every incidence of self-inflicted or assaultive injury seen in the trauma department between 2004-2022. Pertinent data included mechanism of injury (MOI), year of injury, and treatment outcome. Analyses were done using SPSS version 26. **Results:** Preliminary results revealed that the frequency of self-inflicted injuries and assaults significantly increased in the years following the 48-hour waiting period repeal. Independent sample T-tests using the seven years leading up to the repeal (2009-2015) and the seven years following the repeal (2016-2022) revealed a significantly higher level of self-inflicted gunshot wounds (GSWs) (M = 18.57, SD = 4.28) and assaultive GSWs (M = 301.43, SD = 103.94) in the years following the

48-hour waiting period law repeal than self-inflicted GSWs ($M = 8.57$, $SD = 3.51$) and assaultive GSWs ($M = 143.86$, $SD = 24.99$) in the years preceding the repeal ($t(12) = 4.79$, $p < .05$; $t(12) = 3.90$, $p < .05$). Using the total trauma population per year, it was determined that the rates of self-inflicted GSWs ($M = 600.38$, $SD = 114.67$) and assaultive GSWs ($M = 9531.19$, $SD = 2168.16$) were significantly higher following 2015 than self-inflicted GSWs ($M = 397.07$, $SD = 157.25$) and assaultive GSWs ($M = 6633.30$, $SD = 837.08$) were in the seven years prior as well ($t(12) = 2.76$, $p < .05$; $t(12) = 3.30$, $p < .05$). **Conclusions:** Since the 48-hour waiting period was repealed in Wisconsin, both self-inflicted and assaultive injuries by firearm treated in one Level I trauma center have significantly risen. Re-evaluating statewide firearm policies could help to curb the growth of firearm-related injuries in the area.

Session 15: Exploring firearm violence prevention strategies and firearm ownership behavior

Sheraton III, November 2, 9:45 AM - 11:15 AM

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1. Reciprocal effects of household firearm ownership on firearm mortality over time

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Background: Firearm mortality (by suicide or homicide) is correlated with household firearm ownership at the population and individual levels; however, the mechanisms leading to this correlation are controversial and not well understood. The public health implications of these associations therefore also remain unclear. In this study, we test whether firearm ownership reliably predicts changes in firearm mortality, or vice versa), thereby establishing one necessary but insufficient feature of the causal relationships between firearm ownership and mortality. **Methods:** We used a novel measure of the rate of household firearm ownership estimated for 16 population subgroups in each state and year from 1990 to 2018. Population subgroups were defined by the cross-classification of four dichotomous factors: gender, race, marital status, and urbanicity. Firearm mortality rates for each subgroup in each state and year were assessed using microdata from the National Vital Statistics System. These measures were used to estimate whether firearm ownership predicts subsequent changes in firearm mortality and whether firearm mortality predicts subsequent changes in firearm ownership within population subgroups. Population-weighted linear regression was used to fit these cross-lagged models, and the bootstrap was used to estimate variability. **Results:** Across 14 two-year periods, we found that strata with higher firearm ownership in any period had larger increases in firearm suicide rates in the next two-year period, averaging over all strata and periods; however, higher firearm suicide rates did not predict meaningful changes in later firearm ownership rates. We did not find strong evidence that strata with higher firearm ownership, on average, had larger increases in firearm homicide rates, but we found that higher firearm homicide rates predicted small reductions in firearm ownership over time. **Conclusions:** We have found reliable temporal ordering between firearm ownership and mortality, such that changes in firearm suicide and firearm ownership can be predicted by earlier rates of ownership or firearm homicides. Although we cannot conclude that firearm ownership is itself a cause of increased suicide rates, our findings are consistent with such a mechanism, and the fact that firearm ownership rates reliably predict elevated suicide rates is a fact members of the public and policymakers should consider when making personal and public policies concerning firearm acquisition or access.

2. Piloting of a brief, motivational interviewing-based lethal means safety counseling intervention for primary care settings

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Background: Firearm injury accounts for 71% of Veteran suicides. While most Veterans suicide decedents are seen in primary care (PC) settings in the month prior to death, most do not receive lethal means safety (LMS)

counseling. Motivational Interviewing (MI) is an effective, evidence-based approach to facilitate behavior change during brief clinical interactions and is a core competency of primary care (PC) clinicians. To date, no LMS counseling interventions have been developed for or implemented in Veterans Affairs (VA) PC settings. The aim of this project was to pilot collect preliminary acceptability and feasibility data about a brief, MI-based LMS counseling for PC settings. **Methods:** Using stakeholder feedback, we developed the first brief (5-8 minute), MI-based LMS counseling approach for high risk Veterans receiving care in VA PC settings. RAMP (Raise the subject, Assess current firearm storage, Motivate change, and Plan next steps) includes an innovative tool to guide assessment of firearm storage practices and uses examples and prompts to develop discrepancy and motivate changes in safety behaviors. We trained 20 PC and PC mental health integration (PCMHI) clinicians at two VA PC settings in the use of RAMP to motivate Veterans' firearm safety behaviors. Four weeks after the training, we elicited clinician feedback through semi-structured interviews and survey data to assess: 1) whether they used RAMP, 2) feedback about the RAMP intervention, and 3) feedback about the RAMP training. Survey data are presented using frequencies and qualitative data were analyzed using rapid qualitative content analysis. **Results:** Of the 20 PC/PCMHI clinicians that completed the survey, 50% (10/20) reported using RAMP in the month following the training and 95% (19/20) reported they felt "more confident" delivering LMS counseling. Of those who did not use RAMP, 80% (8/10) reported the reason was that they did not care for any Veterans during that time period with elevated suicide risk. In qualitative analyses, we found high acceptance of RAMP, with clinicians highlighting RAMP's clearly defined structure, and liking the incremental approach to LMS counseling. Feedback about the RAMP training was largely positive, with clinicians stating both training content and delivery aided their understanding of LMS counseling. Some clinicians expressed concerns about time for both administering and training in RAMP. **Conclusions:** To our knowledge, this is the first MI intervention specifically developed to motivate behavior change during LMS counseling. We found supportive preliminary evidence for further testing the RAMP intervention among Veterans and PC/PCMHI clinicians.

3. Lifetime history of firearm and violence exposure and attitudes and behaviors regarding safe storage and open carry: A person-centered analysis

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Background: Individual and household firearm ownership are common variables examined in relation to firearm-related behaviors and attitudes. We sought to more comprehensively assess firearm ownership by including prior firearm ownership, as well as having been a child in a household with a firearm. We also sought to examine these behaviors and attitudes in relation to respondents' history of witnessing or experiencing firearm violence, as well as other forms of victimization in childhood and adulthood. **Methods:** We surveyed 2,004 adult Americans using the SSRS probability-based web panel. Questions investigated attitudes toward gun policy generally, and safe storage and open carry policies, specifically. We anticipated that firearm and violence exposure would interact in unique ways to predict these behaviors and attitudes. With an exploratory approach, we applied person-centered latent class analysis (LCA) using several exposure indicators to empirically identify unique subgroups of Americans based on patterns of lifetime firearm and violence exposures. Violence exposure indicators included childhood or adulthood exposure to intimate partner violence, community violence, and physical, sexual, and firearm violence. We hypothesized a solution supporting two or more unique subgroups differentiated by patterns of firearm and violence exposures. We also explored whether subgroups were

differentiated by sociodemographic characteristics. Finally, we tested whether identified subgroups were differentiated by behaviors and attitudes related to safe storage and open carry policies. **Results:** While LCA results are forthcoming, preliminary analyses reveal that more than one-third of respondents from non-gun households (35%) report exposure to firearms via previous ownership or their childhood household and 7% of respondents who have never owned or been part of a gun household report having witnessed, been threatened, or experienced firearm violence. Additionally, non-gun household respondents who grew up with guns were more likely to agree with lawful open carry. For respondents currently in non-gun households, childhood gun exposure did not appear to impact support for secure storage; however, having been victimized significantly increased support for open carry (53% v. 35% without any gun exposure). **Conclusions:** Our research suggests that a more comprehensive assessment of lifetime firearm and violence exposure may provide unique insight into firearm-related attitudes and behaviors and should be included in national surveys.

4. **Measuring shootings and other gun violence: A national and local look**

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Background: Both fatal and nonfatal shootings bring about harmful consequences to communities across the country. Designing interventions that prevent or reduce these harms requires knowledge on the prevalence and characteristics of fatal and nonfatal shootings. Unfortunately, current national datasets do not provide a comprehensive picture of fatal and nonfatal shootings, often limiting their measurement to gun violence more broadly. NIBRS, the nation's source of national crime incident data, for example, does not measure how a gun is used in a violent gun crime, only that a gun is present. This presentation describes a project leveraging local law enforcement data, NIBRS, and an innovative methodology to describe characteristics of nonfatal shootings in particular (i.e., where a victim experienced a penetrating injury) versus other forms of gun violence, both at the national and local levels. **Methods:** Using local law enforcement incident data from three geographically diverse cities during 2019-2020, a fuzzy matching procedure was used to merge local gun violence data to the corresponding NIBRS incident record for each agency. Differences on key NIBRS variables for gun-involved aggravated assaults that were and were not shootings were explored. **Results:** In all three sites, nonfatal shootings were less prevalent than other forms of nonfatal gun violence. In one city for incidents in which gun use was known, the most prevalent gun use pattern was a dwelling or vehicle being shot, representing 22% of the gun violence incidents in 2019-2020, followed by pointing or cocking a gun (18%) and shooting a victim (14%). Shooting victims tended to be mostly Black, male, and younger than victims of other forms of gun violence. Shootings occurred more often outside on a street, highway, or sidewalk relative to other forms of gun violence. The injury most often associated with shootings was "other major injury". A number of incident characteristics suffered from missing data, which may present problems when using NIBRS to understand characteristics of gun violence. **Conclusions:** Results from this project demonstrate key differences in where, when and with whom nonfatal shootings occur relative to other gun assaults that can inform targeted interventions and law enforcement responses, including investigations. Importantly, the analyses further demonstrate how local police departments are recording shootings and other gun violence in national statistics. This not only provides a much-needed look at how shootings are currently measured, but also highlights the gaps in measurement that can be improved in future data collection efforts.

5. Fatal and nonfatal firearm injury in the United States, 2019-2020

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Background: Racial disparities in firearm injury death in the U.S. are alarming and well-established. Much less is known about the magnitude of nonfatal and total firearm injury which hinders policy prioritization for prevention. We combine healthcare administrative data with death certificate data to generate novel estimates of the national incidence of total firearm injuries and case fatality ratios (CFR) by intent of injury in various racial and ethnic groups. **Methods:** We conducted a retrospective, cross-sectional study of US firearm injuries, 2019-2020. Fatal injury data were collected from the CDC. Data on nonfatal injuries were collected from the National Emergency Department (ED) Sample, a 20% stratified sample of US ED visits, weighted to provide national estimates. ICD-10 codes were used to classify intent of injury. We tabulated injuries and deaths by race, ethnicity, intent, gender, age group, and urban-rural location. Race and ethnicity were classified into 6 mutually-exclusive categories: Asian or Pacific Islander, Black, Hispanic, Native American, white, other or unknown. Individuals identified as Hispanic were included in the Hispanic group; all other groups are non-Hispanic. **Results:** There were 252,217 total firearm injuries, of which 94,167 (37.3%) were assaults, 95,454 (37.8%) were unintentional, 52,939 (21.0%) were from self-harm, and 3,503 (1.3%) were law enforcement associated. Rates of suicide and self-harm were highest among white people (11.0 per 100,000 in 2020) followed by Native Americans (9.9 per 100,000). Rates of assault and homicide were highest among Black people (77.2 per 100,000), as were unintentional injuries (64.2 per 100,000). Self-harm had the highest CFR (90.9% overall). Native Americans only accounted for 0.7% of total firearm injuries but had the highest CFR for assault (52.3% vs. 25.8% overall) and law enforcement associated injury (53.6% vs. 32.2% overall). Unintentional injuries accounted for just 1,021 (1.2%) deaths but 94,433 (56.4%) of nonfatal injuries. The CFR for unintentional injuries was more than tripled in Native Americans, at 3.5%, and was highest in rural vs. urban areas (2.0% vs. 0.8%). **Conclusions:** From 2019-2020, there was a firearm injury every 4 minutes and a death every 12 in the United States. Racial disparities in firearm injury death are mirrored in nonfatal injury, with CFRs that vary, possibly due to lethality of weapon, shooter skill or intentionality, and/or access to trauma care. To develop effective interventions to reduce harm from firearm injuries, it is essential to assess the full scope of this disease, which requires strengthening public health data collection.

6. Examining characteristics of firearm homicides that occur within the context of acts of random violence, U.S., 2009–2020

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¹Centers for Disease Control and Prevention

Background: In the U.S., acts of random firearm violence is a public health problem. Although these acts are infrequent relative to other types of firearm violence (e.g., community-related), they can affect communities, instilling fears of violence occurring in places that have generally been considered safe (e.g., places of worship). We examined characteristics associated with firearm homicides resulting from random violence using data from CDC's National Violent Death Reporting System (NVDRS), the most comprehensive data available on this topic. **Methods:** Data were from NVDRS, 2009 (the year "random violence" was added in NVDRS and defined as violent acts where the perpetrator is not concerned with who is being harmed, just that someone is being harmed)

through 2020 (the most recent data available); 49 states, the District of Columbia, Puerto Rico were included. Descriptive statistics were used to characterize random violence firearm homicides. **Results:** From 2009–2020, NVDRS captured 77,085 firearm homicides, of which 1,453 (1.9%) were indicated to be acts of random violence. Firearm homicide victims of random violence ranged in age from 1–95 years (median age 30 years), and 80.3% were males. Black, non-Hispanic (NH) persons accounted for 50.8% of victims; followed by White, NH persons (26.2%); Hispanic persons (17.3%); and Asian or Pacific Islander, NH persons (2.4%; all other groups <2.0%). Almost one-fifth (17.3%) of firearm homicides involving random violence included 2+ victims (range: 2–58 victims). Firearm type was known in 53.6% of firearm homicides involving random violence, of which 83.2% were handguns, followed by long guns (e.g., rifles, shotguns, miscellaneous long guns, etc. [16.7%]); 37.7% were semi-automatic and 0.5% were automatic. Perpetrator information was known in 68.3% of firearm homicides involving random violence. Among known perpetrators, the majority (74.8%) were male; few were suspected of using alcohol (3.6%) or a substance(s) (4.7%) hours preceding the incident. The perpetrator had contact with law enforcement within the past 12 months in 8.7% of incidents; the perpetrator's attack was believed to be the direct result of a mental health problem in 4.1% of firearm homicides involving random violence. **Conclusions:** Although random violence is defined by random selection of victims, perpetrator risk factors and motivations may show patterns. Ongoing qualitative analysis of these data will enhance accuracy and completeness of cases of random violence in NVDRS and provide insights about perpetrators' motivations and other precipitating circumstances. Violence is preventable; understanding the characteristics of random violence can help develop, inform, and support prevention efforts.

Session 16: Exploring firearm access, carriage, and storage

Sheraton I, November 2, 12:45 PM - 2:15 PM

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1. Firearm carrying and storage practices vary based on recency of purchase: Results from nationally representative surveys of Black and AI/AN adults

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Background: Beginning in early 2020 and escalating through the COVID-19 pandemic, the US saw an unprecedented rise in firearm sales, with first-time purchases driven disproportionately by persons of color. It remains unclear, however, to what extent more recent firearm purchasers store and carry their firearms differently and to what extent these patterns vary based upon racial identity. **Methods:** Leveraging KnowledgePanel, a probability-based panel of US adults, we recruited nationally representative samples of Black (n = 2,990) and American Indian/Alaskan Native (AIAN; n = 526) adults. Sample weights were computed by Ipsos to optimize representativeness. Data were collected April 12-May 4, 2023. **Results:** Meaningful portions of Black (8.6%) and AIAN (13.4%) adults endorsed having purchased firearms since March 2020 (surge purchasers). Among both Black and AIAN firearm owners, surge purchasers carry their firearms, store their firearms loaded, and store their firearms unlocked in their vehicles more frequently than non-surge firearm purchasers. Among Black and AIAN surge firearm purchasers, established firearm owners (vs first time firearm owners) carry their firearms and store their firearms loaded more frequently. Results differed more between the Black and AIAN samples when comparing past year purchasers (since March 2022) to other firearm owners. Among Black firearm owners, past year purchasers store their firearms in a locked location and store them unlocked in their vehicles more frequently but store them at home less frequently. Among AIAN firearm owners, past year purchasers carry their firearms more frequently, but store them at home and in a locked location less frequently. **Conclusions:** These results align with prior research demonstrating increases in firearm purchasing among minoritized communities. Furthermore, the results highlight that individuals who have purchased firearms more recently (since March 2020) generally demonstrate a greater tendency to carry their firearms away from home and to store them loaded and unlocked. This concerning pattern was particularly true for those established purchasers procuring additional firearms in recent years relative to those who became first-time firearm owners during this time. Given elevated rates of firearm injury and death in both Black and AIAN communities and the established connection to firearm access, carrying, and storage, the urgency of promoting secure firearm storage and discouraging frequent firearm carrying is clear. The greater tendency towards unsafe firearm behavior among those with more recent purchases highlights the potential preventative value of incorporating such promotional efforts at the point of sale.

2. Pilot implementation of a hospital security program for promoting secure storage of firearms

M. Kit Delgado MD MS¹, Terrence Betsill², Bryan Anthony², Vivek Ahya MD MBA¹, Jeremy Souder MD MBA¹, Evan Spencer MS¹, Aria Xiong MS¹, Jessica Hemmons MS¹, Laurel Adams MBA¹, Krishleen Kaur MS³, Maya Childs¹, Katelin Hoskins PhD MBE CRNP³, Elinore Kaufman MD MSHP¹

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Background: Due to high-profile incidents of violence within medical settings, health systems have prohibited carriage of firearms within their facilities. In November 2021, a hospital in our urban academic health system implemented a high throughput weapons detection system in hospital entrances and associated medical office buildings. For individuals who self-disclose they are carrying a weapon, or who are identified with a weapon during screening, security guards offer the individual the option to leave with their weapon, or to place it in a safe at the hospital for storage. Security guards return the weapon when the visitor is ready to leave. Our multidisciplinary team of injury prevention researchers, security, and hospital leadership piloted a program in the context of routine operations in which security guards offer a cable lock and safety brochure when the gun owner returns to retrieve their firearm at the conclusion of their visit. We report the uptake rate of cable locks during the first 4 months of this program. **Methods:** Our team developed a brief script for hospital security guards to engage firearm owners retrieving their firearm from the security office. The script said that our health system cares about promoting responsible firearm ownership and that we offer free cable locks and a brochure on firearm storage. Security guards recorded whether the lock was taken during each encounter. We tabulated the proportion of encounters and unique individuals who took home a cable lock. **Results:** Over the 4-month period there were a total of 288 encounters in which a firearm was stored and retrieved on site, of which 210 had complete data on whether a cable lock was taken. Of the 210 encounters with complete data, 95 (45.2%) resulted in a cable lock being taken home by the firearm owner. Among the 210 encounters, there were 188 unique individuals since 31 (17.8%) of encounters were repeat visits. Of the 188 individuals, 89 went home with a cable lock indicating an uptake rate of 47.3%. **Conclusions:** We demonstrated a novel and feasible approach to promote firearm safety engagement and distribution of secure storage devices within the context of routine health care operations. Research in progress will elicit barriers and facilitators to program implementation through interviews with security guards and will pilot test methods to assess use of cable locks. Given increased use of weapons screening at building entrances, this program has potential for impact at scale.

3. Firearm safety attitudes and beliefs among rural firearm owners with children

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Background: Safe firearm storage is an evidence-based injury prevention strategy (1) yet many families with children maintain unsecured firearms (2) and this is particularly true in rural areas (3) where there are high rates of firearm ownership (4) and unique considerations regarding the role of firearms in family life (5). According to health behavior change theories,(6, 7) attitudes and beliefs are key mechanisms by which educational interventions promote change, yet important questions remain regarding how firearm-related attitudes influence storage decisions and whether such attitudes are malleable to safety education. The aims of this study were to describe firearm safety attitudes in a small sample of rural firearm-owning parents prior to and after participation in a pilot study of a culturally tailored safe storage prevention strategy. **Methods:** Participants (35% male, 65% female; 98% Caucasian, 5% Native American) were 45 residents of one rural county who owned at least one firearm and had a child under 18 living at home. Parents completed an online baseline survey, engaged with the Store Safely intervention, and completed an online follow-up survey 2-4 weeks later. Items from the Firearm Safety in Children and Teens (FACTS) National Survey-Parent Edition (8) and the Firearm Belief measure (9) assessed attitudes and beliefs hypothesized to impact storage decisions. **Results:** At baseline, parents reported a moderate level of concern that their own or another child could access or be hurt by a firearm in the

home (M=3.02, SD=1.33, range 1= “not at all” to 5 “a major concern”); concerns decreased significantly post intervention ($t(42)=2.13$, $p=.039$; M=2.76, SD=1.34). Parents also rated the importance of a variety of safety behaviors (range=1 “should not be done” to 4= “essential”), including keeping firearms locked and unloaded, as well as taking safety courses and communicating with children about safety. Scores demonstrated a significant increase ($t(42)=-3.65$, $p<.001$) from baseline (M=3.43, SD=0.41) to follow-up (M=3.61, SD=0.36). Parents were also asked about perceived risks of suicide, homicide, or unintentional injury related to firearm ownership and storage, with no significant changes from pre to post intervention. Additional analyses will explore relations between specific attitudes and firearm storage choices pre and post intervention. **Conclusions:** Theoretically-based interventions that attend to attitudes and beliefs in order to culturally tailor safety messages and promote safe storage may have promise in reducing firearm-related injury and mortality.

4. Using panel surveys to collect data on firearm storage safety and practices

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Background: Firearm violence is a serious public health problem. Firearm homicides increased 45% from 2019 to 2021, and compared to 2019, emergency department visits for nonfatal firearm injuries were 37%, 36%, and 20% higher in 2020, 2021, and 2022, respectively. Nationally representative data on the presence and storage of firearms in U.S. homes are limited. Web panel surveys provide an opportunity to collect nationally representative data for health topics where timely data are critical. Recruited, probability-sampled, commercial survey panels are increasingly being used to supplement data collected using traditional “gold-standard” survey methodology, particularly in the face of urgent public health issues. **Methods:** CDC’s Division of Violence Prevention collaborated with the Division of Research and Methodology at the National Center for Health Statistics to add firearm ownership and safety questions to the seventh round of the Research and Development Survey (RANDS 7), administered by NORC. Questions covered firearm storage practices, type of firearm owned (e.g., handgun, long gun), and purpose for owning a firearm (e.g., protection, hunting/sport). In the fall of 2022, 10,320 AmeriSpeak panel members were sampled into the RANDS 7 survey. Of these, 6,821 completed the survey for a completion rate of 66.1% and a cumulative weighted response rate (taking into account panel recruitment and attrition) of 12.5%. RANDS 7 data are weighted and calibrated to the National Health Interview Survey using relevant sociodemographic and health variables. **Results:** Preliminary analysis shows that 37.9% of adults reported having a firearm in the home, with 82.4% reporting owning a handgun and 73.0% a long gun. Common reasons for owning a firearm included protection (77.2%) and hunting/sport (47.8%). The proportion of adults reporting a firearm stored in their home varied across groups, including 55.7% of active-duty military respondents, 38.3% of adults who reported suicidal ideation, 50.2% of those who reported having a housemate with dementia, and 37.4% of adults with a child in their home. Finally, 37.9% of those with a firearm in the home reported at least one firearm was loaded, and among those, 56.2% reported that a loaded firearm was kept unlocked. **Conclusions:** Panel surveys can provide timely data to meet urgent public health needs. With increasing trends in firearm injuries and deaths, improved understanding of household firearm storage could help inform and tailor messages and programs to enhance secure storage practices to reduce unauthorized firearm use.

