



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Assessing the effect of COVID-19 stay-at-home orders on firearm injury in Maryland

Emma Frost^a, Anjali Garg^b, Isam Nasr^b, Katherine Hoops^{a,b,*}

^a Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States of America

^b Johns Hopkins University School of Medicine, Baltimore, MD, United States of America

ARTICLE INFO

Keywords:

Injury prevention
Violence prevention
Firearm
COVID-19
Health policy
Public health
Pediatrics

ABSTRACT

This study sought to characterize frequency and demographic characteristics of firearm injury and penetrating trauma in Maryland over the first year of the pandemic, by comparing these characteristics to those of the three years prior to stay-at-home order issuance.

Patients were identified in the Maryland Health Services Cost Review Commission database using ICD-10 codes for firearm injury by all intents and assaults by penetrating trauma. Cases from July 1, 2017 to March 31, 2020 ("pre-stay-at-home") were compared to those from April 1, 2020 to March 31, 2021 ("post-stay-at-home") using descriptive statistics.

There was no significant change overall in frequency or demographics of firearm injury or penetrating trauma in the year after stay-at-home orders were issued. Youth between ages 15 and 24, overwhelmingly male, comprise a disproportionately high percentage of firearm injuries and assaults, and most penetrating trauma occurs in urban environments where Black non-Hispanic youth and children of low socioeconomic status are at high risk. Our study also found unintentional firearm injury among adults was significantly increased during the pandemic.

While increased unintentional firearm injury among adults was the major significant change found in our study, the persistence of firearm injury, particularly in youth, racial and ethnic minority groups, and those in urban environments, should be deeply concerning. Stay-at-home policies did not keep youth safer from firearm injury. With continued high rates of firearm injury and the national debate over how to prevent these incidents, increased education and comprehensive strategies for prevention are needed.

1. Introduction

The Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2 or COVID-19) caused a global public health emergency that is still ongoing. In addition to the hundreds of thousands of lives lost to COVID-19 disease, the pandemic has also been associated with increased social isolation, worsening mental health conditions, increased suicidality in some populations, and increased violence (Afif et al., 2022; Bray et al., 2020; Holland et al., 2021; McGinty et al., 2020).

During March 2020, state governors across the United States first issued stay at home orders and closed non-essential businesses in an

effort to slow the spread of this deadly virus, with Maryland following suit on March 30th, 2020 (Hogan, 2020a). However, during the stay at home order mandates, firearm retailers were included among essential organizations and remained open in virtually all states, allowing continued access to firearms (Hoops et al., 2020). Firearms have been and still are a major cause of morbidity and mortality, with a dramatic increase in total gun violence in the pandemic exceeding previous years (Hoops et al., 2020; Kravitz-wirtz et al., 2021; <https://www.gunviolencearchive.org/>, n.d.). More than half of the deaths in 2020 related to gun violence were due to suicide (National Center for Injury Prevention and Control, n.d.). Additionally, gun violence disproportionately affects

Abbreviations: ICD, International Classification of Diseases; ICD-10, Tenth revision of the International Classification of Diseases; SARS-CoV-2, Severe Acute Respiratory Syndrome Coronavirus-2; COVID-19, Coronavirus Disease 2019; HSCRC, Maryland Health Services Cost Review Commission database; GSW, Gunshot wound; SW, Stab wound; RUCA, Economic Research Service Rural-Urban Commuting Areas.

* Corresponding author at: Charlotte R. Bloomberg Children's Center, Johns Hopkins University School of Medicine, Department of Anesthesiology and Critical Care Medicine, 1800 Orleans St, Baltimore, MD 21287, United States of America.

E-mail address: khoops1@jh.edu (K. Hoops).

<https://doi.org/10.1016/j.ypmed.2022.107216>

Received 7 April 2022; Received in revised form 22 June 2022; Accepted 17 August 2022

Available online 25 August 2022

0091-7435/© 2022 Elsevier Inc. All rights reserved.

urban male youth, specifically Black males aged 15 to 19 years old (Etra et al., 2021; Bottiani et al., 2021). Gender normative socialization, cultural attitudes and associations with firearms, and effects of historic and systematic racism contribute to this disparity (Bottiani et al., 2021).

