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ORIGINAL ARTICLE

Call to Action: The Rise of Pediatric Gun Violence During the COVID-19 Pandemic

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Abstract

This study examines and describes circumstances involving non-fatal firearm injuries in a pediatric population from a Level I Pediatric Trauma Center in the southeastern U.S. Researchers analyzed Firearm Injury Questionnaire (FIQ) data collected from 144 children and adolescents, aged 2–17 years, who were treated in the emergency department and/or admitted to the hospital for non-fatal firearm injuries. Descriptive statistics are presented regarding participant demographics and FIQ responses, such as caregiver information, mental health history, adverse childhood experience (ACE) exposure, firearm access, injury intent, relationship to shooter, type of firearm used, and context of injury. Most patients identified as Black (82%) and male (75%), with most injuries categorized as intentional (72%) versus unintentional (24%) assaults. The average ACEs score was .60, with only 37% of patients' reporting any ACE experience; however, nearly half (47%) of patients reported experiencing a traumatic event beyond an identified ACE. Community violence was the most common context that attributed to patients' assaults (56%). As U.S. pediatric gun injury and fatality trends are increasing, this study provides timely data regarding pediatric firearm injuries and exposure to community violence. These findings highlight the need to provide integrated health services to pediatric patients experiencing non-fatal firearm injuries. Researchers discuss public health implications for integrated mental health care services, hospital- and school-based violence intervention programs, policy recommendations, and directions for future research.

Keywords Violence · Gun violence · Community violence · Mental health · Children · Adolescents

Gun violence in the U.S. is an ongoing crisis and the leading cause of pediatric death (Centers for Disease Control and Prevention, 2022; Liou et al., 2021). Research shows that approximately 4.6 million U.S. children (7%) live in homes with firearms that are kept loaded and unsecured, thus greatly increasing the potential for harm (Azrael et al., 2018). According to a more recent study, firearm-related accidents account for more than 25% of unintentional pediatric deaths in the U.S. and most of these inadvertent injuries take place in the home while parents and caregivers are away (Cohen et al., 2021).

The COVID-19 pandemic swiftly ushered in a period of significant turmoil and hardship in 2020 with fallout that would ultimately contribute to a surge in gun violence in the U.S. For example, there was a 27% increase in the number of firearm injuries and death cases in the U.S. between April 2020 and July 2020, resulting in 4075 more injuries than the same months in the prior year (Schleimer et al., 2021). There was also a significant increase in firearm incidents involving children ages 0–11 during the first six months of the pandemic (Cohen et al., 2021). During the height of the pandemic in 2020 (March-December), accidental death by firearm in U.S. children increased by 30% compared

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to the same months in 2019 (Schaechter, 2021). Rates of firearm injuries in children younger than 12 increased from approximately 0.30 to 0.68 per million children monthly to 0.52 to 1.20 per million children monthly from March 2020 through August 2020 (Gun Violence Archive, 2020; Cohen et al., 2021).

The rate of firearm purchases in the U.S. has rapidly increased since the COVID-19 pandemic began. As indicated by the Federal Bureau of Investigation (FBI), more than 13.6 million background checks for gun purchases were completed between March 2020 and June 2020, resulting in a 42% increase from the same period during the previous year (Federal Bureau of Investigation, 2021). Further contributing to the rise in pediatric gun violence, people living with children in the home have been more likely to purchase a new firearm during the pandemic (Khubchandani & Price, 2020). Current evidence suggests a positive correlation between the rise in gun ownership and the rise in firearm-related pediatric injuries and fatalities. Children are more likely to be victims of gun violence if they live in homes with guns, especially those which are kept loaded or not securely stored (Liou et al., 2021; Muir, 2021).