5. Older adult firearm owners with early signs of cognitive impairment: Development of a primary care decision support tool to improve firearm safety

Laura Prater PhD¹, Rachel Ross MPH¹, Ali Rowhani-Rahbar MD PhD¹, Ayah Mustafa BS¹, Elizabeth Phelan MD

MS¹

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Background: Certain conditions, prevalent among older adults, including mild cognitive impairment (MCI) and depression, place them at high-risk of firearm suicide. Approximately 40% of older adults either own a firearm or live with one in the home - many do not store their firearms safely. Safe firearm storage is associated with reductions in firearm suicide. Guided by the Ottawa Decision Support Framework (ODSF), Fuzzy Trace Theory, and the Interpersonal Theory on Suicide, we explored desired resources for education and decision-making on firearm safety to develop a decision support tool for older adults with MCI or depression. **Methods:** During March-August 2022, we conducted 20 semi-structured interviews with older adult patients with MCI and/or depression who own firearms or live with them in the home. Interview questions centered on key concepts from the ODSF for development of a decision support tool focused on educating and improving firearm safety and the Interpersonal Theory of Suicide. We report themes aligned with the ODSF and theoretical constructs; emergent themes are reported to inform the implementation of this tool in primary care. **Results:** Older adult firearm owners with MCI and/or depression express a desire for information in the form of statistics embedded within stories delivered from reliable and trustworthy messengers such as law enforcement officers, physicians, and peers with firearm experience. Decision needs include information on the pros and cons of the different firearm storage options and/or how to properly relinquish ownership of firearms. Participants report concerns about being a burden on loved ones, and half (n=10/20) mention taking action to be less of a future burden to loved ones (e.g. long term care research, financial planning). **Conclusions:** The development and implementation of a shared decision-making support tool in the primary care setting is acceptable and desired by older adult patients with MCI and/or depression who have access to firearms. Using themes from the interviews we have developed a decision support tool for patients including four videos of simulated scenarios on firearm safety and suicide prevention, featuring trusted sources for firearm education. Assessing and addressing firearm safety in primary care is critically important for older adults with MCI or depression and access to firearms. Next steps include the implementation of our tool in primary care, testing for improvements in firearm storage and reduction in decision conflict.

6. A good neighbor with a gun? Experiments on preferences for social proximity and interaction

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Background: Expressing one's constitutional rights should not, and typically does not, threaten people's lives. The notable exception is gun ownership. However, pro-gun organizations like the National Rifle Association claim that guns are pro-social because an armed society is a polite society and guns create safer, more secure communities. Is this claim genuine, or does it belie a darker understanding of the dangers of gun ownership? This study investigates whether pro-gun groups (e.g., gun owners, Republicans) and the American public are comfortable with gun-owning neighbors and their gun storage practices. **Methods:** We conducted two preregistered survey experiments with a national sample of US residents. One was a conjoint analysis that tested how a potential neighbor's gun ownership status (e.g., owns an AR-15) affects preferences for having them move nearby (Study 1; n1 = 33,596 choices, n2 = 2,105 respondents). The second was a picture-based factorial vignette that tested how a neighbor's gun storage practices affect respondents' willingness to socialize with them (Study 2; n = 2,098). **Results:** Our ongoing analysis reveals that Americans prefer not to live near neighbors with guns,

particularly AR-15s. Participants also do not want to associate with neighbors who have loaded and unlocked guns in their homes. Similarly, we find that pro-gun participants prefer not to have neighbors with AR-15s, and do not want to associate with neighbors who have loaded and unlocked guns in their homes. **Conclusions:** The experimental results expose a previously hidden awareness of the dangers of gun ownership among pro-gun groups. Our findings contribute to ongoing policy discussions about balancing individual gun rights against harms to social cohesion and heightened risks of injury, homicide, and suicide. Our research contributes to the growing literature on the socialization of gun culture, formation of residential preferences, and the role of political polarization in social proximity.

Session 17: Vicarious trauma and intimate partner violence: Understanding interventions

Sheraton III, November 2, 12:45 PM - 2:15 PM

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1. From vicarious trauma to trauma-informed methodologies: Preparing research teams for the study of firearm-related harms

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Background: When examining firearm-related harms, researchers must attend to both the traumatic experiences of study participants (e.g., survivors of firearm violence and first responders) and the impact of exposure to traumatic material on the research team. Vicarious trauma refers to the cognitive and affective impacts of being exposed to trauma at work. While vicarious trauma has been frequently studied among practitioners, little is known about the effects of trauma exposure on researchers. The Preventing and Assessing Intimate Partner Homicide Risk Studies (PAIRS), a national intimate partner homicide study, designed and examined policies and practices to create a trauma-informed research team. **Methods:** The team examined both their vicarious trauma policies and their trauma-informed training practices. In the first exploratory study, PAIRS examined if and how research assistants (RAs) were affected by reading homicide case files, how they took care of themselves while working, and how the policies supported their well-being. Eleven RAs participated in focus groups and interviews and answered a quantitative survey about their experiences. Data were analyzed using thematic analysis and descriptive statistics. We then examined our training on trauma-informed interviewing methodologies. The interview team underwent an initial 12-hour training on the interview guide, trauma, and trauma-informed interviewing, and completed approximately 10 hours of practice interviews and data abstraction. All team members also observed participant interviews and participated in continuing education sessions on trauma, interviewing skills, and cultural competency. Pre- and post-tests were used to assess changes in confidence and knowledge. **Results:** Findings from our qualitative examination (n=11) indicate the vicarious trauma policies were core to team members' well-being. Participants reported that formal team supports, including regular and meaningful contact with supervisors, working in team settings, taking time off, and checking-in/checking-out of data collection normalized a culture of self-care and validated researchers' struggles with traumatic material in their research. Preliminary quantitative analysis of the efficacy of the interview training indicates that confidence in handling trauma responses from respondents improved and knowledge of vicarious trauma expanded. **Conclusions:** Findings indicated the trauma-informed policies, and the related informal team dynamics, were core to promoting RA's well-being. It is imperative that future studies proactively promote vicarious resilience among team members to ensure sustainable and accurate data collection, prevent RA burnout, and to effectively train future researchers to sustain their work throughout their careers.

2. Suicide and intimate partner violence among US youth, 2014-2018

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Background: Among young people, IPV victimization and perpetration are both associated with elevated risk for suicidal ideation and self-harm, yet no national datasets comprehensively document the connection between IPV and suicide. To address this critical gap, we sought to identify the proportion of suicides for which IPV

victimization and/or perpetration was a potential precipitating factor among young decedents and to characterize IPV as described in available death narratives, including what proportion of IPV-related suicides among youth used a firearm. **Methods:** We used 2014–2018 data from the National Violent Death Reporting System (NVDRS) with known circumstances from 38 US states, Puerto Rico, and Washington, DC (N=29,702 cases). We manually reviewed death narratives from suicides among decedents ages 7–24 years where NVDRS abstractors had already noted the presence of IPV, intimate partner problems, stalking, or jealousy (n=3,859 cases) to focus on cases with possible IPV. We used the Centers for Disease Control and Prevention’s definition to code IPV circumstances (yes/no). We characterized whether the narratives reported a history of IPV perpetration and/or victimization, whether a firearm was used, and types of abusive tactics described in the narratives. After all coders abstracted 80 cases together to reach agreement, 10% of all narratives were double-coded, with evidence of substantial inter-coder reliability (Fleiss $\kappa=0.70$). **Results:** We identified 883 suicides with IPV circumstances, suggesting that IPV circumstances were present in 5.7% of suicides for this age group. Among suicide decedents with IPV circumstances, 19.1% were female and 80.9% were male. Most IPV-related suicides were not connected to other fatalities (93.5%); 6.5% were connected to homicide(s). In 80.1% of IPV-related suicides, narratives indicated that the decedent had perpetrated IPV before death; 17.6% indicated the decedent had experienced IPV victimization directly and/or as a corollary victim. Most (61.7%) IPV-related suicide decedents used a firearm, a significantly higher proportion than in non-IPV related suicides (44.0%, $p<.001$). Results suggested 50.2% of IPV-related suicide decedents threatened suicide before death, and 30.7% threatened suicide in a coercive manner towards an intimate partner. **Conclusions:** Findings underscore the critical need for research that assesses IPV as a precipitating factor for suicides. Considering comprehensive approaches to prevent both IPV and suicidality among young people is an important focus for future research and practice, including consideration of how firearm access interventions could de-escalate risk for both interpersonal violence and self-directed harm.

3. The role of IPV in firearm suicide: A cross-sectional study using natural language processing and machine learning

Julie M. Kafka PhD¹

¹University of Washington

Background: Almost half (46%) of men who kill their female intimate partner with a gun die by suicide within 24 hours of the homicide event. Researchers agree that in the context of heterosexual IPV, male perpetrator firearm access and recent suicide threats are among the strongest indicators for homicide lethality risk. Scant research, however, has been conducted to examine whether male IPV perpetrators are at-risk for using firearms to die by suicide in the absence of homicide. We sought to examine the prevalence of firearm use as the lethal method among men of all ages with IPV involvement who died by suicide. **Methods:** We used suicide data from the National Violent Death Reporting System (NVDRS, 2015-2019, n= 100,820 male suicides), including homicide-suicides and isolated suicide events. We used incident-level information, leveraged prior textual review of death narratives (see Paper 2), and applied a validated supervised machine learning tool to ascertain IPV circumstances for suicides. IPV circumstances were recorded as yes/no; prior research suggests that most men who die by suicide with IPV circumstances had a history of IPV perpetration, although we were not able to confirm each male’s role in the abusive relationship for the present study. Next, we used logistic regression to determine whether IPV circumstances were associated with firearm use as the suicide method, controlling for demographics (e.g., age, race, ethnicity, marital status, educational attainment) and situational factors (e.g.,

mental health circumstances, depression, incident type). **Results:** Among men who died by suicide, IPV circumstances were associated with 1.89 times the odds of firearm use as the lethal method compared to other methods (95% confidence interval: 1.77, 2.02). **Conclusions:** Suicidal men in an abusive relationship may be inclined to use a firearm to fatally attempt suicide, more so than any other method. Comprehensive approaches to address IPV and firearm suicide may be appropriate, including trauma-informed abuser intervention programs that incorporate safe firearm storage messaging. Findings also highlight the need to ensure thorough implementation of IPV perpetrator firearm restriction policies to prevent isolated suicide deaths in addition to preventing homicide.

4. Silent suffering: Understanding the experiences of Black caregivers of violently injured men

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Background: Young Black men aged 15-34 experience the disproportionate burden of violence-related death and injury, largely due to firearms. They experience 10 times more gun homicides and 18 times more non-fatal firearm injuries, than white Americans. The responsibility to support survivors often falls on Black women caregivers. However, the literature centering the experiences of these caregivers is sparse. **Methods:** This paper utilizes a case study approach focusing on the experiences and intersectionality of 8 Black caregivers who were supporting Black men that sustained a non-fatal violent firearm injury. Data was collected between 2017-2018 using focus groups with Black caregivers, who were overwhelmingly women, to understand their experience within this role. **Results:** The findings suggest four novel themes that capture the experience of Black women caregivers: 1) vicarious trauma, 2) emotionally disconnected, 3) the need for support groups 4) medical education regarding the physical and mental needs of gunshot survivors. **Conclusions:** The findings illuminate the challenges of caring for male gunshot survivors and caregivers' needs. This case study demonstrates the importance of hospital-based violence intervention program social workers and their role in supporting caregivers of young Black male gunshot survivors. Suggestions for efficient social work services are also offered.

5. Identifying early life experiences and community resources in Philadelphia, PA that shape firearm carriage, criminal legal interactions, and violence

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¹University of Pennsylvania, ²The Campaign for the the Fair Sentencing of Youth, ³G.R.O.W.N., ⁴Children's Hospital of Philadelphia and the Health Alliance for Violence Intervention

Background: Risks associated with urban firearm violence are highest among young males, individuals of color, and in low-income communities. These risks are often presented without local and sociohistorical context, limiting actionable knowledge on the dynamic and modifiable nature of factors that underlie risk. Understanding opportunities for firearm violence reduction by integrating a life course perspective is key to developing a better understanding of what drives firearm crimes and victimization. The purpose of this study is first, to identify lived experiences that contribute to firearm purchase, carrying, and use in individuals with a history of arrest for firearm-related crimes. Second, it describes how these individuals perceive their lived environment and the impact of local municipal, health, and social services in decisions to acquire, carry, and/or use a firearm. **Methods:** This qualitative study uses a thematic analytic approach, with data derived from in-depth

semi-structured interviews with 10 individuals arrested for any firearm-related crime in Philadelphia, PA since 2012, and who lived in the city during both childhood and adulthood. Potential participants were recruited and responded to informational flyers distributed through city parole and probation offices and via community-based organizations and networks that interface with individuals in the aftermath of violence and incarceration. Demographic data were analyzed descriptively. Interview transcripts were coded using apriori domains of interest to develop an overarching thematic schema. **Results:** 10 individuals completed interviews. Participants reported histories of arrest for firearm-related crimes from 7 months to 12 years prior to interview. All participants self-identified as Black or African American and were a mean age of 44 years (28-59). 80% experienced jailing/incarceration for a firearm-related crime and were released between 1 and 8 years prior to interview. 30% experienced a previous firearm injury. Qualitative themes include 1) pervasive childhood traumas, notably early parental loss, and housing insecurity 2) ubiquity of firearms in social environments, encouraged for personal protection, or for organized criminal activity 3) schools as a core public institution that supported either mentorship or loss of trust in adults, and 4) the desire for more resources in adulthood for mental health, and for community investments in pro-community policing, youth programming, employment, and financial literacy training. **Conclusions:** Individuals with prior firearm-related arrests describe a combination of childhood trauma, exposure to firearms, and public resources that don't sufficiently provide opportunities and address past trauma. Identifying these gaps can inform short and long-term preventative approaches that reduce risks associated with firearm violence.

6. Firearm threat among community women experiencing intimate partner violence: What day-level factors increase risk

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Background: Women experiencing intimate partner violence (IPV) have a greater prevalence of firearms in their homes than the general population. While the majority of firearms and IPV research has focused on homicides, firearms also are used frequently in non-lethal ways to threaten, coerce and intimidate women. Extant IPV-firearms research is further limited - it is largely retrospective and cross-sectional. No studies on firearms have assessed the experiences of women who experience IPV at the micro-longitudinal level (e.g., daily). Micro-longitudinal data afford the opportunity to elucidate lived-experiences at the day level and identify proximal factors that increase risk for or protect against firearm threat. This exploratory study aims to fill these gaps. **Methods:** Using a micro-longitudinal design, 243 women who experienced physical or psychological IPV with their current partner participated in a baseline assessment and then completed once-daily assessments for 90 days. Person-level data from the baseline assessment are summarized to characterize explicit and implicit firearm threat. Day-level data (16,104 responses) are nested within person; A series of multilevel regression models were estimated to assess whether 14 day-level factors including IPV victimization, women's level of fear, relationship dissolution and calling the police were associated with firearm threat. **Results:** Person-level data from the baseline assessment reveal that 15.2% (n = 37) of the sample experienced explicit or implicit firearm threat by their current intimate partner prior to study entry and 34.2% (n=83) experienced explicit or implicit firearm threat by any intimate partner over their lifetime. With only one exception, findings of multi-level models reveal significant, positive bivariate relationships between risk factors and the likelihood of firearm threat – with the largest standardized association being 0.61 (access to a firearm) and the smallest being 0.07 (being stabbed and sexual IPV). The non-significant finding was between relationship dissolution and firearm threat.

Conclusions: Multiple factors are significantly associated with increased risk that participants experience explicit or implicit firearm threat - though several of these factors raise risk substantially more than others. Findings highlight factors to attend to in victim advocacy and safety planning and potentially inform future research regarding risk assessment at the day level.

Session 18: Assessing impact of communications around firearm injury prevention

Erie, November 2, 12:45 PM - 2:15 PM

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1. Firearm violence prevention through a communication and partnership lens

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¹CDC

Background: CDC's National Center for Injury Prevention and Control has been the public health authority on violence and injury prevention for nearly 30 years. The health information published by CDC is based on the best available evidence to prevent violence. To achieve violence prevention objectives, it is imperative that CDC's messages, language, imagery, and assets are tested and tailored to reach each intended audience, and to produce useful, culturally-responsive resources for partners and communities. **Methods:** Grounded in communication science, CDC has been undertaking formative research to identify messages and strategies to reach key audiences with deeper, actionable information related to critical topics like prevention of firearm injury and death and community violence. CDC's Division of Violence Prevention (DVP) has engaged in literature reviews, key informant interviews, focus groups, message testing, and media content analysis around firearm injury prevention. **Results:** CDC will share findings from the formative research, communication products, and next steps. The results of the formative research activities have shifted communication messages and strategies to meet the needs of diverse audiences, including the general public, impacted communities, public health practitioners, and researchers. As a result of the literature reviews, key informant interviews, focus groups, message testing, and media analysis, DVP has incorporated new and refined prevention messages and content for high-level presentations at conferences, meetings, and policy briefings. It has also supported communication messaging rollout for peer-reviewed firearm violence prevention publications, responses to media inquiries, and web and social media content development, including new web pages on firearm homicide and suicide data. DVP is currently in the process of developing a series of videos, infographics, and other communication material and more in-depth message testing with diverse audiences. **Conclusions:** Preventing death and injury from firearms requires effectively disseminating information on prevention strategies and surveillance data. Dissemination is strengthened when messages around preventing firearm injury and death are tailored to specific audiences. Utilizing already tested messages and adapting communication material supports efforts to reach audiences effectively. Additionally, partner participation across multiple sectors can increase their collaboration in addressing firearm injury and death and community violence prevention.

2. Preferences for firearm safety messaging among firearm-owning parents and caregivers: An audience-centered perspective

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Background: There is an immediate need to effectively curb the firearm injury epidemic in the United States and communication campaigns are needed as one prevention strategy. By employing audience-centered approaches, campaigns can be effectively designed to address the specific needs of firearm-owning parents and caregivers, thus promoting firearm safety and ultimately preventing injuries. Thus, the primary objective of this study was to examine the preferences of firearm-owning parents concerning messaging approaches related to firearm safety.

Methods: This qualitative study utilized three online focus groups comprising 14 participants, who were recruited through purposive and snowball sampling methods. The sample represented a diverse range of characteristics, including age, gender, race/ethnicity, number and age of children, and geographic location. Participants were presented with examples of statistical, anecdotal, and analogical messages and were asked to share their opinions and perspectives on these messaging approaches in relation to firearm injury prevention. The study explored participants' views on visual elements in campaign development. Data analysis employed a hybrid inductive/deductive thematic analysis approach. **Results:** This study reveals a preference for anecdotal and analogical messages over statistical evidence, highlighting the importance of providing context and political neutrality in statistical messaging. Concerns about the misuse and overuse of statistics in public health campaigns are raised. Anecdotal messages are favored for their relatability and emotional impact, but caution is advised against fear-based messaging. Analogical messages are endorsed for their logical flow, with comparisons such as "curious children getting into things they shouldn't" and firearms as tools being effective. Participants also discussed colors and symbols, with "safety orange" symbolizing caution and visibility, and symbols representing children, parents, families, and safety being endorsed. Finally, gun shops and schools are identified as potential campaign settings, while opinions on pediatrician offices were mixed among participants. **Conclusions:** These findings offer valuable insights that can inform the development of impactful firearm safety campaigns specifically tailored to meet the needs and preferences of firearm-owning parents. By understanding parents' preferences for anecdotal and analogical messages over statistical evidence, campaign designers may focus on creating narratives and utilizing analogies that resonate with parents' experiences and values. Additionally, considering participants' recommendations for colors and symbols can contribute to the creation of visually engaging and meaningful campaign materials. By incorporating these audience-centered insights, campaign designers can ultimately promote responsible firearm practices and ensure the safety and well-being of families and communities across the nation.

3. **Data listening sessions: A tool for community-based participatory research design and dissemination**

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Background: Engaging community as partners in design and implementation is key to the success of interventions to reduce the burden of firearm violence, as community members provide lived experience, content expertise, and local context that academic researchers frequently lack. As well, data and findings generated from academic studies often find their way into scientific journals and policy reports that are not accessible to members of the community that serve as research subjects. One proposed solution addressing both of these dilemmas is a "Data Listening Session": a structured forum in which focused data presentations are jointly reviewed by community members, service providers, and researchers in a small group setting. **Methods:** Discrete data stations are toured in small groups similar in style to academic meeting 'poster sessions', followed by facilitated group discussion, and concluded with group reports to the broader audience. Group facilitators steer discussion towards exploring the resonance, relevance, and actionability of the data presented. Dedicated group note-takers ensure record-keeping and qualitative data collection. Specific group requests for additional data elements and analysis are distilled, and serve as action items for subsequent sessions. These sessions can be flexibly scaled, tailored to available resources, and adapted to focus on awareness-raising, advocacy, and policy development. **Results:** The Mississippi Violence and Injury Prevention coalition hosts an annual firearm violence summit focused on linking community, hospital, and wider healthcare solutions to firearm violence in

the greater metropolitan area of Jackson, Mississippi. Invitations to the inaugural 2023 summit were extended to 223 participants. Data sources include firearm injury incidence data collected from city government and local trauma center registry sources, intervention statistics from local violence interrupter groups, and census tract-level structural data from the CDC Social Vulnerability Index, the United States Census Bureau, and the American Community Survey. Outcomes from the summit include a community-based organization referral database for linkage to hospital providers, a community data request task list for researchers, and on-going community engagement in violence prevention. **Conclusions:** Data listening sessions: 1) provide an honest and reciprocal platform for on-going partnership, 2) allow stakeholders and individuals with lived experience to meaningfully shape intervention design and analysis, and 3) maximize the likelihood of efficacy and sustainability of interventions. Data listening sessions can serve as powerful tools for data validation, micro-dissemination, and community empowerment.

4. Does the messenger matter? A survey experiment to understand citizen support for secure storage policy in America

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Background: In US, policymakers, advocates, and opponents use the public arena to communicate policy to various constituents including voters. In doing so, each frames their communications according to their audience. This often centers a conversation around a desired outcome. Despite our knowing that framing exists, we know little about how frames operate in the policy process. We will run a survey experiment to improve our understanding of “if” and “how” presenting gun policy from a known trusted messenger; a permissive gun advocacy group such as the NRA; a government agency like the CDC; or as “common sense” impacts a person’s policy support. We will also seek to understand whether or not the effect varies by issue salience (e.g., in this case, how important gun access or gun control is to the focal person). **Methods:** We will embed survey experiments within a larger questionnaire (administered via Gallup, Inc.) to a national, web-based survey panel of 1500 American adults. The survey will be fielded in late June or early July of 2023. We will experiment with different messengers as it relates to support for secure firearm storage, ERPOs, and permitless carry. We will also collect measures of general attitudes and behaviors related to firearm exposure (e.g., presence of firearm in the home, firearm ownership, firearm storage behavior, support and opposition for potential firearm policies) social and political variables (e.g., partisanship, ideology, economic outlook, and religiosity), support or opposition to potential firearm policies (e.g., Child Access Protection, permitless carry, ERPO), and respondent demographics (e.g. age, education, urbanicity, income, race). Results/Outcome: Results will be calculated once data has been collected and transferred to us. We will calculate if and by how much policy support varies based on the messenger. We will also use linear regression to understand if certain respondent characteristics predict policy support (or lack thereof). **Conclusions:** This study can aid in identifying messengers citizens trust to deliver important safety information. Governments require partners to disseminate policy information and reinforce policy efficacy to citizens. Identifying trusted messengers throughout the population can inform the communications and dissemination strategies of life-saving information and, hopefully. Our goal for this project is to understand which messengers of secure storage, ERPO information, and permitless carry policies are best received by the American general public as a whole, and gun owners specifically.

5. Activating gun owners for gun safety

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Background: Where are the commonalities among all Americans, gun owners and nonowners alike, around issues of gun safety and gun violence? How can we develop new language that engages both sides? Brady, the Gun Safety Alliance and Alter Agents conducted this study to find out; testing different versions of gun safety messaging between these two groups to determine the communications and messaging that best resonated, and which groups would be most receptive to it. **Methods:** Methodology for the project included an online survey to gauge attitudes toward gun safety attitudes and messaging was fielded among a nationally representative sample of 3,001 US adults 18+. Respondents included N = 2011 gun owners (including n = 344 NRA members) and N = 1,000 non-owners. Online ads were developed based on the messaging tested and ran online after the Uvalde shootings. 60MM online ad impressions were served across publishers using 22 different messages which allowed the team to test hypotheses surrounding which messages would resonate online. Advertising creative efficacy was measured using a variety of key performance indicators (KPIs) including clickthrough rates (CTR), video view through rates and engagement with the ads. **Results:** Findings from the study indicated that a large majority of both gun owners and non-gun owners agree that it's important for people to know about gun safety. Over nine in ten gun owners and non-owners agree that gun safety is the responsibility of all gun owners. Sixty percent of gun owners and 77% of non-owners view gun violence in the U.S. as extremely or very serious. Gun owners generally agree that gun safety training and programs can prevent accidents and improve safety. In addition, more than half of non-gun owners (61%) and nearly half of gun owners (44%) would support well-known companies taking a stand on decreasing gun violence. Complete results of the study were published and publicized in a white paper entitled "Responsibility as Common Ground" earlier this year. **Conclusions:** These commonalities and shared beliefs indicate that there is an opportunity to work together to educate Americans on specific gun safety measures. There is language, messaging and framing around common sense gun safety laws and practices that appeals to a majority of Americans - including gun owners. Data from the study will help align our conversations, promote common purpose, and inspire effective action to reduce gun violence in the United States.