Children from lower income urban neighborhoods are at increased risk of penetrating trauma from firearms and from the attendant physical, psychological, and post-traumatic consequences (Sakran et al., 2018; Kamat et al., 2020). Repeat violence and recidivism with gun violence has increased mortality in comparison with blunt trauma (Sakran et al., 2018; Kamat et al., 2020). Children who are victims of penetrating trauma are at higher risk of recurrent trauma as well as negative consequences of this trauma (Vincent Felitti et al., 1998). However, the trends in pediatric firearm death during the COVID-19 pandemic are not yet well characterized. This study aimed to describe the burden of firearm injury among youth in Maryland during the time of the COVID-19 pandemic in comparison to previous years. Maryland was chosen specifically in order to quantify penetrating trauma and firearm injury in the population our institution serves and to conduct a statewide analysis for further urban-rural geographic analysis. Furthermore, as lawmakers look for strategies to prevent violence and injury, most policy-making related to firearms occurs at the state level rather than at a federal level, making state-specific characterization of firearm injury all the more important and informative for policymakers and key stakeholders.

2. Methods

2.1. Patient population

This study utilized the Maryland Health Services Cost Review Commission (HSCRC) public-use patient-level case mix data. The dataset contains deidentified inpatient and outpatient data with patient demographics, diagnosis and procedure coding, and payer information for all care received at acute care hospitals located in Maryland. We used a version of this dataset maintained by our institution, known as DataMart, in order to access the most up-to-date encounters possible. The Institutional Review Board approved this retrospective review as exempt from ethical compliance.

All patient ages were included; patients in the dataset are categorized into 5-year age categories. We included all patients who either had a Maryland ZIP code listed for their place of residence or who had a documented external cause code of interest at a Maryland acute care hospital, which may include Maryland residents who received initial care in a neighboring jurisdiction or out-of-state residents who received care in Maryland state borders. This approach was utilized because it captured all patients who would have been impacted in some form by Maryland pandemic policies. Race and ethnicity data was collected through inpatient hospitalization records related to patient encounters. Patient encounter data regarding race and ethnicity is typically self-reported or, occasionally, categorized by support staff. We recognize the latter as a potential confounder in our data (Flanagin et al., 2021).

2.2. Measures

The Governor of Maryland declared a state of emergency due to COVID-19 on March 5, 2020, schools in the state were ordered closed on March 16, 2020, and non-essential business closures (stay-at-home orders) were ordered on March 30, 2020 (Hogan, 2020a; Hogan, 2020b; Hogan, 2020c). While the state of emergency remained in effect until July 1, 2021 (Hogan, 2020c), school closings have fluctuated over the course of the year and local jurisdictions have put in place varying degrees of restrictions. HSCRC encounters include the year and quarter of admission, preventing more granular temporal analyses. Therefore, in a close approximation of stay-at-home order policy implementation, we designated all encounters occurring between July 1, 2017 and March 31, 2020 as “pre-stay-at-home” encounters. All encounters occurring

between April 1, 2020 and March 31, 2021 were designated as “post-stay-at-home” encounters.

Patient encounters of interest were identified using ICD-10 external cause codes. Penetrating traumas by firearms were identified using ICD-10 codes X93*, X94*, X95*, X72*, X73*, X74*, W32*, W33*, W34*, Y22*, Y23*, and Y24*. This mechanism of injury included all intents (e.g., assault, self-harm, unintentional, or undetermined). Penetrating traumas due to sharp objects were identified using ICD-10 code X99*. Only intent of assault was included in our analysis for this mechanism of injury. To capture only initial encounters and avoid duplication of patients within our analysis, we only included external cause codes ending in -A, which denotes an initial encounter (rather than -D and -S, which denote subsequent encounters and sequela, respectively). Penetrating traumas were separated out by gunshot wounds (GSW) and stab wounds (SW).

2.3. Statistical analysis

All statistical analyses were performed using Stata version 14.2 (StataCorp LLC, College Station, Texas) in 2021. Descriptive statistics were utilized to summarize demographic data. A two-value proportion test was used for two-group comparisons of proportions. HSCRC variables were pooled together to create categorical values. For categorical variables, Chi-square analysis was conducted. A *p*-value of <0.05 was used for significance.

For the geographic analysis, zip codes were accrued through HSCRC data extraction and matched by county. Urban and rural designations were made based on Economic Research Service Rural-Urban Commuting Areas (RUCA) rural definition and were assigned to patient data. Penetrating trauma was separated out by type as designated above, and firearm injury was separated out by intent. Chi-square analysis was performed to determine statistical significance in changes prior to and after the stay-at-home order.

3. Results

3.1. All encounters due to firearms—assault, self-harm, unintentional, and undetermined

Between July 1, 2017 and March 31, 2020, there were 2468 unique hospital encounters for firearm injuries in Maryland. Demographics such as age, sex, race, ethnicity, and mortality were included (Table 1).

Table 1
Firearm injury demographics, pre- and post-stay-at-home orders. *P*-value represents the differences in pre- and post-stay-at-home period demographics.