Additionally, there are several other factors that have left children especially vulnerable to gun violence. Caregiver stress has led to an escalation of abuse in households; teachers and guidance counselors have been limited in their ability to report suspected abuse due to school closures and social distancing. (Bell et al., 2021). Increased economic pressure during the pandemic pushed some caregivers to enter the workforce or to work more, while the inability to work remotely led to decreased child supervision. The increased social isolation and decreased peer support has caused increased mental health challenges and rates of self-inflicted gun injuries, particularly in adolescents. The lack of gun storage safety in the U.S. further fuels this crisis. Recent data show that children have been left at home unsupervised far more often since the beginning of the COVID-19 pandemic (Cohen et al., 2021). In households with both firearms and children, almost 50% of these homes do not keep firearms properly stored, and over 20% of children ages 5–14 who live in a home with firearms have handled the weapon without caregivers' knowledge or permission (Children's Defense Fund, 2021). The risk of suicide quadruples in U.S. children when the child lives in a home with a firearm, and in approximately 90% of cases of child suicide by firearm, the gun was accessed at the child's own home or the home of a relative (Schaechter, 2021). Research also indicates a higher likelihood of gun-related injuries and fatalities in children who live in urban areas (Borg et al., 2021), areas of lower socioeconomic status (Price et al., 2021), and areas with higher rates of gun ownership (Liou et al., 2021).

Children exposed to traumatic events, such as gun and community violence, contend with many significant and sometimes devastating mental health effects. They have an increased likelihood of PTSD, suicidality, anxiety, depression, aggression, delinquency, decreased physical activity, weight-related physical health issues, school absences, a higher likelihood of becoming high school dropouts, and mental health-related visits to the emergency room (Borg et al., 2021; Borofsky et al., 2013; Finkelhor et al., 2013; Guerra et al., 2003; Hurt et al., 2001; Johnsona et al., 2002; Muir, 2021; Patchin et al., 2016).

Purpose of the Current Study

As evidenced by the extensive previous literature, childhood trauma, such as pediatric gun violence and exposure to community violence, has been a long-standing issue made worse by the staggering increase in gun violence during the COVID-19 pandemic. In response to this wide-spread issue, the American College of Surgeons Committee on Trauma's (ACS COT) Quality Improvement Program (TQIP) was awarded a grant from the National Collaborative on Gun Violence Research (NCGVR). The ACS COT embarked on a multi-center (71) prospective study that included Level I and II TQIP national centers to seek insight into the micro and macro needs of those impacted by non-fatal firearm injuries. The current study was conducted at a Level I Pediatric Trauma Center in the southeastern region of the U.S. and seeks to quantify and describe the situations and contextual circumstances surrounding non-fatal firearm injuries within pediatric populations in the southeastern U.S. Specifically, the study aims to answer the following research questions:

RQ1: What are the demographic characteristics of pediatric firearm injury patients?
RQ2: What is the extent of prior trauma among pediatric firearm injury patients?
RQ3: What are the characteristics surrounding the injury?

Method

Design

This study was conducted with the approval of the Institutional Review Boards from two universities and the participating children's hospital as part of the ACS COT TQIP. Data reported in this manuscript were collected from March 2021 to March 2022. Participants *($N = 144$)* were children ages 2 to 17 years who were treated at either the emergency department or admitted to the hospital for a non-fatal firearm injury. The trauma mental health counselors and social worker at the participating hospital's trauma services division conducted clinical interviews with participants utilizing the Firearm Injury Questionnaire (FIQ), a survey developed by the American College of Surgeons Committee on Trauma Quality Improvement. The purpose of the survey was to collect data to inform hospitals, physicians and staff on trends of gun-violence victims and their needs. The FIQ was adopted by the hospital as part of a new initiative to establish a mental health standard of care and provide access to wrap-around mental health and social service programs. The interviews were conducted at the bedside if the patient was admitted to the hospital, within the emergency department, or over the phone if the patient was discharged prior to administration of the questionnaire. Patients and their caregivers were told that the information collected was used to examine hospital trends in gun violence victims, for treatment planning and referral to additional hospital and community-based services. They were also informed that they could skip any question they were not comfortable answering. Caregivers were the primary respondents for patients younger than 10 years old, or, if their child was incapable of responding to the questionnaire. In addition to the FIQ, patients and their caregivers were administered the Childhood Stress Disorders Checklist-Short Form (CSDC-SF) to screen for Acute Stress Disorder and mental health distress (Schauss et al., 2022). Any patient scoring "1" or more was immediately referred to the Hurt2Healing™ program, a new hospital-based, mental health standard of care initiative to provide integrated mental health counseling services to patients experiencing mental health distress. Data were recorded utilizing pen and paper, then entered into the TQIP database, which facilitated linkage of survey data to other relevant data from the patients' medical records. The data presented are purely descriptive and no programmatic or research outcomes were evaluated.