6. Community awareness of acoustic gunshot detection systems in Washington, DC.

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Background: To counter urban gun violence, over 100 municipal governments in the US have adopted acoustic gunshot detection systems (AGDS) which seek to automatically detect gunfire and facilitate timely interventions by law enforcement and pre-hospital services. While municipal leaders do not routinely advertise these systems to the public, the media occasionally reports on this surveillance technology; however, it is unknown to what degree the public is aware of AGDS. Therefore, the purpose of this pilot study was to measure AGDS community awareness and attitudes, and explore the association of this community awareness with gun violence indicators in a major US city. **Methods:** We conducted a cross-sectional, non-representative survey between 11/30/2022-4/6/2023 of adults presenting to the emergency department of a level-1 trauma and academic medical center (70,000 visits/year) in Washington, DC. Survey items measured awareness of AGDS, attitudes

towards AGDS, and demographics; responses were analyzed using descriptive statistics. We used multiple linear and logistic regression analysis at the US census level to explore the associations between AGDS community awareness and: counts of AGDS events and proportion of gun-related crimes recorded by the DC Metropolitan Police Department, respectively. Socioeconomic variables from the 2017-2021 American Community Survey controlled for community-level risk factors for gun violence. **Results:** We screened 418 individuals and 228 (54%) met eligibility criteria and consented to participate. Participants had a median age of 41 years and most were female (58%), African American (53%), possessed health insurance (94%) and resided in all eight wards of DC; 24% of respondents were aware of AGDS. When asked about AGDS as a tool to address urban gun violence, respondents indicated: it is a good idea to use AGDS (89%); it is fair to use AGDS (84%); and they would want AGDS in their neighborhood (87%). Regression analysis revealed that counts of AGDS events were significantly associated with AGDS community awareness (beta = .98, 95% CI 5.7-190). **Conclusions:** A substantial proportion of respondents were aware of AGDS and a majority held favorable attitudes towards AGDS as a tool to address urban gun violence. These findings may influence municipal leaders to speak more freely of AGDS as a public health tool, and future work should investigate the impact of community awareness among the population subset that has engaged in recent gun violence, or is at-risk of perpetrating gun violence, to better understand the role of AGDS community awareness as a tool for gun violence reduction efforts.

Session 19: Understanding and addressing disparities (Part II)

Sheraton III, November 2, 2:30 PM - 4:00 PM

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1. Firearm violence exposure and firearm access and use among Black and AIAN adults: Results from two nationally representative surveys

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¹New Jersey Gun Violence Research Center

Background: Gun violence disproportionately impacts some communities. In 2020, Black and American Indian/Alaskan Native (AIAN) individuals died from firearm homicide at higher rates than White individuals (3.16 and 1.78 times respectively). Despite such disparities and evidence the demographics of firearm ownership are shifting, research on gun violence exposure and firearm access has largely been centered on White samples. **Methods:** Leveraging KnowledgePanel, a probability-based panel of US adults, we recruited nationally representative samples of Black (n = 2,990) and AIAN (n = 526) adults. Sample weights were computed by Ipsos to optimize representativeness. Data were collected April 12-May 4, 2023. **Results:** In measuring exposure within the Black sample, 21.7% reported having been threatened with a firearm, 2.7% having been shot, 41.3% knowing someone personally who had been shot, and 38.1% that someone had been shot in their neighborhood. Within the AIAN sample, 30.1% reported having been threatened with a firearm, 6.3% having been shot, 38.3% knowing someone personally who had been shot, and 27.9% that someone had been shot in their neighborhood. Nearly one-third (30.4%) of Black and nearly half (45.4%) of AIAN adults reported typically keeping a firearm in or around their home. Large majorities (91.1% of Black; 86.1% of AIAN) reported access to 1+ handgun. Approximately two-thirds of AIAN adults reported access to shotguns and rifles (vs one-third of Black adults). With respect to firearm storage, in both samples the modal response was that individuals always use specific forms of secure firearm storage; however, the second most common response was that those same methods were never used, indicating a bifurcation within these populations. Nearly 20% of AIAN and approximately 15% of Black firearm owners reported always or almost always carrying firearms outside their homes, with the majority reporting self-protection as a reason for carrying. Additional results broken down by sex, age, income, metro (vs non-metro) residence, and region of residence will be presented. **Conclusions:** These results highlight that substantial portions of individuals from both Black and AIAN communities have been exposed to firearm violence. AIAN individuals were more likely to own firearms, owned a broader array of firearms, and – among men – were more likely to endorse hunting as their primary reason for ownership. The groups exhibited similar storage and carrying practices. These results provide evidence around disparate firearm violence exposure and typical practices among two understudied populations, with implications for tailoring resources within these communities.

2. Racial differences in youth gun ownership, carrying, and use: The roles of community violence exposure and collective efficacy

Jasmine Coleman PhD¹, Emma Kate Hancock¹, Krista Mehari PhD², Phillip Smith PhD¹

¹University of South Alabama, ²Vanderbilt University

Background: Gun-related injuries and deaths represent major public health concerns, especially for non-White youth. Exposure to community violence is associated with gun carrying, which is a risk factor for gun-related

injury. However, less is known about how such exposure relates to youth gun ownership and use against someone. Collective efficacy, the sense that the community has the ability to effect positive change, may serve to reduce risk for gun-related injury. This study examined the concurrent relations among violence exposure and collective efficacy with gun ownership, carrying, and use in a sample of Black and White adolescents. **Methods:** Participants (N=916) included a mostly Black (60%) and female (55%) sample of high school students from public schools in the Upper Gulf Coast region of the U.S. Community violence exposure was measured using an adapted version of the Survey of Children's Exposure to Community Violence. Collective efficacy was measured using an adapted version of the Collective Efficacy Scale. Gun ownership, carrying, and use against someone were measured using questions generated by the research team for the purposes of the larger study. **Results:** Six logistic regressions were conducted to examine the unique effects of violence exposure and collective efficacy on adolescents' gun ownership, carrying, and use, after controlling for age and gender. Black youth who were victimized were more than twice as likely to currently carry a gun, $X^2(5, N=551) = 82.40, p=.02$, and to have used a gun against someone, $X^2(5, N=551) = 89.70, p<.001$, after controlling for witnessing violence and collective efficacy. Black youth who reported greater collective efficacy were less likely to have ever used a gun against someone, $X^2(5, N=551) = -37.70, p=.03$. White youth who witnessed violence were nearly three times as likely to currently own a gun, $X^2(5, N=365) = 104.10, p<.02$, and those who reported greater collective efficacy were nearly twice as likely to currently own a gun, $X^2(5, N=365) = 57.10, p<.03$, after controlling for victimization. No other significant effects were found. **Conclusions:** Violence exposure and a perception of one's community as being able to effect positive change influence youth gun ownership, carrying, and use, with patterns differing for Black and White youth. These findings suggest important contextual and community factors that relate to risk for gun-related injury and death among youth. Strategies reducing community violence and increasing collective efficacy may benefit youths' risk for various gun practices.

3. Equity considerations with the implementation of Extreme Risk Protection Orders: lessons learned from domestic violence protection orders

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Background: Extreme Risk Protection Orders (ERPO) have the potential to ameliorate or exacerbate structural racism in the legal system. ERPOs are a civil order, which may prevent escalation into the criminal system. Conversely, since ERPOs still mandate legal system involvement (e.g., judge grants ERPO), ERPO use may have negative consequences for marginalized communities. As most ERPO laws are based on Domestic Violence Protection Order (DVPO) laws, we sought to understand the history of DVPO implementation. Placing ERPOs in this historical context and identifying aspects of DVPOs that exacerbated or reduced structural racism could be critical to more equitable implementation of ERPOs. **Methods:** Semi-structured interviews with 9 social workers and advocates involved in DVPO implementation in the 1970s-1990s were transcribed and conducted verbatim. We utilized a historical comparative approach using inductive thematic analysis to identify concerns with DVPO implementation with a focus on equity in implementation. We then applied lessons learned to potential equity implications for when social workers or community advocates recommend ERPOs for clients at risk of harming themselves or others. **Results:** Four equity-related themes arose. Theme 1: Participants described their roles as advocates (both in shelters and legal offices) as critical to the successful implementation of DVPOs, especially for women with low socioeconomic status, indicating the need for a similar role of an ERPO advocate. Theme 2:

Many participants described the professionalization of social work (i.e., establishment of regulatory procedures) as a barrier to grassroots advocacy efforts, especially for women of color. Participants recommended careful consideration of the training background and structure of an ERPO advocate role to insulate against this issue. Theme 3: They described the involvement of the legal system inherent to DVPOs as a barrier to use by marginalized communities (e.g., women of color, queer survivors). Many pointed to the success of community domestic violence prevention efforts (that did not involve the legal system) as a model to identify community-based solutions to firearm removal for those in crisis. Theme 4: In contrast, several participants described DVPOs as a groundbreaking tool for domestic violence equity due to the utilization of the civil legal system, bypassing the criminal system. Similarly, ERPOs could address equity by leveraging the civil system, potentially mitigating disparities in the criminal system. **Conclusions:** Because ERPO implementation is embedded in the legal system, there are several equity considerations. With an appropriately constructed role of an ERPO advocate, some of these concerns may be addressable.

4. Firearm violence exposure and health in two nationally representative samples of Black and American Indian/Alaska Native adults

Daniel C. Semenza PhD¹, Nazsa Baker PhD¹, Devon Ziminski MS¹

¹Rutgers University

Background: To analyze the types of firearm violence exposure and cumulative exposure associated with self-rated, physical, and mental health in two nationally representative samples of Black Americans and American Indian/Alaska Natives. **Methods:** Cross-sectional survey data were collected for two samples of Black Americans (N = 3,015) and American Indian/Alaska Natives (N = 527) in the United States in April and May 2023. Exposure measures include four types of firearm violence exposure (being shot, being threatened with a firearm, knowing a family member or friend shot with a firearm, hearing about or witnessing a shooting in the community). Outcome measures include self-rated health, number of poor physical health days in the past month, and number of poor mental health days in the past month. **Results:** The majority of Black Americans and American Indian/Alaska Natives have been exposed to at least one type of firearm violence in their lives. Multivariate regression results demonstrate being threatened with a firearm and hearing about or witnessing a shooting are associated with poorer self-rated, mental, and physical health across the samples. Greater cumulative exposure to firearm violence is associated with increasingly greater harms to health for all outcomes across both samples. **Conclusions:** Firearm violence exposure is associated with poorer health outcomes among Black Americans and American Indian/Alaska Natives. Greater cumulative exposure to firearm violence is particularly associated with harms to health in both populations. Enhancements to firearm violence prevention can yield improvements to population health, particularly among communities with high levels of exposure to firearm violence. Primary and secondary victim services can assist firearm violence survivors, their family and friends, and broader communities to address health needs.

5. Toward a firearms justice framework

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Background: The purpose of this presentation is to examine how the reproductive justice framework can inform a new discourse for gun violence and Second Amendment rights through a justice-centered framework.

Methods: This presentation will analyze how the reproductive justice movement can expand how we as a country—including gun violence researchers—consider gun rights, gun violence, and gun policies by focusing on the law’s role in mitigating or perpetuating inequities and disproportionate suffering within this country’s gun violence crisis. This presentation will emphasize an expansive conception of gun violence that includes nonfatal injuries, post-traumatic stress disorder, and anxiety to demonstrate how Second Amendment rights influence other rights, freedoms, and liberties. Similarly, it will draw attention to the influence of social, political, and economic systematic inequalities that impact the ability to “choose” whether a right can be exercised, incorporating the relevance of poverty, education, environment, employment, and policing. Communities of color suffering from gun violence are treated like war zones and Black men are labeled thugs with little consideration of the laws and policies that lead to gun violence. But it was said that “When it comes to reproductive justice, if you start at the pregnancy, you’re starting in the wrong place.” If we are starting at gun deaths, we are starting in the wrong place. Thus, this presentation will show that policies on Medicaid, voting rights, and green spaces are indeed gun policies. **Results:** The people who are most imperiled by expansive Second Amendment interpretations are also those most at risk to be persecuted and prosecuted for attempts to exercise the very same principles underlying those rights, such as self-defense. Similar to reproductive rights, the ability to exercise Second Amendment rights is not equitable and, at the same time, the experiences of those most impacted has not been central to the constitutional analysis. People of color, for example, were referenced in Bruen as support for expanding the Second Amendment right into the public sphere. Yet, empirical research suggests these people are at increased risk of harm and, simultaneously, more likely to be criminalized for exercising those rights. **Conclusions:** The reproductive justice movement draws attention to the importance of incorporating power and privilege, and the Second Amendment and the way we conceptualize gun rights and gun violence is in desperate need of a similar transformation. Given the nascent stage of Second Amendment jurisprudence, interrogating how the right is currently being framed is essential.

6. Racial capitalism and firearm violence: Developing a theoretical framework for firearm violence research examining the influence of racism

Mudia Uzzi PhD MSc¹, Shannon Whittaker MPH², Renee M. Johnson PhD¹, Michael Esposito PhD³, Shani Buggs PhD⁴, Sabriya Linton PhD¹, Keshia M. Pollack-Porter PhD¹

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Background: There is increasing interest in elucidating how structural racism shapes firearm violence disparities from a public health perspective. Within this research area, more engagement with transdisciplinary theory and frameworks is necessary to organize relevant constructs. Thus, building on theories and concepts from a range of academic fields and the Black philosophical tradition, we developed a theoretical framework to help explain the role of place-based structural racism on firearm violence disparities. A central component of our framework is the concept, Racial Capitalism, which contends that racial exploitation and the accumulation of profits & assets depend on and reinforce one another. In our framework, we highlight how two processes related to racial capitalism—racialized dispossession and racialized spatial stigma—are associated with geographic disparities in firearm violence. **Methods:** We performed an intersectional and ecological cross-sectional study of 146 census tracts in Baltimore, Maryland from 2015-2019. We identified two indicators to operationalize the racial capitalism construct in our framework: historical redlining and racialized subprime mortgage lending. For each tract, the redlining and subprime lending scores were dichotomized into two categories signifying the tracts’

level of disadvantage or advantage. Cross-classification of the redlining and subprime lending variables generated four intersectional groups. We geocoded incidents of all shootings (i.e., firearm homicides and assaults) to the tract level and derived a tract level measure of shooting rates. We used a descriptive epidemiological method—additive interaction—to reveal and quantitatively describe firearm violence disparities between intersectional groups due to their varying exposure to racial capitalism. **Results:** Sustained disadvantaged tracts (tracts that experienced higher subprime lending and were historically redlined) had, on average, 38 more shootings a year per 10,000 residents compared to similarly populated sustained advantaged tracts (tracts that experienced lower subprime lending and were not historically redlined). Moreover, 40% of all shootings within the sustained disadvantaged tracts were linked to the intersection of redlining and subprime lending. This represents approximately 858 shootings in Baltimore’s sustained disadvantaged tracts during 2015-2019. **Conclusions:** Our research findings suggest that racial capitalism is a root cause of firearm violence disparities in Baltimore. Our research introduces racial capitalism as a central concept for a theoretical framework in firearm violence prevention research. A framework based on racial capitalism can inform the development and usage of indicators and analytic methods for firearm violence research. Moreover, this framework can identify factors to prioritize in violence prevention programs and policies.

Session 20: Examining firearm injury risk and prevention strategies for military members and their families

Erie, November 2, 2:30 PM - 4:00 PM

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1. Firearm injury prevention among military service members: Strategies for military-civilian partnerships

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Background: Suicide is a leading cause of death in the US Armed Forces. Among current service members who die by suicide, 60-80% die from self-inflicted firearm injuries—a proportion considerably higher than among civilians (i.e., approximately 50%). Accordingly, the US Department of Defense (DOD) developed suicide prevention guidelines emphasizing the importance of reducing access to lethal means of suicide, such as firearms, among at-risk individuals. Moreover, service members are seen by the public as “credible messengers” surrounding firearm safety, so research and programs in settings where military service members interact have the potential to impact the larger civilian population. **Methods:** This presentation will cover opportunities for research partnerships and collaborations across the DOD, including discussing potential benefits and challenges in these collaborations and strategies for firearm-related research and program development in military communities. The presenter will draw from his experience as a DOD-funded investigator conducting community-engaged firearm injury prevention observational and clinical trial research in military settings. **Results:** The presentation will discuss, for military populations: a summary of recommendations from national military firearm suicide summits, an overview of current firearm-injury-related programs and organizational policies, and strategies for building strong partnerships. **Conclusions:** To strengthen firearm suicide and injury prevention efforts in the military—with translational relevance to the community—partnerships between military and civilian stakeholders are essential.

2. Reducing access to firearms: Secure storage preferences and practices of service members

Kaitlyn Friedman MSc¹, Kayla Meza MPH¹, Megan Johnson MBA¹, Alex Bletz PhD RN¹, Jayna Mocerri-Brooks PhD RN², Raiza Deyto MSN BSN BA AD RN Capt COANG¹, Daphna Rubin MPH¹, Rodney A. Ho Jr. Maj USAF PhD MPH PA-C³, Justin C. Baker PhD⁴, AnnaBelle O. Bryan MS⁴, Craig J. Bryan PsyD ABPP⁴, Michael D. Anestis PhD², Marian E. Betz MD MPH¹

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Background: Firearms are highly lethal and ubiquitous in the U.S. Firearm access is associated with increased risk of injury and death (including suicide). Secure storage or temporary out-of-home storage can reduce this risk. Service members often own personal firearms but may have varied storage practices. This study aimed to understand the personal firearm storage preferences/practices of active-duty service members and their communities with the goal of informing lethal means safety interventions for the prevention of firearm injury and death. **Methods:** Participants were enrolled if they consented to participate, lived in the U.S., were ≥18 years old, and either: dual-military spouses; spouses/partners of active-duty military members, reservists, guard members, or Veterans who served within the last five years; and/or active-duty service members experienced in lethal means safety. Interviews and focus groups were conducted from December 2022-April 2023 via

videoconferencing, audio recorded and transcribed. Coding was conducted by two researchers and themes were identified through a hybrid inductive-deductive content analysis approach. **Results:** 55 participants were enrolled. Preliminary analysis revealed themes including: (1) varied storage practices of personal firearms (ranging from unlocked, loaded, assembled and with ammunition in or around the home); (2) fear of children accessing firearms was a strong motivator for secure storage; (3) supporting lethal means safety for individuals at risk of suicide, but not necessarily seeing a need for universal secure storage; and (4) often having at least one firearm loaded and accessible for protection. One participant shared “we have many guns, some are in lock boxes with locks on them, some are not, some are just disengaged.” Within Theme 2, participants noted “when we brought those [firearms], we explained to the children that “hey, these are not things that we are gonna play with. They have locks on them for a reason,”” and “when we have our daughter, that gun goes away.” Participants also reported “locking up guns is very important, but it's very blurry of treating all situations the same.” Regarding Theme 4, a participant shared “there's almost always like one that is not locked up because it's like the one that they would use in time of an emergency and like in a time of emergency there's no time.” **Conclusions:** The results indicate the need for interventions among active-duty service members related to lethal means safety and secure storage of personal firearms coupled with universal education of the risk of firearm injury, suicide, and other deaths.

3. Unintentional firearm injuries among Veterans: A mixed-methods approach to understand frequency and context

Megan Lafferty MA PhD¹, AnnaMarie O'Neill PhD¹, Nicole Cerra MA MPH¹, Lauren Maxim PhD¹, Vivian Christensen PhD², Melissa Varnum MPH², Erika Cottrell MPP PhD², Kathleen Carlson MS PhD¹

¹Portland VA Health Care System, ²Oregon Health and Science University

Background: Veterans experience high rates of fatal and non-fatal firearm injuries. While risk reduction efforts within the Veterans Health Administration (VA) have largely focused on firearm-related suicide prevention, additional attention is needed to better understand and prevent unintentional firearm injuries among Veterans. Through chart reviews and interviews, this mixed-methods study examined the frequency, characteristics, and context of unintentional firearm injuries among Veterans to inform injury prevention strategies within the VA. **Methods:** VA administrative data were used to identify a random sample of Veterans, stratified and sampled 1:1 by rural versus urban address, with firearm injury-related visits to a VA facility in the U.S. between January 1, 2010 and December 31, 2019; injuries were eligible for inclusion if they occurred outside of active military duty and were treated within those dates. Comprehensive electronic health record reviews were conducted to examine injury characteristics and circumstances. In addition, we interviewed 20 Veterans who had unintentional firearm injuries to understand the context of their injuries, the emotional and physical impacts, and their perspectives on firearm injury prevention strategies. We conducted rapid analysis to interpret interview data. **Results:** The sample consisted of 377 firearm injuries among VA-using Veterans nationally. Overall, 157 injuries (46%) were documented as being unintentional, all of which were nonfatal. Injuries most commonly occurred during firearm cleaning/maintenance (30%), followed by shooting/hunting (20%), and otherwise carrying/handling a loaded firearm (19%). Interviews similarly revealed unintentional firearm injuries often occurred when Veterans were hunting or target shooting, or while cleaning their firearm and not realizing it was loaded or had a bullet in the chamber. Some injuries took place while carrying a loaded, unsecured firearm, and it discharged when dropped or jostled. While most Veterans attributed the incidents to carelessness- ‘just one dumb mistake’ -several participants said a malfunction with their firearm was discovered after the incident.

Veterans endorsed injury prevention strategies such as quick-access storage options, as well as continuing education and training around firearm safety practices. **Conclusions:** Using a mixed-methods approach allowed for a more robust understanding of the prevalence and circumstances of unintentional firearm injuries to inform the development of patient-centered prevention efforts. Unintentional firearm injuries often occurred while cleaning or carrying/handling a loaded, unsecured firearm and during hunting or target shooting. Some unintentional discharges were attributed to firearm malfunction. Providing secure storage options and firearm safety training could be effective firearm injury prevention strategies within the VA.

4. **Characteristics, circumstances, and treatment of gun injuries among rural- versus urban-residing Veterans who used VA healthcare nationally, 2010–2019**

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Background: US military Veterans are at elevated risk of gun injury, as are rural-residing individuals. A detailed understanding of Veterans' gun injuries is needed to inform tailored prevention efforts within the Department of Veterans Affairs (VA) healthcare system. This study examined the characteristics, circumstances, and treatment of gun injuries among rural- versus urban-residing Veterans who used VA healthcare nationally for the 10-year period between 2010 and 2019. **Methods:** A national random sample of Veterans with gun injury-related visits to a VA facility between January 1, 2010 and December 31, 2019 was identified using International Classification of Disease (ICD) codes in VA administrative data. The sampling strategy was stratified 1:1 by rural versus urban address. Detailed injury data were then abstracted through comprehensive chart reviews. We included injuries caused by firearms using a powder charge to fire a projectile (e.g., rifle) and other guns that do not use a powder charge (e.g., BB gun). To be eligible, injuries had to be first treated between 2010-2019 and incurred outside of active military service. Frequencies of characteristics, circumstances, and treatment of gun injuries were compared by Veterans' rural versus urban residence. **Results:** A total of 377 injuries among VA-using Veterans nationally were included; most were nonfatal within a month of the incident (87.0%). The most common injury intent differed by rurality such that unintentional injuries were most common for rural Veterans (48.8%) while assaults were most common for urban Veterans (34.9%), followed by unintentional injuries (32.6%). Firearms were most often involved in the injury (n=166) compared to non-powder guns (n=19), while the remaining types were unknown, other, or missing. About 15% of cases had documentation of Veterans being under the influence of drugs or alcohol at the time of injury (14.1% and 16.3% for rural versus urban Veterans, respectively). Most injuries were first treated in non-VA facilities (e.g., emergency department, primary care) for both rural versus urban Veterans (77.1% and 75.6%, respectively). Most received follow-up care at VA facilities (69.1% and 80.9% of rural versus urban Veterans, respectively). **Conclusions:** Most gun injuries treated among Veterans who used VA healthcare nationally were nonfatal and unintentional. The characteristics, circumstances, and treatment of injuries were similar between urban and rural Veterans, with a notable exception being injury intent. This research will help advance understanding of gun injuries among Veterans and can be used to inform VA-based prevention efforts.