Demographic	% of Total (#)	% pre-stay-at-home	% post-stay-at-home	<i>P</i> -value
Age (years)				0.942
<15	1.4% (34)	1.4%	1.3%	
15–19	14.4% (356)	14.6%	13.9%	
20–24	21.8% (537)	21.9%	21.3%	
>24	62.4% (1541)	62.1%	63.4%	
Sex (male)	90.2% (2226)	90.0%	90.8%	0.604
Race				0.739
White	10.9% (269)	11.1%	10.4%	
Black	81.9% (2022)	81.9%	81.9%	
Other/unknown	7.2% (177)	7.0%	7.7%	
Ethnicity				0.027
Hispanic	3.7% (90)	3.5%	4.0%	
Non-Hispanic	93.6% (2310)	93.2%	94.7%	
Unknown	2.8% (68)	3.3%	1.3%	
Died	5.2% (129)	5.3%	3.7%	0.101

During that time period, 14% were patients between the ages of 15 and 19, 22% were between the ages of 20 and 24, and 62% were over age 24. Most patients were male (90%), Black (82%), and non-Hispanic (90%). Five percent of patients in the cohort died. There was no significant change in demographics comparing the time before and after implementation of the stay-at-home order, with the exception of ethnicity, with a significant decrease in patients classified as “unknown” ethnicity. (See [Tables 2 and 3](#).)

Firearm injury was differentiated by intent and included assault, self-harm, unintentional firearm injury, and undetermined intent ([Fig. 1](#)). There was no significant difference among firearm injury intents prior to and after the stay-at-home order for patients younger than 24 years old. For patients older than 24, unintentional firearm injuries rose significantly (38% to 44% with $P < 0.05$).

Firearm injury over the study period was examined ([Fig. 2a](#)) in relation to assault ([Fig. 2b](#)) and self-harm ([Fig. 2c](#)). In all three cases, firearm injury had no significant change during the time periods studied. The sole exception was that overall firearm injury between January 1 and March 31, 2021 exceeded that of any prior time period in the study. Firearm injury and firearm injury by assault were similar in the 15- to 19-year-old and 20 to 24 year-old age groups across the study period. Self-harm by firearm showed a peak between July 1 and September 30, 2018 with a downtrend until January 2020 across all age groups. Self-harm by firearm showed an increase between April 1 and September 30, 2020, and again between January 1 and March 31, 2021. This trend was consistent among all age groups but was more prominent in individuals older than 24.

3.2. All penetrating trauma – SW and GSW

Between July 1, 2017 and March 31, 2020, there were 2269 unique hospital encounters for assaults by penetrating trauma. During that time period, 12% were patients between the ages of 15 and 19, 18% were between the ages of 20 and 24, and 69% were over age 24. Patients suffering assault by penetrating trauma were most commonly male (89%), Black (78%) and non-Hispanic (90%). There was no significant difference in age, sex, race, or mortality rate for penetrating trauma assaults comparing pre- and post-stay-at-home. As with firearm injury by all intents, there was a significant decrease in patients classified as “unknown” ethnicity in the post-stay-at-home period.

While assaults by penetrating trauma during the time period

Table 2

Assault by penetrating trauma demographics, pre- and post-stay-at-home orders. P-value represents the significance of the difference in pre- and post-stay-at-home period demographics, with $p < 0.05$ as the level of statistical significance.

Demographic	% of Total (#)	% pre-stay-at-home	% post-stay-at-home	P-value
Age (years)				0.931
<15	0.7% (15)	0.7%	0.5%	
15–19	11.7% (265)	11.8%	11.3%	
20–24	18.4% (418)	18.3%	18.9%	
>24	69.2% (1571)	69.2%	69.4%	
Sex (male)	88.5% (2009)	88.2%	89.5%	0.632
Race				0.297
White	11.8% (268)	11.3%	13.3%	
Black	77.9% (1768)	78.1%	77.5%	
Other/unknown	10.3% (233)	10.6%	9.2%	
Ethnicity				0.024
Hispanic	6.6% (149)	6.6%	6.6%	
Non-Hispanic	90.1% (2045)	89.5%	91.9%	
Unknown	3.3% (75)	3.9%	1.6%	
Died	3.8% (87)	3.6%	4.7%	0.225

Table 3

Geographic analysis of penetrating trauma, by mechanism of injury. Percentage of patients with zip code of residence based in an urban environment, with the remainder based in a rural environment.

Penetrating trauma type	% urban, pre-stay-at-home (n)	% urban, post-stay-at-home (n)	P-value
GSW	92.5% (673)	90.7% (207)	0.48
SW	97.7% (920)	97.0% (335)	0.76

analyzed fluctuated significantly, as with firearm injuries, no significant change was noted in the post-stay-at-home period as compared to the pre-stay-at-home period. There was a decrease between April 1 and September 30, 2020, after which an increase to previous levels was seen. This pattern was consistent across age groups ([Fig. 3a](#)). The frequency of stab wounds and gunshot wounds was relatively stable over the time period analyzed ([Fig. 3b](#)), but the frequency of stab wounds decreased after March 31, 2020 and did not rise again until after September 30, 2020, whereas gunshot wound frequency remained fairly consistent before and after the Maryland stay-at-home order was issued.

The proportion of gunshot wounds compared to stab wounds did not change significantly in the pre- and post-stay-at-home periods, with firearms as the mechanism for about 60% of all penetrating trauma assaults. The proportions also did not change in patients 24 years old or younger and patients over 24 years old pre- and post-stay-at-home. In both time periods, gunshot wounds comprise about 7 in every 10 penetrating trauma assaults for patients 24 years of age or younger and roughly half of penetrating trauma assaults for patients older than 24 years of age.

Over the time period of our analysis, most homicides due to penetrating trauma assaults that presented to Maryland hospitals occurred in patients older than 24 years old.

Patient zip-code analysis of the HSCRC data in the greater Maryland area encompassed the District of Columbia, Virginia, Pennsylvania, and Delaware. Injury in urban environments was more prominent regardless of the trauma type. >95% of penetrating traumas occurred in an urban environment based on the aforementioned RUCA designation, with no statistical difference before or after the stay-at-home order. Additionally, firearm injuries stratified by intent did not show a statistical difference in location of injury based around timing of the stay-at-home order, and the majority of events occurred in urban environments.

4. Discussion

The COVID-19 pandemic has had a devastating impact: over 80 million cases and nearly 1 million deaths in the United States alone ([Gastineau et al., 2021](#)). We have only just begun to characterize the far-reaching health and societal effects of the COVID-19 pandemic, including those on firearm injury and assault trauma.

Our study showed that despite the stay-at-home order that was initiated in March 2020 in Maryland, penetrating trauma and firearm injury continued to be highly prevalent over the course of the following year, especially in urban environments. Unlike other studies that found increased penetrating trauma and firearm injury in the months immediately following stay-at-home orders, including in youth, our study considered an entire year of the pandemic and found no significant change overall ([Chodos et al., 2021](#); [Abdallah et al., 2021](#)). While adults comprise the majority of penetrating trauma cases, children and young adults under the age of 24 also suffer from the consequences from penetrating trauma. Patients between the ages of 15 and 24 represent a disproportionately high percentage of firearm injuries and assaults by penetrating trauma presenting for medical care, and for this age group, firearms were involved in 70% of assaults involving penetrating trauma. Furthermore, the majority of penetrating trauma occurred in urban environments among Non-Hispanic Black youth where high concentrations of poverty and the pervasive effects of racism put these youth at