5. **The association between state firearm characteristics and suicide risk for Veteran and non-Veteran residents, 2002-2019**

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¹RAND

Background: There is a great deal of variability across states in the risk for suicide for both Veteran and non-Veteran populations. For example, firearm suicide rates vary between 2 and 22 suicides per 100,000 across U.S. states. This study examines the association of state-level suicide rates with a range of state characteristics, including state firearm prevalence and state firearm policies, examining associations for both Veteran and non-Veteran populations and for both firearm and nonfirearm suicide. **Methods:** Data on Veteran suicide rates between 2002-2019, stratified by lethal means and state, were provided by the Veterans Health Administration. Data on suicides in the U.S. population were taken from CDC Wonder. An analytic non-Veteran comparison sample was created by removing Veteran suicides from the full population suicides and reweighting the remainder to match the Veteran population on age, gender, and state of residence. A multilevel model was estimated predicting suicide rates from: Veteran status, firearm lethal means, state firearm policies, household firearm ownership rates, other time-varying state socioeconomic characteristics and random effects for state and time. **Results:** The increased suicide risk for Veterans relative to non-Veterans (6.5 additional suicides per 100,000) is entirely explained by differences in these groups' firearm suicide rates (6.5 additional per 100,000). State variation in overall suicide rates was strongly associated with state household firearm ownership rates and moderately associated with permissive state firearm regulations for both Veterans and non-Veterans. These association with overall risk for suicide are specific to firearm suicide, with substantially higher firearm suicides rates in states with high gun ownership and permissive firearm regulations. In contrast, high gun ownership was associated with slightly lower risk for nonfirearm suicides, and permissive firearm regulations were not significantly associated with nonfirearm suicides. Although Veterans have a higher propensity to use firearms when committing suicide than non-Veterans, the show similar association with state firearm characteristics. **Conclusions:** There are very large differences in suicide risk across states, and those differences in risk follow the same pattern as state-level measures of gun ownership rates and permissive gun regulations. The findings are consistent with theories in the suicide prevention literature suggesting that reducing firearm ownership and restricting firearm acquisition may be effective suicide prevention strategies. However, the associations shown are not sufficient to infer causation. In particular, these findings do not demonstrate that changes in gun regulations or ownership rates are followed by changes in suicide rates.

6. It's a heavy subject... I don't even know where to start:" Opportunities to support caregivers of U.S. Veterans in lethal means safety conversations

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Background: Nationally, 70% of Veteran suicides involved a firearm. Veterans at risk for suicide express a desire to have a significant other involved in their suicide prevention safety planning, and healthcare providers within the Department of Veterans Affairs are encouraged to engage family caregivers in lethal means safety (LMS) planning with Veterans. The objective of this study was to gain insight into barriers and opportunities for engaging caregivers of U.S. Veterans in LMS conversations and in promoting secure firearm storage practices to prevent firearm injuries and death. **Methods:** We conducted virtual discussion groups with a national sample of 36 caregivers, with an emphasis on including rural caregivers. Each discussion group was co-facilitated by a caregiver who was a member of the research team. We asked about current and past firearm storage practices, experiences with LMS and suicide prevention training, and barriers to talking about firearms with healthcare providers and to engaging in LMS conversations with Veterans. Discussion groups were audio-recorded,

transcribed, and analyzed using a thematic analysis approach. **Results:** Most caregivers identified as women (89%) and were the spouse/partner of the Veteran (78%); about half lived in rural zip codes (44%). Caregivers endorsed the importance of LMS planning and wanted healthcare providers to ask about firearms in the home and provide LMS resources. However, they identified barriers to having LMS conversations with healthcare providers and with Veterans, including (1) lack of knowledge and comfort; (2) concerns about protecting the Veteran's autonomy; (3) relationship strain and interpersonal violence; (4) healthcare providers not including caregivers in LMS conversations, and (5) lack of desirable secure firearm storage options. Caregivers suggested opportunities to improve their engagement in LMS conversations and safety planning including (1) training for healthcare providers on how to communicate about firearms and LMS; (2) processes to ensure caregiver involvement in LMS discussions; and (3) increased resources and support for caregivers, including consideration of caregiver safety and wellbeing. **Conclusions:** Caregivers of Veterans are important and willing partners in promoting LMS to prevent firearm injury and death, but they face barriers to having LMS conversations with healthcare providers and with Veterans. Providing more resources for caregivers and training for healthcare providers on how to engage caregivers in LMS planning could improve caregivers' ability to promote secure firearm storage practices. In some cases, an interdisciplinary approach that includes multiple healthcare team members may be necessary to support successful LMS conversations and safety planning.

Session 21: Examination of firearm policies and their effects on firearm injuries (Part II)

Sheraton I, November 2, 4:15 PM - 5:45 PM

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1. Firearm transactions and background checks in Missouri: Frequency and associated factors

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Background: Extending mandatory firearm background checks to include private sales and other transactions has been a frequent proposal within state legislations. While scholars have estimated the proportion of firearm transactions involving background checks at a national level, there is a dearth of research focusing on states. The objective of this study is to estimate the proportion of firearm transactions involving background checks in the state of Missouri and identify factors associated with the likelihood of undergoing a background check. **Methods:** Data came from the Missouri Firearm Survey which is a statewide survey to better understand firearm-related attitudes, beliefs, and practices among Missouri adults. The Missouri Foundation for Health (MFH), in collaboration with Ipsos, collected data from June 2020 to August 2020. Firearm owners were asked about their most recent firearm acquisition and whether a background check was required. We analyzed the proportion of transactions involving background checks across firearm sales involving a Federal Firearm Licensed dealer, firearm sales not involving a licensed dealer, and firearm transfers that did not involve a purchase (e.g., gifts or trades). We conducted a binary logistic regression to identify sociodemographic and contextual conditions associated to the likelihood of firearm acquisitions involving background checks. **Results:** Between 55 and 60 percent of firearm transactions involved a background check in Missouri. Sales involving Federal Firearm Licensed dealers presented the highest proportion of background checks (83 to 90 percent) while transfers without sales (e.g., gifts or trade) presented the lowest proportion (22 to 24 percent). Younger people and those living in urban areas were less likely to undergo a background check, while handgun transactions and more recent transfers (less than five years ago) were more likely to report a background check. **Conclusions:** Thousands of gun owners in Missouri acquire their firearms without a background check, even when transactions occur at Federal Firearm Licensed dealer. Policy implications will be discussed.

2. State firearm legislation and first-time youth gun carrying in the United States

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Background: Developmental and life-course criminology posits that an early onset of risky gun-carrying behavior is associated with a prolonged and active criminal career, as well as an increased likelihood of violent injury. Yet, there is a noticeable lack of research focusing on the protective factors that might inhibit the early initiation of gun carrying among youths. The present study intends to investigate the relationship between state gun policies and first-time youth gun carrying in the United States. **Methods:** We linked individual handgun carrying histories from a nationally representative sample of U.S. youth (i.e., participants from the National Longitudinal Survey of Youth 1997) with state-level gun policies (obtained from the State Firearms Laws Database) starting from the year 1997. Discrete-time survival analysis was employed to estimate the associations between the overall state gun law environment and policy sub-areas and first-time gun carrying, while adjusting for state- and person-level covariates. In addition, we examined whether these associations differ across various population subgroups.

Results: Our preliminary findings suggested that a higher quantity of state gun laws was significantly associated with reduced odds of initiating gun-carrying behavior. Moreover, laws addressing child gun access prevention, regulations pertaining to concealed carrying permits, and domestic violence-related laws seemed crucial in lowering the likelihood of first-time youth gun carrying. These associations remained largely consistent across population subgroups. **Conclusions:** To the best of our knowledge, this research marks the first exploration of the association between state gun policies and first-time youth gun carrying. The findings underscore the significance of strengthening state gun policies to deter gun carrying in young individuals, especially during their early developmental stages. States should consider introducing and effectively enforcing gun laws that reduce early onset of gun carrying, thereby potentially decreasing the duration and intensity of this risky behavior. Ultimately, such measures could help mitigate gun-related mortality and morbidity.

3. Extreme Risk Protection Orders in Colorado: Law enforcement vs other petitions

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Background: Extreme Risk Protection Orders (ERPOs) are civil restraining orders that temporarily prohibit individuals threatening violence to others or themselves (“Respondent”) from purchasing or possessing firearms. 21 states and the District of Columbia had passed an ERPO law as of June 2023. In Colorado, from 2020-2022 eligible petitioners were law enforcement (LE) or family (including romantic partners, those who share a child together, and roommates). Previous studies show that LE petitions are more likely to be granted; here, we sought to examine other differences among LE versus non-LE petitions. **Methods:** We obtained all court records for all ERPO petitions filed in Colorado between January 1, 2020 and December 31, 2022. Data elements were abstracted by trained staff using a standardized guide into a secure REDCap database. **Results:** Out of all 353 ERPO petitions filed in the study period, 193 (54.6%) were filed by LE. Among non-LE petitioners, 57(35.6%) were current or former intimate partners, 38(23.8%) were related by blood, marriage, or adoption, 16(10.0%) resided with the respondent, 15(9.4%) were a legal guardian, and 11(6.9%) shared a child. LE petitions filed were more likely to be granted TERPOs (temporary ERPO, lasting up to two weeks to allow for an ERPO hearing) compared to non-law enforcement petitions (51.4% vs 15.8%, $p<.0001$) and full year ERPOs (41.2% vs 6.3%, $p<.0001$). LE petitions were more likely ($p=0.002$) to be filed for threats against self (19.9% vs 7.8%) or both self and others (28.0% vs 18.0), while non-LE petitions were more likely to be for threats against others alone (52.2% vs 74.2%). **Conclusions:** Examining differences in behavior between petitioner groups for ERPO’s is critical to improving knowledge and education regarding when and how to apply for an ERPO. More targeted training could be made available to law enforcement and the public, with the latter especially emphasizing ERPO utility in suicide prevention. Understanding how and who is using the ERPO law is crucial for figuring out what would be the best way to educate the public and law enforcement. Further research is needed to learn more about the circumstances involved in ERPO jurisprudence, how and when law enforcement petitions are processed at the suggestion of family members, and how relinquishment of firearms is handled at the time of ERPO and after it expires.

4. The impact of permit-to-purchase laws on types of firearms used in youth firearm suicide

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Background: Rates of youth suicide by firearm have been increasing steadily over the last decade, from 4.7 per 100,000 in 2010 to 7.5 per 100,000 in 2020. Permit-to-Purchase (PTP) laws are state-level policies that require prospective firearm purchasers to first obtain a license from state or local law enforcement. Prior evaluations of PTP laws suggest they are associated with lower rates of suicide in the general population. **Methods:** We obtained data on suicide deaths from the National Violent Death Reporting System (NVDRS) from 2005-2019. Analyses leveraged data from states that were reporting to the NVDRS as of 2005 (n = 16). We generated state-year rates of firearm suicide deaths, stratified by weapon type, race/ethnicity, and age group. We used Comparative Interrupted Time Series models to assess whether Maryland's PTP law, which went into effect in 2013, led to differences in the rate of handguns and long guns used in youth suicide compared to states without a PTP law. Models controlled for demographic-level characteristics and presence of other firearm-related laws. **Results:** The adoption of PTP laws in Maryland were not associated with significant differences of handgun or long gun suicide among youth ages 15-24 compared to states without PTP laws. However, results suggest differences in effect across race/ethnicity and age subgroups. Decreases were observed among the youngest age group, youth ages 15-17 years. Among Black youth ages 15-17 years, PTP adoption in Maryland was associated with a significant annual reduction in handgun suicide (Coef = -1.84, SE = 0.90). Similarly, Among White youth ages 15-17 years, PTP adoption in Maryland was associated with a significant reduction during the first year of the intervention in handgun suicide rate (Coef = -2.12, SE = 0.86). However, overall, among White youth, PTP adoption in Maryland was associated with a significant annual increase in handgun suicide compared to states without a PTP law (Coef = 0.63, SE = 0.32). **Conclusions:** Our findings suggest that the impacts of PTP laws are experienced differently across racial/ethnic groups and age groups. These differences can be a result of disparities in enforcement associated with these laws or differences in the source or how the firearm was accessed by the youth. But, for adolescents who cannot legally obtain handguns, PTP laws appear to be a promising population level strategy to reduce firearm suicide.

5. Comprehensive background check policies effects on county-level firearm homicide: A controlled interrupted time-series analyses in 4 states, 2000-2019

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Background: Background checks are a key strategy to enforce firearm purchasing prohibitions. They have broad public support, but research has shown little effect of comprehensive background check (CBC) policies on firearm-related violence at the state-level. This might be explained by several factors, including aggregation bias and the distribution of population characteristics plausibly affected by the policy, e.g., pre-existing levels of firearm ownership and the proportion of individuals prohibited from purchasing. We examined whether these factors explained variation in CBC policy effects at the county-level in four US states. **Methods:** We used a controlled interrupted time-series analysis from 2000-2019 to estimate the county-level effects of CBC policies in

four states that implemented the policy between 2013-2015 (Colorado, Delaware, Oregon, Washington); control counties were those in 28 states that had not implemented CBCs by 2019. We examined effect modification by county firearm ownership prevalence and prison incarceration. Data were obtained from a firearm law database from Kagawa et al., 2023, the Vera Institute of Justice, and the Centers for Disease Control and Prevention. We used Bayesian segmented Poisson regression models allowing for spatial autocorrelation and county-level heterogeneity in CBC effects. **Results:** There were 2053 counties in our analytic sample (n=138 treated, n=1915 controls; 41,060 total county-years). We estimated a 19% reduction in firearm homicide rates in Oregon counties immediately after CBC policy implementation relative to control counties (RR=0.81, 95% credible interval [CI]=0.61-1.07), with no immediate change in Colorado, Delaware, or Washington and no post-policy slope change for any state. The immediate reduction in Oregon counties was driven by those with low firearm ownership (RR=0.80, 95% CI=0.59-1.06) and high incarceration (RR=0.76, 95% CI=0.55-1.06). We also found a 9% reduction in the annual rate of change in firearm homicide post-CBC in Colorado and Delaware counties with low incarceration (RR=0.91, 95% CI=0.84-0.98) and a 3% increase in the annual rate of change in Colorado and Delaware counties with high incarceration (RR=1.03, 95% CI=0.99-1.08). Other interactions were small in magnitude and not distinguishable from the null. **Conclusions:** We found suggestive evidence that CBCs were associated with immediate reductions in firearm homicide in Oregon, driven by counties with low firearm ownership and high incarceration—where the policy plausibly affected a larger segment of the population. Findings inform our understanding of null effects in prior research and suggest that expectations about CBC policy effects should align with the policy’s mechanisms of action (i.e., preventing new acquisitions to those prohibited).

6. Social and policy characteristics associated with injurious shootings by police in US counties: a multilevel analysis, 2015-2020

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Background: From 2015-2020, an average of 1,769 people were injured annually in shootings by police, 55% fatally. These incidents disproportionately harmed members of minoritized groups, including people who were Black, unhoused, or experiencing behavioral health needs. Prior studies of the structural determinants of these inequities have focused on state-level aggregations and fatal outcomes. Our objectives were to: 1) describe state and county variation in injurious shootings by police, and 2) analyze the relationship between state and county contextual differences and differences in county rates of injurious shootings by police. **Methods:** From July 2021 to April 2023, we employed a data abstraction process to improve the specificity and usability of the Gun Violence Archive’s open-source repository of shootings by police. Counts of incidents involving shooting injuries to non-officers were aggregated by county-year. Selected contextual factors were informed by theories of police use of force and the Social Basis of Disparities in Health conceptual framework. These included social factors relevant to social stratification or potential exposure to policing (e.g., income inequality, population demographics, residential segregation, violent crime rate, rurality, gun prevalence, unmet substance use disorder (SUD) needs) and policy factors relevant to stratification or exposure (e.g., permitless carry, permit-to-purchase, or Extreme Risk Protection Order statutes; per capita spending on health, police, or public welfare). County-level measures were prioritized over state-level measures where possible. Data were organized as a panel dataset and analyzed cross-sectionally by county-year (2015-2020) with counties nested within states. County Incident Rate

Ratios were estimated using multilevel, negative binomial regression models with fixed effects. We controlled for within-group correlation, county population, local reporting presence, and multiple measures of social conflict and community violence. **Results:** From 2015-2020, 56% of counties experienced injurious shootings by police. For each state-level percentage increase in adults with unmet needs related to SUD, there was a 25% increase in number of county-level injurious shootings by police. For each percentage increase in county income inequality, a 5% increase in injurious shootings was observed. Two firearm policies (i.e., statutes requiring concealed carry (CCW) licenses or firearm purchasing permits (PTP)) were associated with fewer injurious shootings. State per capita funding for health, police, or public welfare was not statistically significant. **Conclusions:** To reduce incidents of injurious shootings by police, policymakers should focus on unmanaged SUD in crisis-fund allocation and use, evaluate local investments in non-policing responses to social needs, and adopt stronger CCW licensing systems and PTP statutes.

Session 22: Discussing innovations in firearm research in varied populations

Sheraton III, November 2, 4:15 PM - 5:45 PM

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1. Exploring firearm injuries through data linkage

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¹Washington State Department of Health: Rapid Health Information Network (RHINO)

Background: In 2021, the age adjusted firearm injury death rate in Washington state was 11.2 per 100,000. Preliminary death counts for 2022 suggest this rate has increased. Washington State Department of Health's Rapid Health Information Network program (RHINO) manages the collection and analysis of healthcare encounter data. With support from CDC's Firearm Injury Surveillance Through Emergency Rooms (FASTER) grant, the RHINO team has leveraged healthcare encounter data to better understand trends in firearm injury healthcare encounters through performing two data linkages. **Methods:** To better characterize healthcare visits prior to firearm fatalities, RHINO performed a deterministic linkage where VDRS-eligible firearm-injury death records from 2021 (n=935) were matched by patient's full name and date of birth with 2020 Emergency Department (ED) visit records. Matched and unmatched records were analyzed by age, sex, urbanicity, behavioral health-related ICD-10 codes, and through preliminary text mining of free text fields in R.

To improve understanding of firearm injury survivors' healthcare utilization post-injury, a cohort of non-fatal firearm injury ED visits occurring from 3/1/2020 through 2/28/2021 were deterministically linked by patient's full name and date of birth with prospective ED visits from 3/1/2021 through 2/28/2023. Prospective visits were examined by demographic variables, ICD-10 codes, and text mining of free text fields in R. **Results:** In the deterministic death records linkage, 38% of firearm decedents were matched with an ED visit record (n=1,268). Among matched firearm decedents, the median number of ED visits was two, with 29 firearm decedents having 10 or more ED visits prior to a fatal firearm injury. Among firearm decedents with a linked ED visit, "pain" and "chronic" were among the top 10 terms across all free text fields. The prospective cohort linkage resulted in matching 1,358 initial ED visits with 4,083 prospective ED visits (746 patients). Patients with high ED utilization were older and more likely to identify as female. Approximately 2% (n=27) of firearm injury patients had a prospective ED visit for another distinct firearm injury. **Conclusions:** Both linkages improved understanding of healthcare encounters surrounding firearm injuries. RHINO plans to continue exploring healthcare encounters for patients with multiple firearm injuries and ED utilization immediately prior to fatal firearm injuries with the hope of identifying points of prevention.

2. Latent class analysis of respondents to Extreme Risk Protection Orders in six states

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Background: Extreme risk protection order (ERPO) laws have been enacted in 21 states and the District of Columbia, with most enactments occurring after 2015. While state-level descriptive research has characterized respondents to the orders and the incidents that prompted petitioning the court for an ERPO, we lack a greater understanding of who and what actions prompt petitions across states. **Methods:** We conducted a latent class analysis of respondents to 6,699 ERPO petitions in six states (California, Colorado, Connecticut, Florida, Maryland, and Washington). ERPO case files were obtained from local courts or state governments following

enactment. Case files were coded for respondent demographics, substance use, and mental health concerns or cognitive decline, as well as for characteristics of incidents that prompted the petition, such as risk of suicide and/or violence against others, and who those others were. Latent class analysis was conducted to identify groups with similar violence risk (threat and/or use and against whom). Multinomial logistic regressions were then conducted using respondent characteristics as independent variables to validate the clustering results. **Results:** A 7-class solution was most suitable. The largest class represented those who were at risk for suicide but did not engage in violence against others. This group was used as the referent for the multinomial logistic regression models. In order of size of membership, other classes were characterized by threatening violence against non-family members; community violence; threatening, but not using violence against intimate partners, family, or law enforcement; using violence against intimate partners; and family violence. A last class of individuals fell in the spaces in between these groups. Results of the multinomial logistic regression will be presented. **Conclusions:** This is the largest study of ERPO cases to date and the first to empirically group respondents to learn more about the types of cases that result in petitions. Our analysis suggests that ERPO petitions are used in a range of circumstances, but most commonly in cases of suicide risk. ERPO petitions are also used when interpersonal violence is threatened and used. Findings from this analysis further our understanding of how ERPOs are being used and can inform training and technical assistance efforts to support ERPO implementation.

3. Development of a statewide near-real-time system for firearm injury surveillance in Michigan

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Background: A key barrier to addressing firearm injury in the United States is the lack of timely surveillance data. Timely data on the time and location of the firearm incident could help community violence prevention workers identify foci for place-based interventions, and know how to adapt their current activities to current spatiotemporal trends. In response to this need, we sought to adapt lessons learned during the development of a statewide system for opioid overdose surveillance in Michigan to the surveillance of firearm injuries. **Methods:** We leveraged existing partnerships developed during the development of the Michigan System for Opioid Overdose Surveillance to acquire data for firearm injury surveillance. Our primary source for firearm mortality data are medical examiners (MEs) in the state, and the primary source for non-fatal injuries are Emergency Medical Services (EMS) runs. The initial study activities included onboarding of medical examiners, creation of a system to automatically clean, de-duplicate, and randomly displace locations (to prevent re-identification) of all records, and the design of a web-based dashboard to display spatiotemporal data summaries for community violence prevention stakeholder use. One of the initial ways the team is validating the system is through comparisons to available CDC firearm death data. **Results:** To date, we have obtained ME data from 49 counties, including data from Wayne County and Genesee County, two of the most populous locations in the state with the highest per-capita rates of firearm violence. With the inclusion of these two counties, the mortality data accounts for a large majority of the state's population. In Michigan's largest county, Wayne, our automated data abstraction system included 469 firearm deaths in 2020, 462 in 2021. Official data from the CDC showed 458 firearm deaths in 2020, and 452 in 2021, showing that we overcounted by less than 2.5% in both years. **Conclusions:** Construction of a near real-time system appears feasible and data from the largest county closely tracks with official counts obtained 1-2 years later, suggesting competitiveness with the gold standard. The

expansion of the system will focus on including state-wide EMS tracking of non-fatal firearm injuries, onboarding of additional medical examiners in the state, and conducting qualitative studies with community violence prevention workers to determine how to optimize data delivery to enhance their work. Timely firearm injury surveillance in Michigan can have broad implications, allowing for focused interventions and resource allocation in communities with the highest rates of firearm injury.