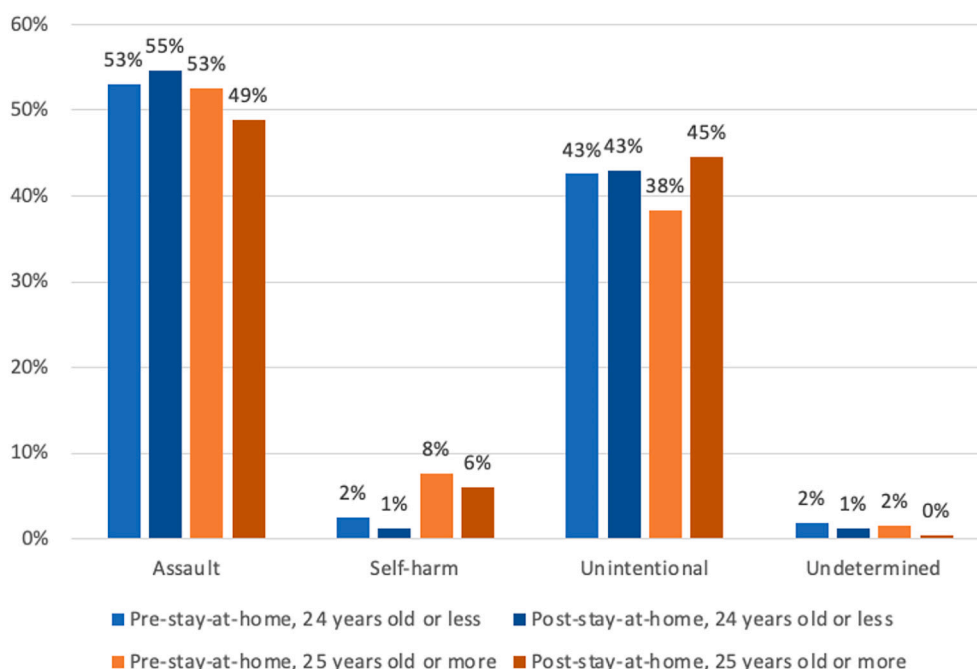


Fig. 1. Firearm injury intent as a percentage of total firearm injuries, by stay-at-home order temporality and age group. Firearm injuries were segmented into groups by both time period and age group; percentages represent the proportion of each of these groups attributable to the specified intent.

disproportionate risk of violence and traumatic injuries and their sequelae (Bottiani et al., 2021). These demographic findings were unaltered by the pandemic and stay-at-home orders.

Assault was the most frequently reported intent of firearm injury in our analysis. There was no statistical difference in assault or suicide by firearm before and during the pandemic. The continued high prevalence of firearm injury during the pandemic could be explained by the increased social isolation and distress seen early in the pandemic (Abdallah et al., 2021). This study found an increase in firearm injury in the initial 10 weeks of the pandemic, but there was not an equivalent increase in ED visits related to firearm injury, perhaps indicating the increased barrier to health care services despite increase in firearm injury.

Our analysis also yields an important finding that warrants further study: unintentional firearm injury among adults was significantly increased during the pandemic. The early months of the pandemic saw surges in firearm purchases (Schleimer et al., 2021). The increase in unintentional injury may be related to the lack of availability of firearm safety training or other safety resources (Schleimer et al., 2021). While the lack of other significant changes in penetrating trauma and firearm injury does little to inform injury prevention policy, this aspect of the data suggests firearm safety courses on safe ownership and storage may affect firearm injury rates in adults.

4.1. Limitations

Our findings must be considered in the context of some limitations. First, a retrospective review of databases is inherently prone to error in inputting and reporting. Furthermore, these reporting errors are further contributed to by the possibility that intent is determined at a time separate from when the injury occurred and may, therefore, be entered at a later date. There may also have been errors in ICD coding reported by the institutions. ICD-10 codes can be associated with misclassification of firearm injuries with regard to how unintentional and intentional injuries are defined. We recognize that our data could be misrepresented or skewed secondary to this misclassification (Catherine Barber et al., 2021). Finally, because we were only able to capture injury presenting to a medical setting due to our choice of database we may have been

unable to fully characterize some of the initial fluctuations in firearm injury and alterations in care-seeking. Finally, these findings provide state-level data that differs from recent analysis of national-level data showing a dramatic increase in firearm injuries in children, which would indicate that further analyses of state-level data may provide important insights into the prevention of pediatric firearm injury and state-level policy approaches to decreasing firearm injury (Gastineau et al., 2021).

5. Conclusion

While increased unintentional firearm injury among adults was the major significant change found in our study, the persistence of firearm injury, particularly in youth, racial and ethnic minority groups, and those in urban environments, should be deeply concerning. Stay-at-home policies did not keep youth safer from firearm injury. Therefore, as this pandemic continues, and local, state, and federal governments search for evidence-based and feasible solutions, measures that reduce youth access to firearms such as child access prevention laws and measures that address root causes of violence are urgently needed.

Funding/support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Contributor's statement page

Dr. Frost performed data analysis with the exception of geographic analysis and drafted the initial manuscript.

Dr. Garg conducted the literature search, performed the geographical analysis, and drafted the initial manuscript.

Drs. Nasr and Hoops conceptualized the study, provided guidance on data analysis, and reviewed and revised the manuscript.

All authors approved the final manuscript and agree to be accountable for all aspects of the work.

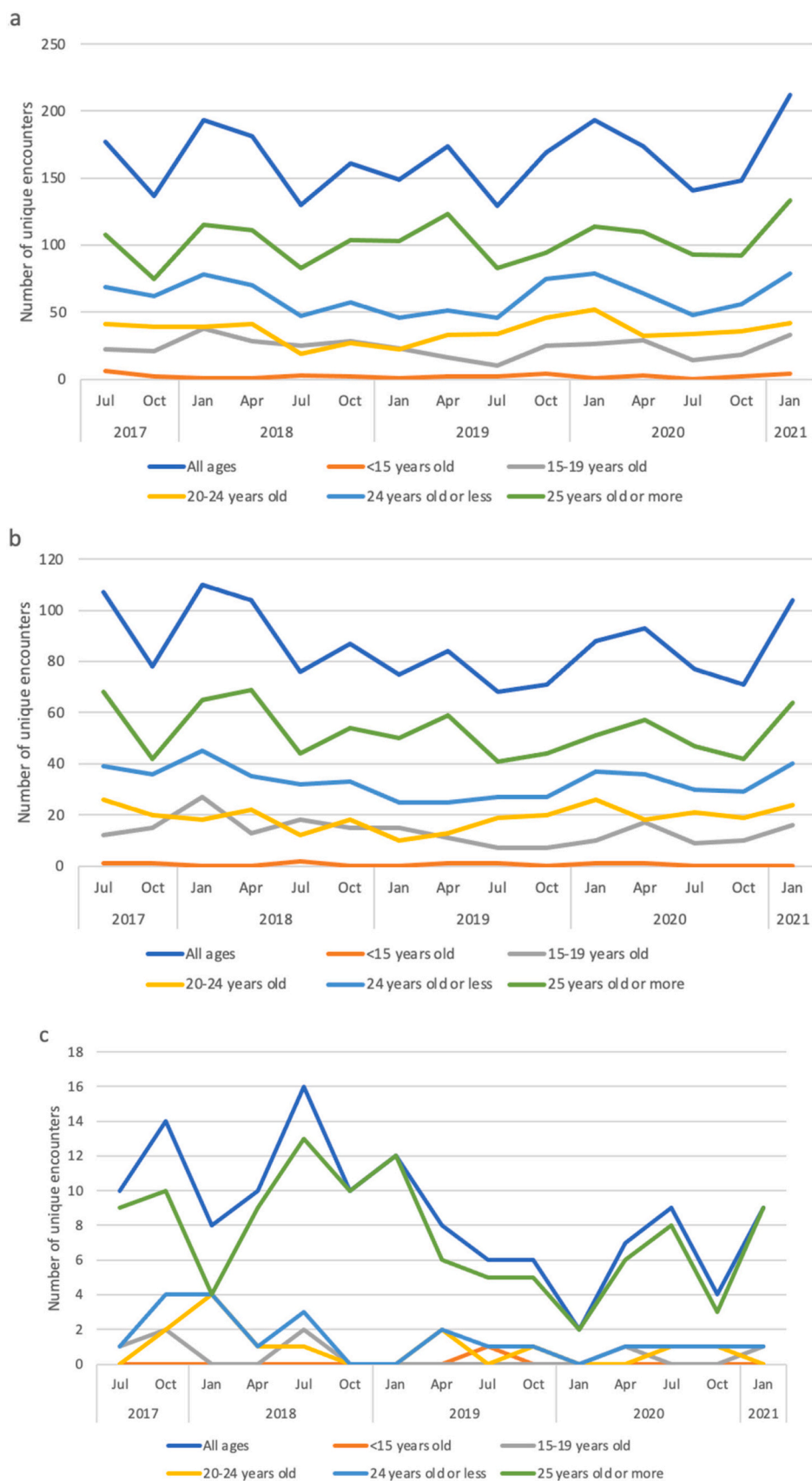


Fig. 2. Frequency of firearm injury over time, by age group and (a) all intents, (b) assault, and (c) self-harm. Firearm injury counts were graphed to the first day of the quarter (January 1, April 1, July 1, October 1).