4. Network analysis of risk factors for firearm violence: Baseline results from Project SPARK

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Background: To determine rates of firearm violence, factors associated with firearm violence, and how those factors cluster together among young adults using baseline data from the Screening to Predict Young Adults at Risk for Firearm Violence (SPARK) project—a multi-site longitudinal study of firearm violence prediction. **Methods:** Study staff recruited young adults aged 18-24 from emergency departments (EDs) in Philadelphia, Seattle, and Flint from 9/2021-5/2023. Participants completed a self-administered survey assessment that included validated measures of violence behaviors and scales measuring potential risk factors associated with violence. Relevant factors included: community characteristics, substance use, mental health (PTSD, anxiety, depression) symptoms, violence attitudes, peer influences, social support, family conflict, adverse childhood experiences (ACEs), anger management and impulsivity, resiliency, and prosocial involvement. We described firearm violence rates (victimization or aggression, including firearm threats) in the sample and their association with each factor. We then conducted regularized partial correlation network analysis to determine how the risk/protective factor domains are interconnected, and explore what factors are central to the risk factor network. **Results:** The SPARK baseline includes 1,506 participants (40.9% Black/African American; 33.0% White; 61.6% female). Overall, 14.7% reported past-six-month firearm violence, including firearm threats (Seattle: 17.7%; Philadelphia: 12.6%; Flint: 12.4%). Peer and parental support, positive peer influences, prosocial involvement, and negative attitudes toward violent retaliation were all negatively associated with firearm violence ($p < 0.05$). Negative peer influences, community violence exposure, familial conflict, ACEs, substance misuse, mental health symptoms, greater tendency toward anger and impulsivity were all associated with firearm violence ($p < 0.05$). Our partial correlation network analysis was regularized via the eLasso to eliminate weak network edges. The resulting network showed four primary triads: mental health symptoms (anxiety, depression, PTSD), positive factors (resiliency, prosocial involvement, peer support), delinquent associations (negative peer influences, alcohol misuse, drug misuse), and violence exposure (ACEs, community violence, family conflict). PTSD showed the largest absolute strength (sum of edge widths) in the network and was, on average, the closest factor to the rest (closeness). Negative peer influences were most often found as the shortest path between non-connected factors (betweenness). **Conclusions:** Firearm violence is common among youth presenting to urban EDs, and its risk and protective factors are highly interconnected. Negative peer influences most often connected different domains of risk factors, and PTSD symptoms were on average the most associated with other firearm violence risk factors. Prevention efforts should involve multi-pronged approaches that recognize the interdependence between factors associated with firearm violence.

5. Las Vegas Cardiff Violence Prevention Program

Chris Francis Papesh MBA¹

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Background: Public violence is a major health problem in the United States and globally; Nevada has elevated levels of firearm and other violent injuries. Incidents involving violent crimes are often not reported to law enforcement. The Cardiff Model is a violence prevention program developed in the United Kingdom to identify and enable data sharing of violence injury locations among public health, healthcare and local law enforcement to help identify violent injury hotspots to guide community interventions. Las Vegas has seen an increase in violent injuries in recent years. As a result, in 2022 the Southern Nevada Health District (SNHD) and University of Las Vegas (UNLV) team started the Cardiff Project as a viable methodology to address this medical-public health crisis. **Methods:** This project has explored natural language processing (NLP) and machine learning/artificial intelligence (AI) models to extract violent injury, including firearms injury, location information from emergency department records using data from the CDC's syndromic surveillance system (Electronic Surveillance System for the Early Notification of Community-based Epidemics, ESSENCE). **Results:** The Artificial Intelligence models built in Python successfully mapped the locations of public violence in the Las Vegas metropolitan area. One can drill down and up to see the impacts on specific neighborhoods. This research aimed to determine whether location information could be extracted from ER records without requiring additional intervention, training, or processing by hospital staff; only 4% of the ER violent injury cases have accurate locations. **Conclusions:** Our Las Vegas Cardiff team is working with three major local hospital systems to improve the quality of the violent injury data recorded and enhancements to their clinical systems to better record the locations and types of violence or assaults. Our AI models are built with open-source free software and can be used by any cities implementing the Cardiff Model (supported by the CDC Violence Prevention team) or hospital clinical systems which request a copy of the AI models, Python software. In 2023 and 2024, we will implement our Cardiff Team strategies to use ED data to monitor and reduce violence in neighborhoods with high levels of firearms injury and public violence.

6. Evaluation of a nowcasting model for predicting weekly national firearm homicide deaths during a period of rapid increase in 2020

Steven Sumner MD MSc¹, Elizabeth Swedo MD¹, Alen Alic MS¹, Royal Law PhD¹, Marissa Zwald PhD¹, May Chen PhD¹, Daniel Bowen MPH¹, James Mercy PhD¹

¹Centers for Disease Control and Prevention

Background: Official national data on firearm homicide mortality trends, which are derived from death certificates and reported through the Centers for Disease Control and Prevention's (CDC) National Vital Statistics System (NVSS), are often delayed by over a year as a result of the time needed to collect and process information from all 50 states. During the emergence of the COVID-19 pandemic in 2020, firearm homicide trends experienced significant and rapid changes from baseline. We sought to evaluate the ability of a previously developed nowcasting model, which estimates firearm homicide trends in near real-time by combining information from several proxy data sources, to detect these changes. **Methods:** We obtained weekly time series data from five sources as predictors in the nowcasting model: emergency department visits for firearm injuries from the National Syndromic Surveillance Program (2014-2020), emergency medical service activations for firearm-related injuries from biospatial (2014-2020), National Domestic Violence Hotline calls flagged as firearm-related (2016-2020), and Google and YouTube search trends related to firearms (2014-2020). We used a previously developed 2-phase machine learning pipeline which fit optimal prediction models first for each individual data source and then combined predictions via a second machine learning model. Model performance was assessed by comparing predictions from the nowcasting model to the actual number of deaths occurring as

recorded in CDC's NVSS. We further compared predictions from the nowcasting model to results from a traditional seasonal autoregressive integrated moving average (SARIMA) model. **Results:** For 2020, the machine learning-based nowcasting model predicted 17,289 firearm homicide deaths (89.3% full year accuracy) compared to 14,508 deaths (75.0% full year accuracy) predicted by the SARIMA baseline model. The nowcasting model exhibited a 0.74 Pearson correlation coefficient for weekly death estimates compared to 0.38 for the SARIMA model. The root mean squared error was 62.8 and 114.1 for the nowcasting and SARIMA models, respectively. **Conclusions:** In this exploratory study, a machine learning-based nowcasting model was able to detect national increases in firearm homicides during a period of rapid and unprecedented change in 2020. Although predictions underestimated the total count of firearm homicides, the model markedly outperformed a SARIMA model, a widely used approach for forecasting injury mortality trends. Nowcasting models may have potential to inform emerging firearm homicide trends where official data are not yet available and thus improve the speed of public health response.

Session 23: Examining hospital-based violence intervention programs

Erie, November 2, 4:15 PM - 5:45 PM

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1. “Protect & Provide”: Perceptions of manhood and masculinities among disabled violently injured black men in a hospital violence intervention program

Nazsa Baker PhD MA¹, Cortney VanHook MPH MS MSW², Tiffany Ricks PhD RN³, Teri Lassiter PhD MPH⁴, Christopher St.Vil PhD MSW⁵, Stephanie Bonne MD FACS⁶

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Background: Exploring the post-injury lives of those who have survived gunshot wounds is essential to understanding the entire scope of firearm violence. The lives of Black male firearm violence survivors are transformed in various ways due to their injuries both visible and invisible. This study explored how Black men who suffer from disabilities via a firearm negotiated their masculine identities. **Methods:** A qualitative descriptive approach was used for this study. Semi-structured, qualitative interviews were conducted with 10 violently injured Black men participating in a hospital-based violence intervention program. **Results:** Survivors expressed their thoughts on how their injuries impacted their manhood and masculinities. Three themes emerged: 1) perceptions of manhood; 2) loss of independence and burden on others; 3) and mobility. These themes highlighted and described how their lives were impacted post-injury and characterize their psychological and physical experience of recovery. **Conclusions:** The research findings suggest the need for more qualitative studies to further explore the relationship between firearm injury, Black masculinity and perceptions of manhood. In addition, while Black men are understudied in health research and invisible in disability research, they continue to be hyper-invisible when discussing violently acquired disabilities.

2. Pediatric injury and post-injury recovery: examining recovery needs and HVIP implementation for firearm- vs. non-firearm-injured patients

Hillary M. Kapa MPH¹, Zijing Liu MS¹, Joel A. Fein MD MPH¹, Rachel K. Myers PhD MS¹

¹Children's Hospital of Philadelphia

Background: Hospital-based violence intervention programs (HVIPs) support psychosocial recovery after violent injury. To date, limited research has specifically examined pediatric HVIP implementation and client recovery to examine differences by injury mechanism, which is particularly relevant given national increases in pediatric firearm injuries. Thus, we sought to (1) examine trends in violence-related injury mechanisms among patients treated within a pediatric emergency department (ED) and (2) compare metrics of HVIP implementation between patients' with firearm-related and non-firearm-related injuries. **Methods:** We utilized existing ED injury surveillance data and pediatric HVIP records to examine non-familial interpersonal violence-related injuries and HVIP implementation measures between 2018-2022. We identified injured patients (ages 8 to 18) by query of hospital electronic health records for ICD-10 mechanism of injury codes and confirmatory chart review. We summarized injuries by year and mechanism (firearm vs. non-firearm). We separately described measures of HVIP implementation for firearm and non-firearm-injured patients including: (1) rate of enrollment, (2) program dosage (number of encounters with program staff), (3) length of program participation, (4) completion rate (i.e.,

completed vs. drop-out), and (5) recovery needs by domain (e.g., mental health, basic needs, medical, legal, educational). **Results:** 1317 patients (86% Black, 59% male, mean age=14.1 years) sought emergency care at our Level I trauma center for a non-familial interpersonal violence-related injury. Most experienced blunt injuries (n=1241, 94.2%), followed by firearm (n=50, 3.8%) and stabbing injuries (n=26, 2.0%). Firearm-injured patients were older (mean age difference=0.9 years) and more frequently male identifying (80% vs. 58%) than non-firearm-injured patients. Beginning in 2020 firearm-related injuries became more prevalent, representing 0.9% of injuries (n=6) between 2018-2019 and 6.7% (n=44) between 2020-2022. Firearm-injured patients had higher HVIP enrollment rates (36% vs 23%), dosage (median encounters=48 vs. 34), length of participation (median time=172 vs. 153 days), and completion (75% vs. 67%) than non-firearm-injured patients. Firearm-injured patients commonly identified mental health- (94%), basic needs- (75%), and medical-related recovery needs (64%), which were identified less frequently by non-firearm-injured patients (mental health: 86%; basic needs: 51%; medical: 37%). **Conclusions:** Our findings suggest that the pediatric HVIP model may be an appropriate and relevant strategy to support recovery of both firearm-injured and non-firearm-injured pediatric victims of interpersonal violence. However, firearm-injured patients may require a greater intensity and duration of program services than patients with non-firearm injuries. Further our observation of some heterogeneity in recovery needs by injury type may indicate differential needs and warrants further investigation.

3. Assessing reinjury outcomes among participants of a region-wide hospital-based violence intervention program: A case-control study

Taylor Marie Kaser MPH¹, Kristen Mueller MD¹, Matt Vogel PhD², Rachel Ancona MS PhD¹, Kateri Chapman-Kramer MSW¹, Vicki Moran RN PhD³, Chris Behr MD³, Ben Cooper MPH¹

¹Washington University in St. Louis, ² State University of New York at Albany, ³St. Louis University

Background: Victims of violence are at a heightened risk for violent reinjury after surviving their index injury. Hospital-based violence intervention programs (HVIPs) aim to reduce reinjury risk by providing social- and case-based services and counseling. Four level-1 trauma centers in St. Louis, MO partnered to create the STL-HVIP, the first multi-system, region-wide program in the United States. The objective of this study was to evaluate the STL-HVIP's effectiveness in reducing incidence of violent reinjury. **Methods:** This case-controlled study assessed patients treated for acute violent injuries (firearm, stabbing, blunt assault) at a STL-HVIP partner hospital. Data were queried from the program's companion multi-system data repository (STL-HVIP-DR), which contains individual encounter-level data for all STL-HVIP partner hospital violent injury visits from 2010 onward. Cases were STL-HVIP participants who were engaged in the program for at least six months. Controls were selected from the repository using propensity score matching at a 2:1 ratio, balanced on demographics, geography, and injury characteristics. The study period was 08/15/2018 – 06/30/2022. Both cases and controls were included if they experienced their index injury after start of the study period and before 12/31/2021. We allowed for a minimum six month follow up to detect reinjury. A logistic regression model compared the likelihood of reinjury between cases and controls. **Results:** There were 134 STL-HVIP participants meeting the inclusion criteria during the study period. Fourteen of 134 (10.4%) STL-HVIP participants and 35 of 268 (13.1%) matched controls were violently reinjured. Controls had 1.29 times the odds of reinjury compared to program participants (95% CI 0.68, 2.56; P = 0.45). **Conclusions:** These preliminary results indicate STL-HVIP participants were less likely to be reinjured than controls. Findings are limited by the rare occurrence of reinjury and small sample of program participants. We anticipate increasingly robust future outcome analyses as the program

grows. Our multi-site HVIP model and data sharing approach can serve as a guide to other HVIPs designing programs and conducting evaluations.

4. “It gave my confidence back”: Youth and family-centered outcomes of a pediatric hospital-based violence intervention program

Rachel K. Myers PhD MS¹, Hillary M. Kapa MPH¹, Carolena Muno BA¹, Laura Vega DSW¹, Joel A. Fein MD MPH¹

¹Children's Hospital of Philadelphia

Background: Hospital-based violence intervention programs (HVIPs) support recovery after interpersonal violence, including firearm injury. While research has examined HVIP impact on reinjury and recidivism, less is known about programs’ strengths-based, client-centered outcomes, particularly in the pediatric setting. As part of a formative evaluation, we identified domains of relevant youth- and family-centered pediatric HVIP outcomes from the perspectives of multiple stakeholders, including youth, caregivers, program staff, and community partners. **Methods:** Former adolescent clients (n=6), caregivers of clients (n=12), program staff (n=7), and community partners (n=17) completed qualitative interviews to elucidate client-centered outcomes realized through HVIP participation. We double coded de-identified transcripts using a content analysis approach and constant comparison. We reviewed excerpts coded as “Client Outcomes” or “Caregiver/Family Outcomes” to identify themes across stakeholder groups. **Results:** We identified six outcome domains. (1) Satisfaction-related outcomes included feeling respected by staff and perceptions of having needs met. (2) Well-being outcomes included physical recovery and improved mental health, confidence, agency, self-efficacy, and quality of life. One client shared, “[Program] helped me gain my confidence...I’m back to myself again.” (3) Interpersonal support outcomes included greater perceptions of social support, communication, and comfort discussing needs. A caregiver stated, “I feel like our communication is better...I’m not so quick to judge situations when it comes to [my daughter]. ” (4) Safety outcomes included enhancements to physical and emotional safety, including establishment of safety plans and basic resource access. One community partner described: “[Program is] really helping at the bottom of the triangle as well, housing and food and just the resources that we need from day to day.” (5) Personal growth outcomes included academic achievement, employment, and extracurricular engagement. A client shared “If it wasn't for the fact that [program staff] helped me build my resume, I probably wouldn't have had a job,” while a community partner discussed how “This young lady ended up back in school and she had the support....she didn't stop going to school.” (6) Psychosocial functioning outcomes reflected positive coping strategies, regulated responses to stress, and positive parenting practices. A staff member shared “[Clients] gain an understanding [of] coping skills in trauma and...language for what has happened for them.” **Conclusions:** Salient outcomes of pediatric HVIPs from the perspectives of diverse stakeholders, including clients and families themselves, centered on individual and family strengths, functioning, and well-being. Future systematic collection of data to document these outcomes will enhance our knowledge of the impact of HVIPs.

5. Barriers to implementing firearm violence prevention initiatives in healthcare settings

Laura Seewald MD¹, Heather Hartman MD¹, Jorge Portugal MS¹, Lynn Massey MSW¹, Laney Rupp MPH¹, Marc Zimmerman PhD¹, Rebecca Cunningham MD¹, Brian Story MD¹, Maureen Walton PhD¹, Patrick Carter MD¹

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Background: Firearm injuries are the leading cause of death for U.S. teens/adolescents, 67% due to interpersonal violence. While healthcare settings are recognized as a critical access point for at-risk youth, SaFERteens is the

only evidence-based intervention for youth seeking medical care demonstrating efficacy for reducing violence outcomes across multiple clinical trials. Despite this, SafERteens remains underutilized, signifying a need for effective translational strategies that accelerate uptake of this CDC-best practice program. To inform effective SafERteens implementation, we characterize perceived implementation barriers among healthcare providers. **Methods:** As part of an on-going multi-site hybrid effectiveness-implementation trial of SafERteens, we collected survey data (5/2023–6/2023) from healthcare providers (n=80) at one Emergency Department site. Perceived barriers to implementing evidence-based violence programs were measured, including negative program/population attitudes, social normative beliefs (i.e., clinical role perceptions), and control beliefs (e.g., training, time). Validated items also examined provider-level factors, including socio-demographics, job satisfaction, provider empathy, and attitudes towards evidence-based practice. Additional organizational factors measured included: organizational culture (i.e., hospital values/norms), organizational climate (i.e., attitudes/perceptions of hospital environment), implementation culture (i.e., values/norms around implementing evidence-based practices), and implementation climate (i.e., leadership support for evidence-based practice implementation). We report descriptive statistics on implementation barriers, and bivariate associations between these barriers and key provider/organizational factors. **Results:** Among this sample (Mage=37.0; 92.5% female; 92.2% non-Hispanic White, 88.8% nurses, 56.0% firearm ownership), main barriers to implementing violence prevention programs included control beliefs related to lack of training (53.0%) and time constraints to providing violence prevention counseling (51.9%). In bivariate comparisons between provider-level factors and a perceived barriers summary score, providers reporting lower job satisfaction ($p<0.001$) and lower empathy scores ($p<0.05$), and those expressing less favorable attitudes towards new evidence-based treatments practice integration ($p<0.05$) reported higher levels of perceived implementation barriers. Other provider-level factors, including socio-demographics, clinical role, and firearm ownership were not associated with perceived barriers. At the organizational level, perceptions that the hospital has a rigid/less proficient culture ($p<0.01$) and that the hospital has a higher stress/lower functioning climate ($p<0.01$) were associated with more perceived implementation barriers. Further, perceptions that the climate favored implementing new evidence-based practices ($p<0.01$) and has a culture/leadership supportive of new initiatives ($p<0.01$) were associated with lower perceived barriers to implementation. **Conclusions:** Implementing evidence based violence prevention in hospital settings will require identifying translational strategies that address both provider-level and organizational factors to optimize adoption.

6. “It is nice, but it can’t keep me safe”: The perspectives of Black men who survived gunshot wounds on the effectiveness of violence prevention

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Background: There are significant racial health disparities associated with gun violence, including rates of victimization and prevalence of long-term physical injury and mental illness. In Maryland, Black men are less than 15% of the state’s population but account for 82% of the state’s gun homicide victims. Hospital-based violence intervention programs (HVIPs) have been identified as comprehensive service providers for individuals who are violently injured. These multidisciplinary programs seek to reduce repeat violent injury through the provision of psychosocial services—including individual psychotherapy, peer group support, and referrals to education, employment, and housing services. However, the overt focus on trying to address the social determinants of health associated with repeat injury and poor health outcomes has precluded substantive understanding of what

Black men who survive gunshot wounds actually experience in terms of health, trauma, recovery, and healing.

Methods: This presentation draws from a long-term multi-sited ethnographic research project designed to provide rich qualitative data on the emotional experiences of Black men who survived gunshot wounds and participated in an HVIP. The research sites include the programs associated with the two busiest trauma departments in the state of Maryland and the only medical-legal partnership program in Baltimore. Data includes semi-structured interviews with HVIP participants (two interviews completed approximately 4 to 6 months apart: N=25 for first interview, N=15 for second interview), a family member or friend of a participant (N=15), and program staff (N=11).

Results: This presentation highlights the perspectives of Black men who survived being shot and who received supportive services from an HVIP on the viability of current methods of gun violence intervention. Their perspectives emphasize the significance of understanding health and social experiences related to being shot in context, as participants routinely rejected the notion that current services prevented violence or kept them safe in their neighborhood. In contrast, they argued that meaningful violence intervention and prevention is contingent upon social change predicated upon reducing racial inequality.

Conclusions: It is imperative that approaches to gun violence prevention center the perspectives of those who are most impacted by this form of violence—this includes engaging with their beliefs about what causes violence, assessments of current intervention strategies, and insights on new directions for programs. This presentation underscores the importance of framing gun violence as a racial justice issue in which the solutions are contingent upon structural change.

Session 24: Examination of firearm policies and their effects on firearm injuries (Part III)

Sheraton I, November 3, 8:00 AM - 9:30 AM

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1. Assessing the relationship between permit-to-purchase law changes and weapons arrest rates: A longitudinal study from 1981-2019

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Background: Firearm licensure laws, known as Permit-to-Purchase (PTP) laws, require individuals to obtain a permit from law enforcement before purchasing firearms. Evidence suggests that states adopting PTP laws experience reduced firearm violence, while repealing such laws leads to increased violence. PTP laws may influence firearm violence by affecting weapons arrests, including lower rates of straw purchases and decreased time-to-crime. **Methods:** We analyzed data from the FBI's Uniform Crime Reports (UCR) to examine overall and stratified rates of weapons arrests by race and sex. To assess the impact of PTP adoption and repeal, we employed two causal methodologies: 1) the two-stage Difference-in-Difference method (DiD2s), and 2) the Augmented Synthetic Control Method (ASCM). Two states adopted PTP laws (Connecticut in 1995 and Maryland in 2013), while two states repealed PTP laws (Missouri in 2007 and Michigan in 2012). We compared PTP adopters to never-treated states and PTP repealers to always-treated states. **Results:** The DiD2s results indicate that PTP adoption is associated with lower rates of weapons arrests among white citizens (ATT = -20.04, SE = 7.51) and females (ATT = -5.17, SE = 1.63). However, PTP repeal did not result in changes in weapons arrest rates. In the ASCM models, PTP adoption in Connecticut was linked to a reduction of 21.78 weapons arrests per 100,000 population (SE = 3.86). Moreover, PTP adoption in Connecticut was associated with lower weapons arrest rates per 100,000 among white citizens (ATT = -17.49, SE = 1.94) and males (ATT = -40.83, SE = 8.48). However, PTP adoption did not significantly impact weapons arrest rates among Black citizens in Connecticut (ATT = -57.65, SE = 45.98) or females (ATT = -3.01, SE = 1.58). No other states showed significant changes in the ASCM analyses. **Conclusions:** Adopting PTP laws is likely linked to lower stratified rates of weapons arrest rates. These laws hinder access to firearms for individuals prohibited from possessing them, supporting existing research on PTP laws. However, our findings indicate an unequal impact of PTP laws, with significantly lower weapons arrest rates among whites but not among Blacks. This finding may be explainable by disproportionate law enforcement practices surrounding these laws.

2. Effects of firearm laws controlling for demographically-specific information on firearm ownership

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Background: Firearm ownership is correlated with suicide risk across individuals as well as across U.S. states. Differences in firearm ownership rates may, therefore, be an important source of variance in suicide rates. Properly adjusting for ownership rates could improve estimates of the effects of firearm policies. Until recently, state and substate longitudinal estimates of firearm ownership were unavailable, and the widely used proxy measure of ownership (firearm suicides as a proportion of all suicides) can be associated with suicide rates for reasons other than gun ownership. In this study we control for a novel longitudinal measure of firearm

ownership for 16 demographic groups within each state and year, 1995-2018, while estimating the effects of four state firearm policies: child-access prevention laws (CAP), stand-your-ground laws (SYG), waiting period laws (WP), and permissive concealed carry laws (CC). **Methods:** Suicide counts were drawn from CDC mortality files for 16 demographic groups across 50 states and 23 years (N=17,856 estimates). Firearm ownership rates for each group and year were estimated from national survey data (General Social Survey and Behavioral Risk Factor Surveillance System) using multilevel regression with poststratification implemented with a Bayesian machine learning algorithm. Law effects were estimated using a model we have shown through simulations to be optimal for estimating law effects on firearm mortality compared to hundreds of alternative models (Schell et al., 2018). Specifically, we used the Bayesian nonlinear autoregressive model with time fixed effects described in Cefalu et al. (2021), allowing law effects to emerge over a five-year period. This model included social, economic, and political covariates as well as firearm ownership. **Results:** CAP was associated with an incident rate ratio (IRR) of 0.89 (80% credible interval: 0.85-0.94), indicating passage of these laws is associated with an 11% reduction in firearm suicides five years later. WP had an IRR = 0.95 (CI: 0.91-0.93), SYG had IRR = 1.05 (CI: 1.02-1.09), and CC had IRR = 1.05 (CI: 0.98-1.13). **Conclusions:** Considerable evidence suggests that SYG laws increase firearm homicides (Smart et al., 2023). The current results suggest they also meaningfully increase rates of firearm suicide by mechanisms that have not yet been explored. States without waiting period or child-access (safe storage) laws should consider implementing them as a strategy for reducing firearm suicides. Finally, law effects estimated with fine control for firearm ownership rates may reveal stronger evidence of law effects than similar models we have examined without those controls.