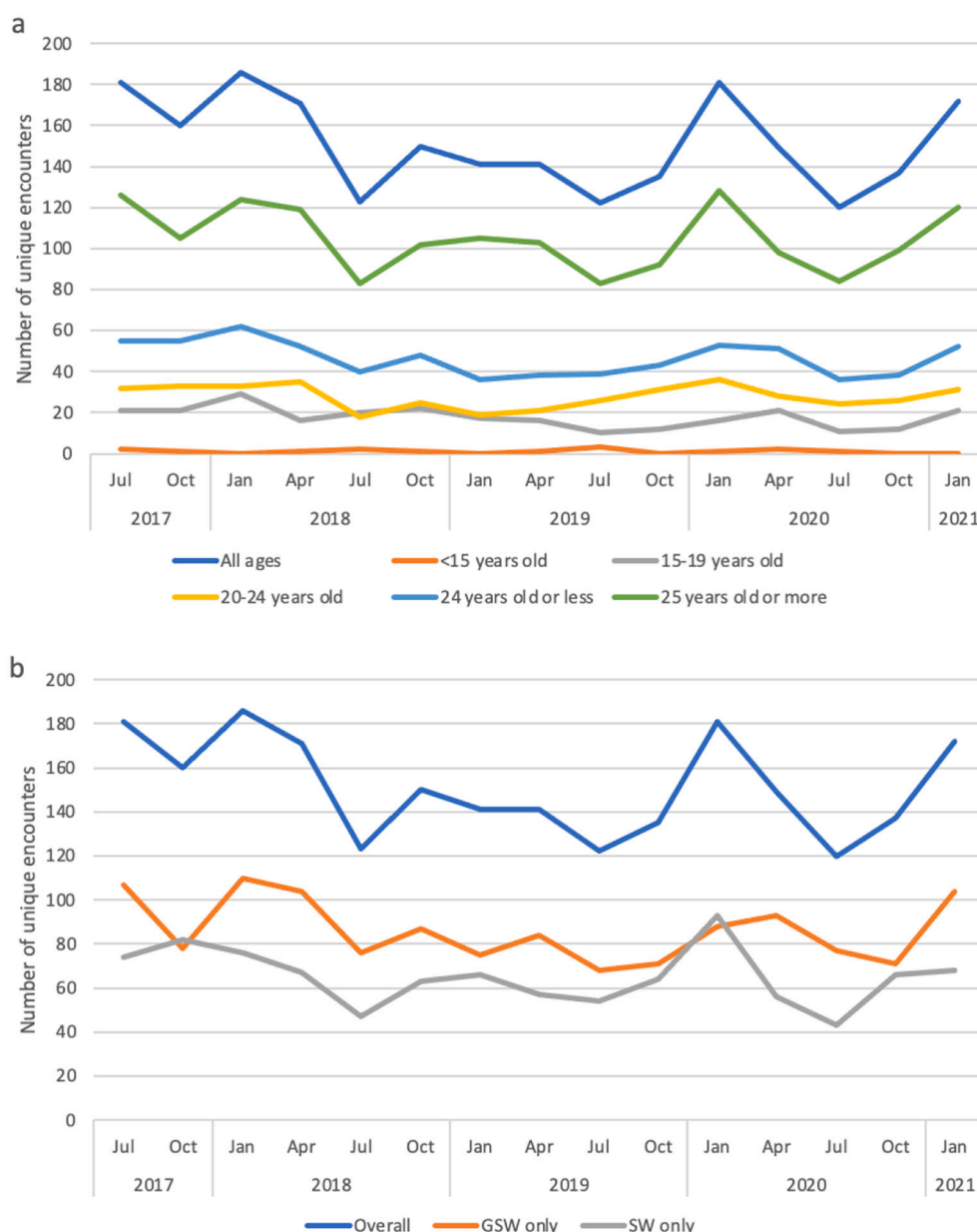


Fig. 3. Frequency of assault by penetrating trauma over time, by (a) age group and (b) type of weapon. Assault by penetrating trauma counts were graphed to the first day of the quarter (January 1, April 1, July 1, October 1). Abbreviations: GSW gunshot wounds, SW stab wounds.

Declaration of Competing Interest

All authors have no conflicts of interest to disclose.

References

- Abdallah, H.O., Zhao, C., Kaufman, E., et al., 2021. Increased firearm injury during the COVID-19 pandemic: a hidden urban burden. *J. Am. Coll. Surg.* 232 (2), 159–168.e3. <https://doi.org/10.1016/j.jamcollsurg.2020.09.028>.
- Afif, I.N., Gobaud, A.N., Morrison, C.N., et al., 2022. The changing epidemiology of interpersonal firearm violence during the COVID-19 pandemic in Philadelphia, PA. *Prev. Med.* 158 (January), 1–8. <https://doi.org/10.1016/j.ypmed.2022.107020>.
- Bottiani, J.H., Camacho, D.A., Lindstrom Johnson, S., Bradshaw, C.P., 2021. Annual research review: youth firearm violence disparities in the United States and implications for prevention. *J. Child Psychol. Psychiatry Allied Discip.* 5, 563–579. <https://doi.org/10.1111/jcpp.13392>.
- Bray, M.J.C., Daneshvari, N.O., Radhakrishnan, I., et al., 2020. Racial differences in statewide suicide mortality trends in Maryland during the coronavirus disease 2019 (COVID-19) pandemic. *JAMA Psychiatry* 2020–2022. <https://doi.org/10.1001/jamapsychiatry.2020.3938>.
- Catherine Barber, M., Eric Goralnick, M., Matthew Miller, S., 2021. The problem with ICD-coded firearm injuries. *JAMA.* 181 (8), 1132–1133. <https://doi.org/10.1001/jamainternmed.2021.0382>.
- Chodos, M., Sarani, B., Sparks, A., et al., 2021. Impact of COVID-19 pandemic on injury prevalence and pattern in the Washington, DC Metropolitan region: a multicenter study by the American College of Surgeons Committee on Trauma, Washington, DC. *Trauma Surgery Acute Care Open.* 6 (1), 1–6. <https://doi.org/10.1136/tsaco-2020-000659>.
- Etra, J.W., Canner, J.K., Aslam, U., Nasr, I.W., 2021. Penetrating trauma in Baltimore: an analysis of the effect of a rise in localized violence by age group. *J. Surg. Res.* 262, 38–46. <https://doi.org/10.1016/j.jss.2020.11.083>.
- Flanagin, A., Frey, T., Christiansen, S.L., 2021. Updated guidance on the reporting of race and ethnicity in medical and science journals. *JAMA - J. Am. Med. Assoc.* 326 (7), 621–627. <https://doi.org/10.1001/jama.2021.13304>.
- Gastineau, K.A.B., Williams, D.J., Hall, M., et al., 2021. Pediatric firearm-related hospital encounters during the SARS-CoV-2 pandemic. *Pediatrics.* 148 (2) <https://doi.org/10.1542/peds.2021-050223>.
- Hogan, L., 2020a. Order of the Governor of the State of Maryland: Amending and Restating the Order of March 23, 2020, Prohibiting Large Gatherings and Events and Closing Senior Centers, and all Non-Essential Businesses and other Establishments, and Additions. Executive Department State of Maryland, 20, pp. 1–8. <https://go.vernon.maryland.gov/wp-content/uploads/2020/03/Gatherings-FOURTH-AMENDED-3.30.20.pdf>.