3. The effects of permitless concealed carry on gun violence and victimization

Susan Parker PhD¹

¹*Northeastern University*

Background: In the last ten years, one of the most substantial changes in firearm policy is the widespread adoption of permitless concealed carry. Since 2010, twenty-two states have adopted a permitless carry law. Permitless concealed carry policies allow firearm owners to carry a concealed handgun in public without first obtaining a license and undergoing a background check. The effects of permitless carry on violent crime, specifically gun crime, are not known as the passage of permitless carry laws have outstripped research on its effects. This paper examines the effects of permitless carry laws using to investigate whether permitless carry policies affect violent crime and, if so, who is impacted by gun violence. **Methods:** I estimate the effects of adopting a permitless carry law on these outcomes using a staggered difference-in-differences framework that uses variation in the timing of state policy changes from 2015-2020. Because treatment effects may be heterogeneous, I avoid biased estimates by using a stacked difference-in-differences model (Baker et al., 2022; Cengiz et al., 2019; Deshpande & Li, 2019). I use the Federal Bureau of Investigation (FBI) Uniform Crime Reporting Program's National Incident Based Reporting System (NIBRS), which provides detailed information about crime incidents and victims. As NIBRS does span all states, I additionally use the FBI's Summary Reporting System (SRS) to ensure that sample composition does not drive results. I focus this analysis on a seven-month time frame after policy adoption because permitless carry should take effect rapidly and to reduce the likelihood that effects are driven by unobservable shifts in gun ownership and other time-varying confounders. **Results:** I estimate an approximately 7 percent increase in aggravated assaults in states that adopted permitless carry in the seven months after policy adoption. This increase in violent crime is driven by gun crime, which rose 9.1 percent, with no evidence that non-gun violent crime similarly increased. Rather, increases in gun violence

take place in public between acquaintances and strangers, and are not driven by domestic or intimate partner violence. I also find that armed conflicts between individuals involving firearms increasingly result in injured victims. Victims of gun violence tend to be white males over 40 years of age. **Conclusions:** This proposed presentation seeks to address an empirical gap in the firearm injury literature by assessing the effects of permitless carry laws and what mechanisms drive estimated increases in gun violence.

4. State expansion of supplemental nutrition assistance program eligibility and rates of firearm-involved deaths in the United States

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Background: Poverty is a consistent correlate of firearm-involved mortality, yet little work has considered the effects of social and economic policies on firearm deaths. This study examined associations of state elimination of the asset test and increases in the income limit for Supplemental Nutrition Assistance Program (SNAP) eligibility with rates of firearm-involved total, suicide, and homicide deaths in the United States. **Methods:** This ecological cross-sectional study used 2015-2019 data from the SNAP Policy Database and death certificate data from the National Vital Statistics System. The exposures were state elimination of the asset test only and state adoption of both SNAP eligibility policies (i.e., elimination of the asset test and increases in the income limit). The outcomes were firearm-involved total, suicide, and homicide deaths. The research team conducted mixed-effects regressions to estimate associations. Multivariable analyses adjusted for time-varying measures by state and year of the underlying state policy context (state minimum wage, refundable EITC, maximum Temporary Assistance for Needy Families [TANF] benefit for a family of three, Medicaid expansion, recreational marijuana legalization, number of restrictive firearm policies) and state economic conditions (percent population unemployed and median household income). **Results:** State elimination of the asset test (aIRR: 0.76; 95% CI: 0.60, 0.97) and adoption of both policies (aIRR: 0.80; 95% CI: 0.63, 1.02) were associated with decreased rates of total firearm deaths compared to state adoption of neither policy. State elimination of the asset test (IRR: 0.67; 95% CI: 0.48, 0.91) and adoption of both policies (IRR: 0.68; 95% CI: 0.49, 0.92) were associated with decreased rates of firearm-involved suicide deaths compared to state adoption of neither policy. There were no associations with state firearm-involved homicide rates. **Conclusions:** SNAP is an important social safety net program that addresses food insecurity, and the present results suggest it may also contribute to reductions in firearm-involved suicide.

5. The perils of Bruen for gender-based violence

Michael R. Ulrich JD MPH¹

¹Boston University

Background: The purpose of the presentation will be to analyze the deliberate disconnect between what New York State Rifle and Pistol Association v. Bruen implies with regard to safety for women under an expansive Second Amendment and the real-world implications of the historical test the case requires. **Methods:** This presentation will contrast the narrowed use of anecdotal stories of women saved by firearms to justify expansive interpretations of the Second Amendment while omitting population-level empirics that prove the converse. Moreover, the historically focused test mandated by the Court in Bruen all but ensures that women's safety will

take a backseat to an individual challenger's interest in self-defense. In his Bruen concurrence, Justice Alito references a woman saved from an attacker by a man carrying a firearm in public. The invocation of "stranger danger" is common in the debate over gun policies, but it belies the data that demonstrate women are most often at risk from people they know. Yet, the case *United States v. Rahimi*, which challenges restrictions to firearms for those under domestic violence restraining orders, demonstrates that a constitutional analysis devoted entirely to history removes the consideration of modern empirical research and places women at greater risk by threatening one of the most useful policy tools to protect them from gun violence. **Results:** Striking down restrictions to firearms for those who commit domestic violence will have a drastically devastating impact on women's health, especially pregnant women who are already at increased risk after the Supreme Court's abortion decision last year. **Conclusions:** There is a strong possibility that the Supreme Court will hear the *Rahimi* case in the 2023-2024 term. An analysis of how the Court might uphold the federal law at issue and the implications if it does not, will be both timely and important.

6. [A social problem analysis of the 1993 Brady Bill & the 2022 Bipartisan Safer Communities Act \(BSCA\)](#)

Devon Ziminski MS¹

¹*Rutgers University*

Background: Despite increasing firearm violence in all its forms, U.S. federal policy has not kept pace to align harm with action. In June 2022, the U.S. federal government passed its first major firearm since the Brady Bill of 1993, the Bipartisan Safer Communities Act (BSCA). The goal of this work is to outline the social problem of firearm violence, consider the ideological frameworks that undergird the Brady Bill & BSCA, and analyze how the policies themselves underemphasize the social realities of U.S. firearm violence. This work informs the role of federal policy in defining and monitoring gun violence as a public health issue, identifying risk and protective factors, and allocating preventative efforts in communities that are most affected. **Methods:** Historical comparative analysis was used to determine how the social problem of firearm violence was outlined in both the 1993 Brady Bill and the 2022 Bipartisan Safer Communities Act, particularly given the social changes across 30 years. Textual analysis was conducted through NVivo 14. **Results:** Results highlight the appropriations attached to both bills and note the implicit reasoning for the occurrence of firearm violence as "prohibited persons" and mental illness. Both policies rely on focused deterrence as the sole avenue to address firearm violence. Both policies do not address the disproportionate effect of gun violence on certain populations or equitable allocation of resources. Indeed, the words "firearm violence" or "gun violence" do not appear in either of the texts. **Conclusions:** Findings demonstrate that the goals, objectives, values, assumptions, and theories of the Brady Bill and BSCA remain in misalignment with the social problem of current day U.S. firearm violence. The policies conflate various types of firearm violence, focusing on individual level factors without inclusion of structural elements that contribute to the critical socio-ecological context of interpersonal and community violence. The absence of these policies' assessment of any systemic inequities and/or disproportionate effects on certain populations distances future policies' ability to effectively address the issue long term as the direct naming of the problem and populations affected will continue to place firearm violence as an under-researched/less understood issue compared to other public health arenas, delaying the field further in addressing long-term solutions. To continue to reduce firearm violence in communities, U.S. policymakers must complement immediate and shorter-term evidence-based firearm regulations with longer-term investments in community-based violence intervention initiatives and policies that address social determinants of firearm violence.

Session 25: Examining school-based violence prevention strategies

Sheraton III, November 3, 8:00 AM - 9:30 AM

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1. State by state legislative action to the Sandy Hook mass shooting and analysis of subsequent legislative reaction

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Background: We developed a database of firearm-related laws enacted by states in the legislative session immediately after the Sandy Hook massacre and in the seven years that followed, analyzed subsequent state legislative reactions, and identified patterns in these reactions starting with the initial “Sandy Hook” laws through subsequent legislative activity in response to mass shootings through 2020. **Methods:** Using Thomson Reuters Westlaw, we developed a database of gun laws enacted or amended beginning in 2013. We tracked legislative response through 2020. We coded legislative response identifying four patterns: legislative action leading to firearm restrictive laws, firearm expansive laws, a mixed response, or consistent legislative inaction. **Results:** In the first legislative session after Sandy Hook, state responses varied. An almost equal number of states failed or chose not to pass legislation, passed a mix of legislation that both restricts and expands access or possession of firearms, or passed restrictive legislation only. Trends in the subsequent years revealed a continuity in heterogeneity with twenty-nine states passed a mix of firearm restrictive and expansive laws, ten states consistently enacted firearm restrictive legislation, nine states were mostly inactive, and two states consistently firearm expansive. Legislation that passed fell into two categories: 1)firearm restrictive laws that involved domestic violence or mental health, and 2)firearm expansive laws that expanded concealed carry options. We conclude that inconsistent state legislative action from one year to the next with contracting and expanding access to firearms may contribute to an overall weakening of firearm policy. **Conclusions:** This database and study provided two insights: it shows heterogeneity in longer term legislative response patterns to mass shootings beginning with Sandy Hook, and more broadly, it shows why state firearm policy might not be as effective even in states passing restrictive laws despite evidence that restrictive laws are associated with lower firearm deaths because of the within state legislative heterogeneity every one to two years.

2. School lockdowns and student mental health in the United states

Keith L. Hullenaar PhD¹, Frederick Rivara MD¹

University of Washington

Background: The Washington Post estimated that 4.1 million youth experienced a real school lockdown during the 2017-2018 school year. A school lockdown is a security response to threats of violence in or around the school that requires all school staff and students to shelter in their classrooms or designated safe areas until school administrators determine that the school grounds are safe. Studies suggest that school lockdown drills may reduce students’ perceived safety, increase students’ avoidance behaviors, and induce anxiety states. However, prior studies focus on the impact of school lockdown drills as opposed to actual lockdown events. Lockdown drills likely do not have the same emotional and psychological impact as actual lockdown events that

present real threats of danger to youth. This study investigates the link between experiencing school lockdowns due to violence and mental health in US children. **Methods:** This study utilized four waves of data collected from 6,251 US children who participated in the Adolescent Brain and Cognitive Development (ABCD) study. The primary exposure was whether the child experienced a school lockdown in the past year due to violence or threat of violence (Wave 3). The primary outcome set comprised changes in seven childhood mental health scores (Wave 3 to Wave 4) as measured by the Child Behavioral Checklist (CBCL) and the Achenbach System of Empirically Based Assessment (ASEBA) DSM-oriented T-scores. We used linear regression models with robust clustered standard errors to compare these changes between children who experienced a school lockdown (versus children who did not experience a school lockdown). **Results:** Approximately 10% of children in the ABCD study (n = 611) reported experiencing a lockdown in the past year. We found that children who experienced a school lockdown in the past year (versus children who did not experience a school lockdown) reported significantly higher changes in ASEBA scores for somatic disorders ($\beta = 0.81$, [0.34, 1.29]), attention-deficit/hyperactivity disorder ($\beta = 0.45$, [0.08, 0.81]), oppositional-defiant disorder ($\beta = 0.42$, [0.05, 0.78]), and stress problems ($\beta = 0.45$, [0.08, 0.82]). **Conclusions:** In the face of violent threats, US schools use lockdowns as a tactic to increase school safety and prevent harm to their students. While this tactic may protect students from physical harm, school lockdowns and the threat of violence can still harm students' mental health. Our findings suggest that schools should prepare to avail school-based mental health services to students to promote student mental health recovery post-lockdown.

3. 'We remember them': A mixed methods study of posttraumatic growth, collective efficacy, and agency among survivors of mass violence in California

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¹University of Toronto

Background: Mass violence in the United States has been shown to cause trauma for survivors. These events may also create for survivors the experience of posttraumatic growth (PTG), the facets of which include personal strength, appreciation for life, new possibilities in life, spiritual change, and enhanced relationships with others. However, the role of collective efficacy and agency in the development of PTG following mass violence remains unknown. The purpose of this study is to assess the relationship between PTG and experiences of collective efficacy and agency among survivors of the Isla Vista, California tragedy of 2014. **Methods:** The mixed methods objective was to explore the interpretive context within which the agency and collective efficacy experiences occurred. Quantitative data collected in a questionnaire (n=166) were used to inform the collection of qualitative interview data (n=12). **Results:** Participating in therapy, organizing community events, and making the decision to either leave or stay in Isla Vista positively correlated with PTG based on hierarchical regression analysis. Themes of personal agency, the importance of role, and participating in collective action emerged from interviews. **Conclusions:** This study offers unique methodological approaches to using mixed methods data to understand the experiences which contributed to PTG among survivors of a mass shooting.

4. Posttraumatic change among survivors of mass public shootings: The role of the event impact and social acknowledgement

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Background: Although mass public shootings are statistically rare events in the context of the U.S. crime picture, these events continue to increase in both frequency and lethality each year. While most attention is paid to those whose lives are taken by these events and the individuals who are injured, the impact of these tragedies is far more widespread. To date, however, there is little research examining the perceptions of survivors of mass public shootings, particularly in the longer-term aftermath, to understand their recovery experiences. **Methods:** Snowball sampling through peer support networks for mass shooting survivors and others known to the researcher was used to recruit individuals who have been directly (e.g., injured, family of the deceased, present but physically unharmed, first responders) and indirectly (e.g., community members) impacted by mass public shootings in the U.S. Participants completed an online survey that examines a range of outcomes both generally and across the different phases of disaster (immediate, intermediate, and long-term). For this presentation, the potential effects of event centrality, social acknowledgement, and access to mental health care on posttraumatic change are explored using previously validated scales and questionnaires embedded within the survey. **Results:** Initial descriptive analyses (as data collection still is in progress) find that a majority of respondents reported growth relative to posttraumatic change. They also reported that the incident was central to their identity but that many other people they encounter lack comparable experiences and cannot understand what they went through. The relationship between these variables will be explored using multivariate regression modeling (with adjustments made for clustering by community or type of impact as needed) to better understand how the disparity between survivors' own identities after the shooting (centrality of event) and their perceptions of how others see and interact with them (social acknowledgement) impact posttraumatic change. Additional consideration is given to how these perspectives differ based on how the participant was impacted and what type of location the shooting occurred at. **Conclusions:** As more people are impacted by mass public shootings each year, it is imperative to understand how best to support them in the aftermath to facilitate a positive posttraumatic journey. Identifying both facilitators and barriers to posttraumatic growth through both formal (e.g., mental health care access) and informal (e.g., social acknowledgement) mechanisms can help develop a layered approach to supporting individuals impacted by mass public shootings not just immediately but long after the tragedy occurs.

5. Is it possible to detect true effects of firearm policies on the risk for mass shootings using common statistical methods?

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Background: Mass public shootings are rare events, but their far-reaching impacts on citizens' wellbeing galvanize public attention and spur calls for policy reform. Identifying policies that can prevent these costly incidents is a priority, yet the literature is inconclusive about which policies will be effective. This study assesses the extent to which inconclusive evidence reflects limitations of the statistical methods used to evaluate the effects of policies on these relatively sparse outcomes. **Methods:** We conduct statistical simulations to examine the performance of several commonly used models for examining state-level firearm policy effects on the number of mass shooting or mass public shooting incidents. Using real mass shooting incident data aggregated to the state-year level from 1976 to 2020, we iteratively simulate policy enactment dates for a random subset of states (5, 15, or 35), create true effects of varying sizes (incidence rate ratios [IRRs] between 0.80 and 1.25) within the real data, then assess performance of effect estimates. We measure performance in terms of bias, root mean squared error (RMSE), confidence interval (CI) coverage, and correct rejection rate. **Results:** Across all

simulated conditions for mass public shootings, RMSE estimates for all methods evaluated were quite large (on the same order of or larger than the effect size imposed). Large RMSEs were primarily driven by the high variance of the estimates, although several methods (e.g., models with state-specific slopes, models with linear or spline terms for national trends) produced substantially biased effect estimates when relatively few states were treated. For mass public shootings, all methods evaluated had severely limited statistical power (correct rejection probability less than 0.2) for detecting policy effects unless effect sizes were very large (i.e., IRR=0.80 or IRR=1.25). Analyses of mass shootings performed better on all dimensions, although power remained limited unless effect sizes were large and most states had implemented the policies. **Conclusions:** Standard methods for evaluating causal effects of state-level policies on firearm violence have severely limited power, even when actual effects are meaningfully large. It is thus likely that policies that are truly beneficial for preventing mass shootings will not yield statistically significant results in most empirical evaluations. Relatedly, it suggests that a potentially large fraction of previously reported significant effects are spurious, and do not accurately reflect the true effect size or even the direction of the true effect, in some cases. Recommendations for conducting research that can appropriately guide public policy are discussed.

6. Firearm-related tips in a statewide school anonymous reporting system: Prevalence, urgency, and form of violence using natural language processing

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Background: Anonymous reporting systems (ARS) are widely implemented in the U.S. with over 50% of schools using at least one system. Yet, there is limited empirical data available regarding how ARS are used and the efficacy of ARS for preventing firearm injury. The sheer volume of tips received and the unstructured nature of the tip-narrative data (i.e., blocks of text) necessitates innovative approaches to codify data into themes and identify trends and correlations among tip characteristics. The current study demonstrates how researchers can leverage computational methods to yield information on firearm-related ARS tips. **Methods:** We conducted secondary data analysis of over 18,000 tip narratives submitted through a statewide ARS from 2019-2023. We employed natural language processing to analyze the prevalence of fire-arm related tips by school year, with further breakdown by event urgency (i.e., life threatening or not), the type of tip submitted, and resolution outcome. **Results:** From 2019 through spring 2023, >18,000 unique tips were reported through the ARS across the state and 1,772 (9.8%) directly referenced a firearm-related term (i.e., gun, shotgun, pistol, ammo, firearm, semiautomatic, musket, rifle, bullet, shot up, shoot). Just over half of firearm-related tips were classified as urgent, life-threatening tips (51.1%). Based on the event-type, 73.2% of weapon related tips contained a firearm-related term; 70.2% of planned school attack tips referenced a firearm; 31.0% of intent to harm someone tips contained reference to a firearm; 33.1% of gang violence/activity tips referenced a firearm topic; yet only 3.7% of suicide-reported tips referenced a firearm-related term. The most common outcomes were notification of parents (39.0%), handled through school disciplinary (22.2%) or non-disciplinary (19.5%) means, police welfare check (15.6%) and continued monitoring by school personnel (15.1%). Issuance of a citation, recovery of a weapon, hospitalization, restorative practices, safety planning, and establishing a treatment plan all occurred in <2% of tips. **Conclusions:** Currently, there are no nationally accepted standards for how to utilize ARS data. Evaluating and tracking the prevalence and distribution of tips, event urgency, and form of violence reported is critical for ongoing measurement of firearm-related violence trends within school-aged children and

adolescents. Further, given that not all firearm-related tips require emergency service response, future work to understand opportunities to help schools and parents with skills to address safety concerns identified within ARS is needed.

Session 26: Assessing risk and implementing evidence-based solutions to prevent suicide (Part III)

Sheraton I, November 3, 9:45 AM - 11:15 AM

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1. The association of suicide risk factors with firearm ownership and storage practices in Colorado

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Background: Individuals with firearms at home, compared to those without, have three times the odds of suicide death. In the U.S., one-third of households have a firearm and less than half store their firearms safely (i.e., unloaded and locked), which may further contribute to completed suicide. We sought to examine the relationship of select suicide risk factors with firearm possession and storage practices. **Methods:** The Colorado Behavioral Risk Factor Surveillance System is a cross-sectional telephone survey including both landline and cellular phone respondents, sponsored by the Centers for Disease Control and Prevention, and weighted to represent the Colorado population. Using data from all non-institutionalized Coloradan adults surveyed 2020-2022, we conducted survey-weighted logistic regression to examine associations of select suicide risk factors: poor mental health, frequent mental distress, excessive alcohol use, and poor physical health, with two binary outcomes: (1) having a firearm in or around the home and (2) unsafe firearm storage practices among those who have firearms, defined as having at least one firearm in or around the home that is unlocked or loaded. Covariates included the respondent's age, sex, marital status, and having a child in the home. **Results:** Among all respondents (n=7,873), 36.5% said that they kept at least one firearm in or around their home, representing 2,670,750 Coloradans. Of those with a firearm in/around the home, 28.3% said ≥ 1 firearm was loaded, 54.9% said ≥ 1 firearm was unlocked, and 28.3% least 1 firearm loaded OR one firearm unlocked. Of the risk factors assessed, excessive alcohol use was the only one associated with having a firearm in/around the home (OR 1.21, 95% CI 1.02, 1.42). Among those with a firearm in or around the home, none of the selected suicide risk factors were associated with unsafe firearm storage after adjusting for confounders. **Conclusions:** The association of excessive alcohol use with having a firearm in/around the home is consistent with previous studies and highlights the need for more targeted prevention strategies in this population. One intervention consistent with these findings is out-of-home firearm storage to increase time and distance between a firearm and those at risk for suicide. Future studies should examine additional confounding unmeasured here and examine mediation by marital status and having a child in the home.

2. Promoting secure firearm storage in pediatric primary care: Results from an effectiveness-implementation trial of the S.A.F.E. firearm program

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Background: Youth suicide has increased in the US over the past decade; over 40% of these deaths involved a firearm, making firearm storage a modifiable determinant of youth suicidal injury and mortality. Pediatric primary care is an optimal venue for intervention. However, despite the existence of evidence-based practices and recommendations from the American Academy of Pediatrics, these practices are not routinely conducted. Our Adolescent and child Suicide Prevention in Routine clinical Encounters (ASPIRE) randomized controlled trial (R01 MH123491) tests strategies to deliver a universal suicide prevention program, S.A.F.E. Firearm, in well-child visits (ages 5-17). This program includes (1) brief discussion on firearm storage with youth and their caregivers and (2) offering a free cable lock. The study compares two active implementation strategies informed by behavioral economics: "Nudge," a reminder embedded within the well-child visit template in the electronic health record (EHR) vs. "Nudge+," the EHR reminder plus practice facilitation, where a trained support facilitator helps troubleshoot implementation barriers and provides audit and feedback. **Methods:** This cluster randomized hybrid effectiveness-implementation trial compares two implementation strategies, Nudge and Nudge+, on clinician-reported delivery of S.A.F.E. Firearm components (i.e., reach) over one year in 30 clinics within two large health systems in Michigan and Colorado. Clinics were randomized to receive Nudge or Nudge+ (k=15 each). Caregiver-reported program receipt was assessed via online survey. **Results:** 43,421 well-child visits were eligible during the one-year trial. Clinicians documented that they offered firearm storage counseling and free cable locks at 57.5% and 40.2% of eligible visits, respectively; clinicians documented offering both at 39.4% of eligible visits. Caregiver report (39.8% response rate) was within 10% of clinician documentation (48.3% and 31.2% of caregivers reported receiving firearm storage counseling and being offered a free cable lock, respectively; 30.6% reported receiving both). Data analysis is ongoing and will be completed in September 2023; we will present primary results of the randomized trial by arm on reach, as well as secondary findings of caregiver-reported receipt of the program. **Conclusions:** At least one component of S.A.F.E. Firearm was delivered at nearly 25,000 well-child visits across two geographically and demographically diverse health systems in just one year, suggesting promise for broad reach of this program in pediatric primary care. This study provides valuable insights into strategies to encourage pediatric clinicians and health systems to implement S.A.F.E. Firearm nationwide, with the goal of reducing unauthorized youth firearm access and, ultimately, preventing youth injury and suicide.

3. Firearm suicides among young Americans

Tannuja Rozario PhD¹, Mackey O'Keefe¹

¹Everytown for Gun Safety

Background: The firearm suicide rate among young people increased faster than for any other age group over the past decade, resulting in thousands more young lives lost. Structural racism and ongoing stressors related to the COVID-19 pandemic posed unique challenges for America's youth. In addition, certain young Americans, like those ages 10 to 14, experienced sharp increases in firearm suicide. The purpose of this project is to explore firearm suicide among young people ages 10-24 in the United States from 2018 to 2021 by comparing firearm suicide trends by demographics and age groups. Importantly, this study also examines the relationship between state gun laws and youth firearm suicide. **Methods:** Data with suicide as the underlying cause of death among persons aged 10 to 24 from 2018 to 2021 was obtained from the Centers for Disease Control and Prevention's Web-based Wide-Ranging Online Data for Epidemiologic Research (WONDER) website. Annual numbers of suicides were obtained, as well as age, race, ethnicity, sex, region and suicide method. Gun safety policies came from Everytown's Gun Law Rankings, which are based on a comprehensive survey of 50 laws in all states. A

composite score is calculated and states are categorized as leaders, making progress, missing key laws, weak systems, and failures. **Results:** We find that more than 3,300 young people die by firearm suicide each year. From 2018-2021, the rate of firearm suicide among young people increased by 18%. Black youth experienced the largest increase. Boys and young men represent 9 in 10 youth firearm suicide victims, however, the firearm suicide rate among girls outpaced that of boys among the age group 10-14, which saw sharp increases. Youth firearm suicide increased as state gun safety policies became weaker. Youth suicide involving firearms were 27% in states that lead the nation with strong gun safety policies, 50% in states making progress, 52% in states missing key gun safety laws, 56% in states with weak systems, and 59% in states that have failed to put basic protections into place. **Conclusions:** Firearm suicide among young people has reached a crisis point during the pandemic. States that have led the nation in enacting strong gun safety policies have lower youth firearm suicide rates than states with lax policies. These findings have implication for youth at risk of suicide in states where practices and policies create easy and immediate access to firearms.

4. Firearm access and risk mitigation among Veterans at elevated risk for suicide who seek emergency services

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Background: The Veterans Health Administration (VHA) implemented a universal suicide risk screening and evaluation protocol for patients receiving care in emergency departments (ED). For patients who screen positive for elevated risk, the Comprehensive Suicide Risk Evaluation (CSRE) is conducted that facilitates risk stratification, as well as identification and mitigation of modifiable risk factors (e.g., firearm access). The aim of this study was to characterize firearm access and clinician-reported firearm injury risk mitigation strategies among a national population of Veterans. **Methods:** We used the VHA Corporate Data Warehouse to identify all Veterans who accessed VHA ED services from January 2021 through October 2022. Veterans were included if they screened positive for elevated suicide risk, had a CSRE completed, and were discharged home. We abstracted templated, clinician-documented data on suicide risk level (high, intermediate, low), veteran-reported firearm access, and clinician-reported delivery of lethal means counseling and distribution of firearm locking devices. **Results:** Of 24,682 Veterans who screened positive for elevated suicide risk and met other eligibility criteria, 9.9% were stratified as high risk, 47.5% as intermediate risk, and 42.6% as low risk. Overall, 69.7% of patients were documented as lacking firearm or other lethal means access, 13.1% were documented as having firearm access, 8.9% were documented as unknown access, and 10.6% were documented as having access to other methods of suicide (e.g., ligatures). The prevalence of documented firearm access was similar across risk levels (11.9% high, 13.0% intermediate, 12.0% low), whereas the prevalence of documenting unknown access was higher among high-risk patients (15.6%) in comparison to intermediate (8.9%) and low risk patients (6.6%). Of those identified as high risk, 8.7% were documented as recently using or seeking access to lethal means of suicide (2.6% intermediate, 0.4% low). Of those with firearm access, 70.3% received lethal means counseling (68.3% high, 80.8% intermediate, 59.2% low) and 10.1% were distributed a firearm locking device (9.3% high, 12.4% intermediate, 7.9% low) prior to discharge. **Conclusions:** Among Veterans accessing VHA ED services who were at elevated risk for suicide, one in eight were documented as having firearm access; a far lower prevalence relative to the national population of U.S. Veterans (~45%). Additional work is needed to clarify the reasons why many

individuals are documented as having “unknown access.” Given the elevated suicide risk among patients accessing ED services, further work is needed to facilitate delivery of evidence-based lethal means interventions, including counseling and distribution of locking devices.

5. Firearm access is associated with the capability for suicide and suicide ideation

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Background: Over half of suicides in the U.S. are completed with firearms and living in a home with a firearm is a risk factor for suicide. Theory-driven research within psychology describes firearm access and familiarity as representing a type of suicide capability. The notion of suicide capability was first articulated by the interpersonal theory as a limiting factor in differentiating those who would, given the desire for death by suicide, go on to die by suicide. The interpersonal theory described suicide capability as being comprised of fearlessness about death and tolerance for physical pain. Authors later adopted the term suicide capability to represent a class of factors associated with the transition from the desire for death by suicide to engaging in suicidal behavior (i.e., the Ideation-to-Action Framework) with firearm access characterized as a practical form of suicide capability. This study aims to better understand the relations of firearm access, different forms of suicide capability, and suicidal thoughts and behaviors in youth and adults. **Methods:** Data were collected from 1,124 high school youth in the southeastern U.S. Participants were mostly female (55%) and Black (69%). A nationally representative survey of 2,000 adults is currently underway and will be completed and analyzed by September 2023. Participants completed self-report measures of gun access, the Suicide Capability Scale, and the Paykell Suicide Scale. **Results:** Among the youth sample, 67.5% reported that they lived in a home where a gun was present. Living in a home where a gun was present was associated with higher suicide capability ($=.23$, $t=7.65$, $p<.001$) and suicidal thoughts and behaviors ($=.19$, $t=6.44$, $p<.001$) while controlling for age and gender. These relations were not moderated by race. Similar analyses will be conducted with the adult sample as will additional analyses deconstructing different facets of suicide capability and suicidal thoughts and behaviors. We will also explore moderating relations consistent with the interpersonal theory and ideation-to-action framework. **Conclusions:** Though access to firearms is largely described in terms of its practical relevance to risk for suicide among those already experiencing acute suicidal desire, the current findings suggest that firearm access may promote other aspects of suicide capability. Access to firearms may be associated with other mental health factors that are, themselves, risk factors for suicide among youth.

6. Mobility problems preceding female firearm suicide: a descriptive analysis using the national violent death reporting system

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Background: Female firearm suicide rates increased by 20% from 2010 to 2020. Established risk factors for suicide include mental illness, substance use disorder, physical health problems and pain, stressful life events, and exposure to violence over the life course. However, limited studies examine the relationship between

mobility problems (such as neurological movement disorders, musculoskeletal pain, or senescence) and female firearm suicides. Mobility problems may contribute to a variety of circumstantial risk factors preceding suicide. This study aimed to describe decedents of female firearm suicides who were noted to have preceding mobility problems. **Methods:** Deidentified data from the National Violent Death Reporting System (NVDRS) Restricted Access Database was obtained on all female firearm suicides from 2014 to 2018 with at least one year of data from all 50 states and territories. The NVDRS Database contains unstructured narratives from law enforcement (LE) and the coroners/medical examiners (CME). Using key search terms identified from prior literature to define mobility problems, we used text mining and subsequent manual review to identify decedents with explicit descriptions of mobility problems in LE/CME narratives. Descriptive analysis was performed using stratifications by pre-coded and manually coded demographic and circumstantial variables. **Results:** Between 2014 and 2018, the NVDRS recorded 8,313 female deaths by firearm suicide. Text mining identified 2,092 (25.2%) cases of firearm suicides; manual review identified 165 (2.0%) of the 8,313 decedents as having mobility problems preceding the suicide. Decedents with noted mobility problems were older (mean=60.5; SD=14.5) compared to decedents without noted mobility problems (mean=46.9; SD=16.9). A history of suicidal thoughts (40.0% vs 32.0%) and having a depressed mood as perceived by others close to them (41.1% vs 33.9%) were more common among decedents with mobility problems versus those without mobility problems. Of the decedents with mobility problems, 25 (14.8%) had a substance use problem at the time of death and 26 (15.4%) had a mention of prior surgery. Descriptive reports indicated that arthritis, musculoskeletal injuries (e.g., fractures, paralysis), and neurological problems were major contributors to mobility problems. **Conclusions:** Female firearm suicide decedents with mobility problems were more frequently noted to have a history of suicidal thoughts and to be perceived as depressed. Arthritis, injuries, and neurological problems were major contributors to mobility problems. This comprehensive descriptive study indicates the need for further research on the relationship between mobility problems, firearm access, and suicide.

Session 27: Exploring neighborhood characteristics relating to firearm injury

Sheraton III, November 3, 9:45 AM - 11:15 AM

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1. Substance misuse, housing instability, and positive symptoms of psychosis as documented in Extreme Risk Protection Order (ERPO) petitions in Colorado

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Background: Extreme Risk Protection Orders (ERPOs) allow for temporary removal of firearms from persons posing significant risk of firearm violence. ERPO laws were implemented in Colorado in 2020. Individuals with a history of substance misuse (SM), housing instability, and mental health conditions (MHC), specifically those exhibiting the positive symptoms delusions and hallucinations (PS), are at higher risk of firearm violence. We sought to identify the prevalence of these factors among respondents in ERPOs filed between 2020-2022 in Colorado. **Methods:** ERPO petitions filed in Colorado between 2020-2022 were collected and analyzed using an established abstraction tool and team-based approach. Case data abstracted from petitions and court documents were analyzed descriptively. **Results:** Thus far from 2020-2022 353 ERPO petitions have been filed in Colorado. The majority (86.1%) of respondents were male and 65.2% were Caucasian. 50.2% of petitions mention SM. Of these, 147 (41.6%) reported alcohol misuse, 54 (15.3%) illicit drugs (e.g. cocaine), 36 (10.2%) cannabis, 41 (11.6%) prescription medications, 55 (15.6%) non-specific “drugs,” and 6 (1.7%) other. 133 (37.7%) respondents had mental illness or recurring mental health issues. Respondents actively experiencing PS made up 45 (12.7%) total respondents. Of these, 16 (4.5%) were documented as experiencing hallucinations and 36 (10.2%) experiencing delusions. 7 respondents (2.0%) were ordered to have mental health evaluations. On review of case narratives, only 9 (2.5%) cases mention a respondent being currently unhoused or having experienced housing instability in the past. **Conclusions:** MHC and SM are prominently represented in the analyzed cases. While data has shown increased risk of violence in those experiencing PS, this analysis of ERPO utilization does not show a strong correlation. Reported data suggests that SM and MHC in general are high-level factors when determining an individual’s risk for violence. Interestingly, cases documenting housing instability are less prevalent. This factor was difficult to abstract from court documents, and thus its implication is less clear in ERPO jurisprudence. The lack of concrete data could be due to quite a few factors – issues in documentation, lower use and knowledge of ERPOs among unhoused individuals, decreased desire to interact with law enforcement, and others. Data regarding ERPO efficacy in preventing firearm violence in high-risk individuals is still nascent. Law enforcement and community members are continuing to learn how to utilize ERPOs in promoting public safety. These data highlight ERPOs as a unique opportunity to intervene and provide warranted treatment to respondents experiencing the discussed conditions.

2. Results from a pilot study to improve the readability of credible messenger documentation notes

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Background: Credible messengers are members from the community who mediate conflicts before they escalate to episodes of firearm violence. Dialogue around the effectiveness of credible messengers has been questioned

partially due to the difficulty of identifying what strategies they employ to mediate conflicts at the mezzo and micro level. The lack of description related to what credible messengers actually do to prevent firearm conflict is partially due to poor documentation and low readability of their case notes. This poor documentation and low level of readability is due to credible messengers being less likely to have experienced professional training in documentation/case management, thus needing support in applying strategies to improve their documentation practices. This study reports on the outcomes of a social worker-led training used to improve the readability of frontline worker documentation. **Methods:** Flesch Kincaid readability calculators were used to calculate average readability scores across 9 credible messengers (114 case notes) pre and post training. We defined reading grade levels above eighth grade or a Flesch Reading Ease score less than 60 as having inappropriately complex language and sentence structure. Repeated measure t-tests were employed to detect differences between the pre and post scores. **Results:** At time 1 (baseline) 4 out of 9 (44%) outreach workers generated a reading ease score less than 60. The combined readability average of the outreach workers was 57.62 (10-12th grade reading level). By time 4, following the fourth and last training, all but one of the outreach workers reported a score less than 60. At time 4 the average readability score of the outreach workers improved to 73.69 (7th grade reading level). Aspects of readability such as average number of words and sentences increased as well as improved rigor of content. **Conclusions:** Findings suggest that the outreach workers can, with support and training, improve their documentation. Recommendations for training and on-going support that can be replicated across other programs will be discussed. Furthermore, this exercise demonstrates one way in which social workers can be used to improve the skills of credible messengers so they can better articulate the strategies they employ that inform best practices. This practice is in line with social work ethics.

3. Independent and joint impacts of alcohol and cannabis outlet densities on firearm assault injuries

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Background: A growing number of US states have legalized recreational cannabis and now permit large-scale commercial markets selling cannabis products to people aged 21 or older. Because cannabis use and alcohol use are interrelated, changes in the physical availability of legal cannabis may have important implications for the epidemiology of alcohol-related firearm violence. The effects of alcohol availability on firearm violence, including impacts on racial/ethnic inequities, are not well established and may depend on cannabis availability. **Methods:** We evaluated how the introduction of recreational cannabis outlets in California in 2018 modified the relationship of neighborhood alcohol outlet density with firearm assault injuries. We combined statewide data on firearm assault injuries from emergency department and inpatient hospitalization discharge records, alcohol outlet license listings, webscraped cannabis outlet listings, and sociodemographic factors that were potential confounders, for the period 2017 to 2019, across 1604 ZIP Code Tabulation Areas (ZCTAs). Using Bayesian spatiotemporal regression models to account for small-area spatial dependence, we modeled quarterly ZCTA-level rates of firearm assault injury as a function of alcohol outlet density, cannabis outlet density, and their interaction, adjusting for potential confounders. **Results:** California introduced 490 recreational cannabis outlets over the study period. In ZCTAs not introducing recreational cannabis outlets, an increase in alcohol outlet density of 20 per 10,000 was associated with a 4% higher rate of firearm assault injury (adjusted rate ratio: 1.04; 95% credible interval: 1.01, 1.06). Conversely, in ZCTAs introducing recreational cannabis outlets, alcohol outlet density was not associated with firearm assault injuries (aRR: 0.99; 95% CI: 0.90, 1.08). These associations did not differ significantly by race/ethnicity of the victim or type of alcohol outlet (on-premise restaurant,

on-premise bar/pub, off-premise). **Conclusions:** Communities with higher densities of alcohol outlets experienced higher rates of firearm assault injury, but the introduction of recreational cannabis outlets appeared to mitigate this pattern for all racial/ethnic groups. Further research is warranted to confirm whether restricting alcohol outlet density or increasing access to recreational cannabis may help reduce risky alcohol consumption and thereby prevent firearm assault injuries.

4. **Housing stability and firearm violence: A natural experiment utilizing COVID-19 eviction moratoria in the United States**

Christina A. Mehranbod MPH¹, Ariana N. Gobaud MPH¹, Carolyn S. Fish BA¹, Brady R. Bushover MPH¹, Christopher N. Morrison PhD¹

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Background: Firearm violence is a significant cause of health disparities in the US. Research suggests firearm violence is higher in communities with high housing instability and minority populations. Evictions, civil legal processes through which property owners may remove tenants from rental units, are important contributors to housing instability. Empirical studies of economic disruptions have found associations with violence, but few studies have considered links between evictions and firearm violence and have focused on only a few cities. With the affordable housing crisis already threatening housing stability, the COVID-19 pandemic exacerbated disparities. Eviction moratoria, emergency restrictions on eviction, provide opportunities to study abrupt changes in housing stability on firearm violence. This study uses eviction moratoria during the pandemic as a natural experiment to examine associations with shootings in US cities. **Methods:** We obtained shooting data from the Gun Violence Archive for 2018-2021. We used a public moratoria dataset from Princeton University to create a binary variable indicating presence of moratoria. Lastly, we used data from the Eviction Lab to obtain weekly eviction filing counts beginning January 2020. Major US cities with at least one eviction moratorium, shooting data, and eviction filing counts were included in the analysis. Using autoregressive integrated moving average (ARIMA) models to weekly time series data, we estimated the impact of eviction moratoria policies on shootings per 10,000 population from 01/01/2018 – 04/01/2021. Additionally, we used ARIMA models to test differences in state policies and the realization of eviction filings from 1/01/2020 – 04/01/2021. **Results:** We included 25 cities from 19 states in this analysis. A total of 28,224 shooting events and 449,428 eviction filings occurred during the study period. A majority of the cities estimated protective effects of eviction moratoria though 95% confidence intervals included the possibility of negative associations. In Dallas, Texas, an eviction moratorium was associated with a significant decrease of 0.021 shootings per 10,000 population per week (95% CI: -0.037, -0.006), and 100 evictions were significantly associated with 2.2 additional shootings per 10,000 population per week (95% CI: 0.01, 5.0). **Conclusions:** Eviction rates may be an important contributor to rates of firearm violence. This study identified that evictions and eviction moratoria in Dallas, Texas, significantly impact shooting rates. Significant associations were not universally observed, warranting further exploration into mechanisms influencing housing instability. Reducing evictions may provide a community-level intervention point to decrease firearm violence by keeping tenants in homes and increasing housing stability.

5. **The association between Second Amendment sanctuaries and firearm death in the United States**

Paul Michael Reeping PhD¹, Veronica Pear PhD¹

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Background: Second Amendment (2A) sanctuaries are jurisdictions that adopt resolutions or ordinances to assert their opposition to restrictive firearm policies. The resolutions, which vary in scope and enforceability, often state that local resources will not be used to enforce laws perceived as infringing on firearm rights. These jurisdictions may underenforce restrictive firearm policies, which consequently may have an effect on firearm death; however, this has not yet been studied. The objective of this study is to estimate the association between 2A sanctuary status and firearm death. **Methods:** The primary exposure of this study was a variable indicating whether each county had passed any ordinances designating it as a 2A sanctuary as of 2020. This could have occurred on two levels: the county level, where the county governance declared itself a sanctuary, or the state level, where the county resided in a 2A sanctuary state. The outcomes of this study were county level firearm deaths (total, homicides, and suicides) in 2020. A multivariable quasi-Poisson model with an offset of log(population) was used to estimate the association between Second Amendment sanctuary status and firearm deaths, adjusting for covariates. County level covariates included median age, median income, percent white, percent below federal poverty line, percent female headed household, percent high school graduation and a measure of urbanicity. To account for the fact that a county could be deemed a 2A sanctuary on both the county and state level, an interaction term was added between county and state 2A sanctuary status. **Results:** 850 counties and 17 states have passed ordinances to become 2A sanctuaries. In total, 1958 counties (62.7%) were therefore in jurisdictions that were declared 2A sanctuaries as of 2020. The unadjusted rate of firearm deaths in 2A sanctuaries was 17.5 per 100,000; in non-2A sanctuaries it was 14.2 per 100,000. After adjusting for covariates, counties with county-level 2A sanctuary ordinances had 5.8% (95% CI: 2.4%, 9.5%) more firearm deaths. Counties with state-level 2A ordinances had 38% (95% CI: 35.2%, 41.7%) more firearm deaths. There was also a significant multiplicative interaction between county and state level 2A sanctuary status. Results were similar when looking only at homicide or suicide deaths. **Conclusions:** Second Amendment sanctuary counties had higher levels of firearm death than counties that are not SA sanctuaries. Future research should explore longitudinal associations to better capture potential causality.

6. The contribution of Adverse Childhood Experiences (ACEs), injury intent, & neighborhood characteristics to psychological outcomes in injured Black men

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Background: Black boys and men who experience their childhoods and adulthoods in US urban environments can be highly vulnerable to the nexus of ACEs, traumatic injuries, and exposure to socio ecological disadvantages in their lived environment. While ACEs focus on exposures within home/family environments, socioecological exposures outside the home may have a unique or cumulative impact on psychological health after physical trauma. There is limited research exploring how ACEs, injury intent, and lived environment impact psychological injury outcomes. Addressing this gap is critical for interventions to address the well-established relationship between negative post-injury psychological symptomatology and suboptimal physical recovery, re-injury, substance use, and adverse criminal legal system interactions. This study's purpose was to determine the relative contribution of ACEs, injury intent, and neighborhood characteristics on psychological symptom burden 3

months after an injury hospitalization. **Methods:** Data were drawn from a prospective cohort study of psychological outcomes experienced by injured Black men recruited in Philadelphia, PA. Data included: number of self-reported ACEs, pre-injury physical and mental health, intentionality of injury, perceptions of childhood and adult disorder (Neighborhood Environment Scale/NES), census tract-level adult residential measures of disadvantage and PTSD (PCL-5) and depression (QIDS-SR) at 3 months post-discharge. Data were analyzed descriptively. Linear mixed effects models were used to identify how ACEs, injury intent, perceived neighborhood disorder, and objectively measured neighborhood disadvantage were associated with psychological outcomes. Models were adjusted for pre-injury physical and mental health status and injury severity. **Results:** The sample comprised 365 men self-identified as Black (4.7% Latino), mean age of 35.6 (SD 14.0), single (64.1%), employed/student (64.1%) and completed high school (53%). 56.4% were violently injured and 45.8% reported > 3 ACEs. Fully adjusted models revealed that PTSD symptom severity was significantly associated with violent injury (B=6.18, p=.002), adult NES (B=0.72 p=.003), and childhood NES (B=0.55 p =.016). Depression symptom severity was significantly associated with ACEs (B=0.35, p = 0.02), violent injury (B=1.17 p=0.04), and adult NES (B=0.15 p = 0.04). Neighborhood exposures as measured by census tract level crime and socioeconomic indicators at the time of injury were not significantly associated with psychological outcomes. **Conclusions:** Post-injury psychological outcomes are related to ACEs, violent injury, and perceptions of neighborhood social and environmental disorder in both childhood and adulthood. This research emphasizes the importance of socioecological exposures within and outside the home for shaping health across the life course, and specifically, in association with psychological sequelae that follow serious injury.

Session 28: Exploring the impact of place on firearm injury and prevention (Part II)

Sheraton I, November 3, 12:45 PM - 2:15 PM

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1. Firearm related injuries and public housing in New York City children

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Background: Disparities in firearm related harm persist for youth in low-income urban communities, particularly in and around public housing. Prevention has focused mainly on young adult males. This study evaluates an association between firearm injuries and public housing among children in New York City, to inform early prevention strategies. **Methods:** We conducted a retrospective descriptive analysis of shooting incident cases resulting in firearm injuries in children (<18 years), from July 1, 2016 to June 30, 2021 in NYC, as documented by the Gun Violence Archive. Demographics, spatiotemporal data, and available media reports were reviewed. Analyses included Kernel density estimation and Nearest-Neighbor analysis to reveal incident clustering. Point locations were additionally mapped against four concentric buffers (0.04, 0.2, 0.4, and 0.6 mi) as a proxy for walking distances (1, 5, 10, and 15 min) surrounding New York City Housing Authority (NYCHA) units using NYC Open Data. **Results:** A total of 254 cases were identified, mean age 14.9 years (1 to 17 yo) with 22.4% < 15 years (n=57), 83% male (n=212), 77.9% (n=198) sustained non-fatal injuries, and incidents occurring equally proportional on weekends (n=72) and weekdays (n=178). Among younger children (< 15 years), only 66.6% (n=38) were male, which was significantly lower than the total group (95% CI: 4.8 - 30.4% difference, p = 0.004), 50% (n=29) were interpersonal violence bystanders, and only 17.5% (n=10) were shot in a home (4 accidental discharge, 5 family violence, 1 assault related). Amongst all children, geospatial analysis revealed significant incident clustering (index: 0.1063, p < 0.00001) with a statistically significant proportion occurring within 1, 5, and 10 minutes walking distance of NYCHA units (1 min (0.04 mi): 33.5%; 5 min (0.2 mi): 60.63%; 10 min (0.4 mi): 79.53%). This pattern was comparable among children < 15 yrs. Not all NYCHA units were equally prone and only 56.7% fell proximally within 0.2 mi of an incident. **Conclusions:** Children under 15 years old with firearm injuries in New York City, were mostly shot outdoors in proximity to public housing, and half were reported bystanders of interpersonal violence. Further sociodemographic and structural determinants associated with firearm related harm in urban children, including girls, should be identified to bolster equitable investment in place based primary prevention strategies.