- Hogan, L., 2020b. Order of the Governor of the State of Maryland: Declaration of State of Emergency and Existence of Catastrophic Health Emergency—COVID-19. Presented at: [at](#).
- Hogan, L., 2020c. Order of the Governor of the State of Maryland: Prohibiting Large Gatherings and Events and Closing Senior Centers. Presented at: [at](#).
- Holland, K.M., Jones, C., Vivolo-Kantor, A.M., et al., 2021. Trends in US emergency department visits for mental health, overdose, and violence outcomes before and during the COVID-19 pandemic. *JAMA Psychiatry*. 78 (4), 372–379. <https://doi.org/10.1001/jamapsychiatry.2020.4402>.
- Hoops, K., Johnson, T., Grossman, E.R., McCourt, A., Crifasi, C., Benjamin-Neelon, S.E., 2020. Stay-at-home orders and firearms in the United States during the COVID-19 pandemic. *Prev. Med.* 141 (July), 106281 <https://doi.org/10.1016/j.ypmed.2020.106281>.
- Gun Violence Archive. Accessed August 18, 2021. <https://www.gunviolencearchive.org/>.
- Kamat, P.P., Santore, M.T., Hoops, K.E.M., et al., 2020. Critical care resource use, cost, and mortality associated with firearm-related injuries in US children's hospitals. *J. Pediatr. Surg.* 55 (11), 2475–2479. <https://doi.org/10.1016/j.jpedsurg.2020.02.016>.
- Kravitz-wirtz, N., Aubel, A., Schleimer, J., Pallin, R., Wintemute, G., 2021. Public concern about violence, firearms, and the COVID-19 pandemic in California. *JAMA Netw. Open* 4 (1), 1–11. <https://doi.org/10.1001/jamanetworkopen.2020.33484>.
- McGinty, E.E., Presskreischer, R., Han, H., Barry, C.L., 2020. Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA - J. Am. Med. Assoc.* 324 (1), 93–94. <https://doi.org/10.1001/jama.2020.9740>.
- National Center for Injury Prevention and Control. WISQARS: Web-based Injury Statistics Query and Reporting System. Accessed August 18, 2021. <https://www.cdc.gov/injury/wisqars/index.html>.
- Sakran, J.V., Mehta, A., Fransman, R., et al., 2018. Nationwide trends in mortality following penetrating trauma: are we up for the challenge? *J. Trauma Acute Care Surg.* 85 (1), 160–166. <https://doi.org/10.1097/TA.0000000000001907>.
- Schleimer, J.P., McCort, C.D., Shev, A.B., et al., 2021. Firearm purchasing and firearm violence during the coronavirus pandemic in the United States: a cross-sectional study. *Injury Epidemiol.* 8 (1), 1–10. <https://doi.org/10.1186/s40621-021-00339-5>.
- Vincent Felitti, M.F., Anda, R.M.M., Nordenberg, D.M., et al., 1998. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *Am. J. Prev. Med.* 14 (4), 245–258. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8).