2. U.S. heatwave characteristics & firearm mortality

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Background: In 2021, the United States not only saw record numbers of firearm mortality, but the nation also experienced record-breaking heatwaves. Lyons et al. (2022) revealed positive associations between daily temperatures and gun violence in the 100 U.S. cities with the highest number of shootings and estimated that 6.85% of shootings were attributed to above-average daily temperatures. Thus, this study sought to investigate

relationships between U.S. heatwave characteristics and firearm mortality. **Methods:** SPSS V.28 was used to analyze data from the U.S. Environmental Protection Agency on changes in U.S. heatwave characteristics from 1961-2021 as well as data from the CDC National Center for Health Statistics on U.S. firearm mortality by state. **Results:** The 25 U.S. states with the highest average firearm mortality showed significant increases in the number of heatwaves per year from 1961-2021 and significant increases in the number of heatwave days per year from 1961-2021. 48% of the 25 states with the highest average firearm mortality showed an increase of >4-6 heatwaves per year from 1961-2021, 20% showed an increase of >6-8, 16% showed an increase of >2-4, 12% showed an increase of >8, and 4% showed an increase of ≤ 2 . In comparison, 52% of the 25 states with the lowest average firearm mortality showed insignificant changes in the number of heatwaves per year from 1961-2021, 32% showed an increase of >4-6, and 16% showed an increase of >2-4. 48% of the 25 states with the highest average firearm mortality showed an increase of >40-60 heatwave days per year from 1961-2021, 24% showed an increase of >80, 16% showed an increase of >60-80, 8% showed an increase of >20-40, and 4% showed an increase of ≤ 20 . 52% of the 25 states with the lowest average firearm mortality showed insignificant changes in the number of heatwave days per year from 1961-2021, 24% showed an increase of >40-60, 20% showed an increase of >20-40, and 4% showed an increase of >60-80. Bivariate correlations revealed strong positive associations between changes in the number of heatwaves per year from 1961-2021 and firearm mortality ($r(50) = .494, p < .001$) as well as between changes in the number of heatwave days and firearm mortality ($r(50) = .554, p < .001$). **Conclusions:** This study underscores the urgency of the climate crisis in relation to firearm mortality and the importance of heat adaptation strategies and climate saving action within the dialogue of firearm injury prevention.

3. Heatwaves and firearm violence in 4 U.S. cities

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Background: Firearm violence is a major public health burden in the United States. Research has found that firearm violence incidence is greater on extreme heat days, and extreme heat days are increasing globally due to climate change. Therefore, it is vital to further understand the impacts of heat on firearm violence to inform prevention efforts. Theoretically, warmer temperatures increase aggressive behavior due to greater stress and irritability, and empirical studies support this mechanism. It follows that accumulations of extreme heat days (“heatwaves”) could have additive impacts on firearm violence, beyond the expected independent effects of increased temperatures on each extreme heat day. The aim of this study was to examine the association between cumulative days of high temperatures and firearm violence. **Methods:** The unit of analysis for this study was city-days. We obtained firearm violence data from 2010 to 2019 for Chicago, IL; Cincinnati, OH; and New York, NY, and from 2015 to 2019 for Philadelphia, PA from municipal police departments’ registries of shooting incidence. The National Oceanic and Atmospheric Administration provided daily maximum temperature readings. We defined heatwaves using the National Weather Service definition of 3 or more days with a maximum temperature of 90°F or more, and an extreme heat day as any day with a maximum temperature of 90°F or more. We created binary variables indicating whether a given day was considered an extreme heat day or part of a heatwave. Our dependent measure was count of shootings. We estimated associations between shooting incidence and heatwave days and extreme heat days using generalized linear autoregressive moving average models controlling for seasonal trends and temporal autocorrelation. **Results:** Extreme heat days were

significantly associated with an increase in firearm violence in Chicago [$\beta = 0.13$, 95% CI: (0.085-0.18)]. In New York, heatwave days were associated with an increase in firearm violence [$\beta = 0.11$, 95% CI: (0.0034-0.23)], independent of the effects of the extreme heat for that specific day. Heatwave days were not associated with shooting incidence in Chicago, Cincinnati, or Philadelphia. **Conclusions:** In line with previous studies examining associations between warmer weather and firearm violence, this study detected an increased incidence of firearm violence on extreme heat days. The impacts of extreme heat days are cumulative in New York City. As the global climate warms, cumulative impacts of extreme heat could contribute to further increased firearm violence in some U.S. cities.

4. Historical redlining policies' effects on firearm violence today

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Background: Redlining, the practice of grading neighborhood mortgage risk based on multiple characteristics including racial and immigrant composition, began in the 1930s by the Home Owners' Loan Corporation (HOLC). These policies limited mortgage availability and reinforced segregation and concentrated poverty that exists today. Our goal was to investigate the relationship between historical redlining policies and firearm fatalities today in order to inform the potential health implications of this federally sanctioned segregation. **Methods:** We obtained data from several datasets, including the Gun Violence Archive, the Mapping Inequality project, the ArcGIS Living Atlas, and the United States (US) Census. We overlaid HOLC maps from 202 cities with incidents of firearm fatalities from 2014-2022. A multilevel (neighborhood nested within cities) negative binomial regression model was fit to test the association between modern-day firearm fatalities and HOLC historic grading (A="Best"; B="Still Desirable"; C="Definitely Declining"; D="Hazardous"), controlling for year, HOLC neighborhood-level demographics and state-level factors (household firearm ownership rate, presence of specific firearm legislation) as fixed effects and a random intercept for city. Incidence rates (IR) per 100,000 persons and adjusted incident rate ratios (aIRR) for each HOLC grade were estimated using A-rated areas as the reference. A priori mediation models were also estimated, which controlled for percent Black race and poverty concentration. **Results:** During the years 2014-2022, 41,428 firearm fatalities occurred in HOLC graded areas. Across all models, there was an increase in the firearm fatality rate as the HOLC grade progressed from A to D. By HOLC grade, the IR per 100,000/year and the aIRR relative to A areas was A: IR=3.78/100,000 (3.52, 4.05); B: IR=7.43/100,000 (7.24, 7.62), aIRR= 2.18 (95% CI 2.00, 2.38); C: IR=11.24/100,000 (11.08, 11.40), aIRR=4.12 (95% CI 3.79, 4.49); D: IR=16.26/100,000 (16.01, 16.52), aIRR=6.02 (95% CI 5.52, 6.57). In the adjusted model, the fatality risk increased with increases in firearm ownership rate and increases in percent aged 15-29 years. The risk decreased with the presence of violent misdemeanor legislation (no significant change with universal background check or may issue legislation), increases in percent male, and increases in population density. In the mediation model, the risk increased with increases in percentage below the poverty level and increases in percentage Black. **Conclusions:** Discriminatory redlining policies from 80 years ago are associated with firearm fatalities today. To address firearm violence inequities, we need to understand the role of government-sanctioned structural racism and work to substantially revise current neighborhood socioeconomic infrastructure and safety.

5. Unmasking the confluence: Evaluating the joint effects of COVID-19 and historic redlining on firearm violence

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Background: COVID-19 has had a significant impact on widening the racial disparities in public health outcomes through amplifying inequities in health, safety, and socio-economic status. Through its interactions with structural racism and other pre-existing vulnerabilities in socio-economic status, it may have exacerbated exposure to violence and crime. Firearm violence is a critical public health concern, however, the joint effects of COVID 19 and historical racist policies such as residential segregation have not been well elucidated. We propose a novel empirical approach to estimate the causal effects of the federal "redlining" policy implemented in the 1930s by the Home Owners' Loan Corporation (HOLC) and COVID 19 on contemporary distribution of firearm violence. **Methods:** We leverage an exogenous population threshold in HOLC policy whereby only cities with a population above 40,000 were subject to mapping. To estimate the interaction effect of the redlining policy and COVID 19, we adopt a difference-in-differences design and compare neighborhoods that received a specific grade with those that would have received the same grade had they been graded by HOLC. To identify our control neighborhoods, we utilize a machine learning algorithm trained to create maps similar to those produced by the HOLC. We utilize a random forest algorithm trained on a hexagon-level dataset using full-count geocoded census records to map grades onto control neighborhoods and employ a difference-in-difference strategy to compare neighborhood for each grade separately. **Results:** Overall, our algorithm correctly predicts over 90% of the grades accurately. Results of the difference-in-difference specification shows that COVID 19 significantly increased firearm violence in redlined cities. The effect is significant for both fatal and non-fatal firearm violence and robust to the inclusion of city fixed effects as well as socio-demographic controls. **Conclusions:** Our findings demonstrate how social and environmental constructs can interact in a complex manner to compound disadvantage on marginalized communities. They also show how discriminatory practices can perpetuate inequities in public health and safety and magnify the detrimental impacts of exogenous shocks.

6. Neighborhood predictors of illegal dumping: The association between illegal dumping, community factors and firearm violence

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Background: The association between deteriorated vacant lots and crime, including firearm violence, is well established. As urban communities that have experienced decades of industry loss, population decline and economic disinvestment seek to develop tools to address vacancy, safety, and well-being, one obstacle persists: illegal dumping. Illegal dumping is pervasive across these communities and presents health, environmental and economic challenges above and beyond basic land management. Among these challenges may be the additional burden of firearm violence. There is insufficient evidence informing our understanding of modifiable characteristics related to illegal dumping in the US. We sought to determine whether incidents of violent crime involving a firearm were associated with the presence of illegal dumping on vacant land compared to vacant land that does not experience dumping. **Methods:** Land Bank-owned vacant parcels that received

community-engaged mowing across the city of Flint, MI were categorized as illegal dumping or non-dumping sites (dependent variable) based on reporting from community organizations who maintain the land. After exclusions, our sample included 5,496 parcels (5,154 non-dumping 342 dumping sites). We obtained small area data from the 2020 U.S. Census Bureau American Community Survey (ACS), city of Flint Planning and Development Department data, Genesee County Land Bank Authority (GCLBA) and the Michigan Incident Crime Reporting (MICR) system for independent variables. We calculated z-scores to standardize continuous exposure variables. We began by selecting covariates based on their theoretical justification from community input and evidence from previous studies, conducted significance testing and tests for collinearity and produced odds ratios using unadjusted logistic regression to model the association between each covariate and illegal dumping. We then used a forward selection for multivariable logistic regression and sought the most parsimonious model that accurately reflects the true outcome of the data. **Results:** Reports of illegal dumping averaged about 2 per site. Final multivariable models showed higher odds of violent gun crime, disadvantage, vacancy, tree density, greater distance from public housing, and change in population density and lower odds of distance to public transit, major roads, and public schools among illegal dumping sites compared to sites that did not report illegal dumping. **Conclusions:** It is critical to establish an evidence-based understanding of the relationship between illegal dumping on vacant land and factors such as firearm violence and neighborhood demographics so that intervention strategies can be developed and supported on a large scale by policymakers. Our findings suggest that several modifiable, priority characteristics should be considered in intervention development.

Session 29: Firearm injury prevention among adolescent and pediatric populations

Sheraton III, November 3, 12:45 PM - 2:15 PM

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1. Impacts of exposure to deadly gun violence on adolescents' sleep duration and quality

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Background: Adolescents can be negatively impacted by gun violence in their neighborhoods, even if they do not experience it firsthand. Previous research suggests that exposure to violence is associated with sleep disturbances, though most studies rely on small samples or self-reported measures of violence exposure and/or sleep outcomes. This study investigates the impact of spatially proximate gun homicide exposure on objectively measured sleep duration and quality among a national sample of urban adolescents. **Methods:** The sample includes adolescents from the Future of Families and Child Wellbeing Study, a birth cohort study following children born between 1998-2000 in 20 large US cities, who participated in a sleep actigraphy study at age 15 and provided 5+ days of valid actigraphy data. Sleep data were merged with data on the timing and location of gun homicide incidents from the Gun Violence Archive. We calculate the percentage of adolescents experiencing 1+ gun homicide within 1 mile of their home or school in the past 60 days. We use linear regression to estimate the effects of this exposure on adolescents' average sleep duration (minutes/night), wake after sleep onset (WASO; minutes/night), and sleep maintenance efficiency (percentage of time asleep during sleep interval). Lower WASO and higher sleep efficiency indicate better sleep quality. **Results:** Among the sample of 660 adolescents (Mage=15.4 years, 52.6% female, 47.4% Black, 27.6% Latinx), 37.7% experienced 1+ gun homicide near their home or school in the past 60 days. Black and Latinx adolescents were 3.4 times and 2.2 times more likely, respectively, to be exposed to gun homicide in their neighborhoods than white adolescents. Average sleep duration was 465.8 minutes/night (7.8 hours/night); adolescents spent 43.7 minutes/night awake after falling asleep and 90.7% of nighttime sleep intervals asleep, on average. Sleep duration was significantly shorter among adolescents exposed to gun homicide, even after adjusting for age, sex, race/ethnicity, household income-to-poverty ratio, and neighborhood disadvantage (unadjusted B=-11.4, adjusted B=-13.4, p<.05). WASO and sleep maintenance efficiency were not significantly associated with gun homicide exposure in unadjusted or adjusted models. **Conclusions:** Living or attending school near gun homicide incidents may affect adolescents' sleep duration, but not necessarily their sleep quality. Forthcoming analyses will employ propensity score matching and risk stratification methods to explore possible heterogeneity in these relationships. Investments in community-based support and trauma-informed care for adolescents in neighborhoods experiencing high levels of gun violence may be important for promoting sleep health and reducing broader health inequities.

2. Violent experiences, mental health, and patterns of firearm ownership/access in childhood and young adulthood

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Background: Longitudinal data on childhood behaviors, mental health symptoms, and gun ownership/access can help us understand how individuals conceptualize and modify risk. In childhood, little is known about whether parents modify their children’s gun access based on signs and symptoms of elevated risk to self or others. In addition, little is known about how gun access and violent experiences in childhood predict gun access in adulthood. This body of research looked at how violent experiences and risky behaviors are associated with changes in gun access changes over adolescence and young adulthood. **Methods:** The Great Smoky Mountains Study, covering 11 contiguous, mostly rural counties in the Southeastern U.S., has two decades of individual-level follow-up on factors related to behavioral health. Periodic survey data was gathered in adolescence through participants’ late 20s (most recent wave complete in 2019). We used a lagged regression analysis to describe how parental reports of internalizing (e.g., depression) and externalizing (e.g., combative behavior) were associated with changes in gun access among families that owned guns and families who did not own guns at the initial timepoint. In addition, we used adjusted logistic regression to estimate associations between violent experiences and gun access in young adulthood. Violent experiences in childhood (bullying, sexual and physical abuse, violent events, witnessing trauma, physical violence between parents, and school/neighborhood dangerousness) and adulthood (physical and sexual assault) were evaluated. **Results:** 581 women and 679 men had complete data on firearm ownership/access through young adulthood. Gun access/ownership was more common in childhood (women: 63.3%; men: 83.9%) than in adulthood (women: 35.9%; men: 60.5%). Among gun owning families, externalizing behaviors among children at initial phases were statistically significantly associated with reduced gun access in later phases, but internalizing behaviors were not. The most common longitudinal pattern was consistent access/ownership from childhood to adulthood (40%) followed by having access/ownership in childhood only (26.8%). Among people who grew up with guns, the cumulative effect of childhood violence on gun access was strongest among men (men OR: 0.69 [95% CI: 0.56, 0.86]; women OR: 0.89 [95% CI: 0.73, 1.11]). **Conclusions:** Gun ownership/access can be fluid and highly individualized. Additional education and guidance for parents about risks associated with internalizing behaviors may be warranted. In addition, early adulthood—when access is relatively low—may represent another opportune time for education on risks associated with firearm access, as well as strategies for risk mitigation.

3. The REVEAL study: Using brain imaging to research the effects of gun violence exposure on attention and learning

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Background: Exposure to trauma during childhood and adolescence can have detrimental effects on the development of executive functions and attention. Specifically, exposure to gun violence is considered an adverse childhood event that leads to cognitive, behavioral, emotional, and psychological sequelae. These effects not only contribute to the perpetuation of violence in our communities but also affect individual and community attainment across the lifespan. However, limited understanding exists regarding the mechanisms through which exposure to violence contributes to inequities in lifespan attainment. The human stress response begins in the brain, where exposure to violence and associated activation of fight-or-flight responses cause cellular and systemic changes. Early stress exposures can result in changes in developmental trajectories associated with learning difficulties, emotional disorders, earlier onset of later-life cognitive decline, and even earlier mortality. However, since stress is an adaptive response, and the brain remains highly adaptable throughout much of adolescence, evaluating traditional academic measures may not reveal subtle shifts in mechanisms governing

academic attainment. Consequently, we are evaluating neural correlates of attentional shift and cognitive resource allocation as they happen, in the brain. **Methods:** We are measuring brain activations using high-density electroencephalography while individuals with and without a history of exposure to gun violence complete the Attentional Network Task. This paradigm is designed to activate brain networks that allocate attentional resources on-line to complex and competing demands. We are also interviewing participants about their direct and indirect exposures to gun violence, to identify interactions between gun violence exposure, executive control of attention, and related brain activations. **Results:** Data are still under collection and findings are yet to be analyzed. By November we will have data to present. We anticipate observations of changes to brain function and executive control that are associated with gun violence exposure, similar to extant reports showing that early-life traumas have significant sequelae for brain and cognitive development. **Conclusions:** This is the first study to identify specific neural and brain mechanisms associated with academic and social attainment that are adversely impacted by exposure to gun violence. We hope to better understand the mechanisms through which exposure to violence contributes to inequities in lifespan attainment and develop interventions that can mitigate its adverse effects. The application of brain imaging methods to public health issues paves the way for evidence-based intervention approaches and demonstrates the imperative for cross disciplinary approaches to addressing the crisis of gun violence in the United States.

4. A national study of firearm use and safety training of rural adolescents

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Background: Data regarding rural youth's experience with firearms is limited despite their frequent presence in homes. Firearm training is considered an important aspect of safety and preventing unintentional firearm injuries and deaths. Our objective was to investigate rural adolescents' use of firearms and whether they had received formal firearm training. **Methods:** A convenience sample of 2021 National FFA (formerly Future Farmers of America) Convention & Expo attendees were given an anonymous survey. The survey explored their use of rifles/shotguns and handguns, when they first fired them, and whether they had completed a firearm training certification course. Data was compiled and exported to Stata 15.1 (StataCorp, College Station, Texas). Descriptive (frequencies), bivariate (chi-square, Fisher's exact test) and multivariable logistic regression analyses were performed. **Results:** 3,206 adolescents of ages 13-18 years participated with 45% reporting they lived on a farm/ranch, 34% lived in the country but not on a farm and 21% lived in town. The vast majority of participants (85%) had fired a rifle/shotgun; 43% reported firing them >100 times. Of those that had fired rifles/shotguns, 41% had done so before 9 years old and 71% before 12 years. Most had also fired a handgun (69%), with 23% having fired handguns >100 times. Of those that had fired handguns, 44% had done so before 11 years of age and 77% before 14 years. Average age for first firing rifles/shotguns was 9.5 (SD 3.1) years, and 11.1 (SD 3.0) years for handguns. Males, non-Hispanic Whites, and those living on farms or in the country had significantly greater percentages that had fired a rifle/shotgun or a handgun. Significant differences were also seen by U.S. Census Region. Over half (64%) reported they had gone hunting with 32% first hunting before 9 years old and 55% before 11 years. Of those that had used a firearm, 67% had completed a firearm safety training course. Overall, 23% were/had been members of a school or club shooting team and of these, 87% had taken a safety

course. **Conclusions:** Most FFA member participants had fired both rifles/shotguns and handguns, many at very young ages. Significant differences in firearm use were noted by demographic factors including the youth's home setting (i.e., farms/ranches) and their U.S. Census Region. Substantial numbers of adolescents that had used a firearm had not received formal training. All youth should take a firearm safety training course before using firearms.

5. Support for age-related gun policies

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Background: Firearms are the leading cause of death for children and teens in the U.S., accounting for nearly 20% of all child and teen deaths. The 2023 National Survey of Gun Policy sought to measure levels of support for policies intended to reduce firearm injury and mortality among children and young adults. **Methods:** The 2023 National Survey of Gun Policy was fielded from 1/4/23-2/6/23 using NORC's AmeriSpeak panel, a nationally representative, probability-based sample of US adults (n=3,096). We oversampled for gun owners and Black, Hispanic, and Asian Americans. Respondents were asked to rate their level of support for various gun-related policies, including policies implementing age restrictions and safe storage policies. Survey weights were applied to generate representative estimates. Logistic regression and predictive probabilities were used to compare differences in policy support by gun ownership and political party affiliation. **Results:** The majority of respondents supported safe storage policies (72%) and policies that increase age-related limitations on gun ownership, such as prohibiting a person convicted of a serious crime as a juvenile from having a gun for 10 years (77%), prohibiting a person under the age of 21 from having a handgun (67%), and requiring an owner of a semi-automatic rifle to be at least 21 years of age (73%). Overall support was low for allowing a person who can legally carry a concealed gun to bring that gun onto a college or university campus (27%) or onto school grounds for kindergarten through 12th grade (25%). Gun owners and Republicans were significantly less likely to support restrictive policies and significantly more likely to support permissive policies than non-gun owners and Democrats. Differences in support by political party affiliation were larger than differences by gun ownership. For example, levels of support for prohibiting a person under the age of 21 from having a handgun differed by 14% between gun owners (58%) and non-gun owners (71%) and by 30% between Democrats (83%) and Republicans (53%). **Conclusions:** Given the significant harm of firearm violence faced by children, there is a need to push for gun policies intended to keep children and young adults safer. High overall support for these policies may help catalyze their successful passing, but there is a need to appeal to gun owners and Republicans to increase support among these groups.

6. Unintentional firearm injury deaths among U.S. children aged 0–17 years, 2003–2020

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Background: In the U.S., unintentional injury is a leading cause of death in children aged 0–17 years, and firearms are a leading injury method. Factors such as unsecure firearm storage (e.g., firearm stored unlocked and/or loaded) can increase risk of child unintentional firearm deaths. We examined characteristics commonly associated with unintentional firearm injury deaths among children using data from CDC's National Violent Death Reporting System (NVDRS), the most comprehensive data available on this topic. **Methods:** All available years

and states/jurisdictions from NVDRS were used (49 states, the District of Columbia, and Puerto Rico; 2003–2020). Descriptive statistics were used to characterize unintentional firearm injury deaths among children aged 0–17 years. **Results:** From 2003–2020, NVDRS captured 1,017 unintentional firearm injury deaths among children aged 0–17 years (81.8% boys; 53.2% injured at home). Children aged 11–15 years accounted for 33.1% of unintentional firearm deaths, followed by those 1–5 years (25.7%), 16–17 years (23.8%), 6–10 years (13.9%), and children <1 year (2.1%). White, non-Hispanic (NH) children accounted for 43.8% of unintentional firearm child deaths, followed by Black, NH children (38.1%), Hispanic children (10.3%), and American Indian/Alaska Native, NH children (4.1%; all other groups less than 3.0%). Half (50.7%) of fatal unintentional child firearm injuries were inflicted by another person, while 33.9% were self-inflicted (disproportionately toddlers [aged 1–5 years]); in 15.3% of incidents it was unknown whether the injury was self-or other-inflicted. The most common circumstances preceding the unintentional firearm discharge included the shooter: playing with the firearm (60.5%); unintentionally pulling the trigger (22.7%); showing the firearm to another person (13.7%); thinking the firearm was unloaded (13.5%); and the firearm being mistaken for a toy (9.7%). The firearm used to inflict the fatal injury was known to have been stored loaded in 27.8% and unlocked in 28.6% of these incidents, although this information may be underreported. **Conclusions:** Unintentional child firearm injury deaths are preventable, and over-half occurred at the victim's home. Playing with a firearm was the most common precipitator in unintentional child firearm deaths, and firearms used in these deaths were often stored loaded or unlocked. Findings highlight opportunities to partner with parents to promote secure firearm storage. Approaches that promote secure storage practices and parental supervision (especially when a firearm is in the home), amplify messaging around child firearm safety, and reduce unsupervised child access to firearms may help prevent child firearm deaths.