The trauma mental health counselors and the trauma social worker received training from the American College of Surgeons on administration and interpretation of the FIQ. Trauma mental health counselors included licensed university faculty and staff as well as advanced-standing graduate students completing their master's degrees in Clinical Mental Health Counseling and PhD in Counselor Education and Supervision. All participants were eligible for free mental health counseling services during their admission to the hospital or post discharge at the hospital's outpatient clinic.

Questionnaire

The American College of Surgeons TQIP team created the FIQ to bridge the gap in knowledge of the social, emotional, and community elements surrounding non-fatal firearm injuries. The FIQ is part of the National Trauma Data Standard (NTDS) that contains more than 140 questions. Information from the NTDS is collected from the 71 participating institutions and the American College of Surgeons that share data use agreements to improve quality and patient outcomes. The FIQ is a demographics questionnaire that includes 28 questions, takes approximately 10–40 min to complete, and collects data on patient demographics, risk factors, and circumstances surrounding the non-fatal firearm injury. Knowing these modifiable factors are essential for addressing patients' holistic needs and decreasing the potential for negative long-term impacts. The current study examined the responses to 16 of the 28 FIQ questions. Other items from the questionnaire were not included in the study, as they applied to less than 5% of the sample.

Results

Table 1 reports the characteristics of firearm injury patients ($n = 144$). In our sample, most patients were Black (82%), male (75%), and had an average age of 12.71. The FIQ asks respondents to report any caregiver(s) they had at the time of injury. More than one third of our sample (37%) reported living with a single mom, 29% reported living with both parents, 14% reported living with their grandparents, 9% reported living with another family member/friend, 8% reported living with a single dad, and 3% reported "other." Patients were asked about their mental health history; 74% reported no mental illness diagnosis/treatment history. The FIQ also includes questions regarding criminal and victimization history in which 10% of patients reported having a prior incarceration/arrest while 5% reported a prior violent victimization.

Question 13 of the FIQ asks respondents to report any ACE history, which includes 10 potentially traumatic exposures prior to age 18 as initially conceptualized in Felitti et al.'s (1998) original ACE study. The average ACE score was 0.60 with a range of 0 to 6, with only 37% of patients reporting experience of any ACE. The most frequently reported type of ACE (Question 14) was parental separation/divorce (27%), followed by incarceration of a household member (7%), household member with a mental illness (6%), emotional abuse (3%), physical abuse (3%), witnessing violence towards mother (3%), household substance use (3%), physical neglect (3%), and emotional neglect (2%). No patients reported a history of sexual abuse. Questions 15 and 16 ask respondents about other potentially traumatic events, including community violence, Child Protective Services (CPS) involvement, housing/food insecurity, illness/injury, and "other" traumatic events. Nearly half the sample (47%) reported experiencing any traumatic event (i.e., outside of an ACE). The most frequently reported traumatic event exposure was community violence (31%) followed by CPS involvement (17%).

Table 1 Descriptive Statistics of Pediatric Firearm Patients (n = 144)

Variable	Mean/%	S.D	Range
Age	12.71	4.32	2–17
Race			
White (Non-Hispanic)	11%	–	0–1
Black	82%	–	0–1
Hispanic	5%	–	0–1
Other Race	2%	–	0–1
Primary Caregiver			
Single mother	37%	–	0–1
Parents	29%	–	0–1
Grandparents	14%	–	0–1
Single father	8%	–	0–1
Other family member/friend	9%	–	0–1
Other	3%	–	0–1
History Of Mental Illness	10%	–	0–1
Incarceration/Arrest History	10%	–	0–1
Prior Violent Victimization	5%	–	0–1
ACE Score	0.60	1.03	0–6
Any ACE	37%	–	0–1
Emotional Abuse	3%	–	0–1
Physical Abuse	3%	–	0–1
Violence Towards Mother	3%	–	0–1
Household Substance Abuse	3%	–	0–1
Household Mental Illness	6%	–	0–1
Divorce/separation	27%	–	0–1
Incarceration in Household	7%	–	0–1
Emotional Neglect	2%	–	0–1
Physical Neglect	3%	–	0–1
Traumatic Event			
Any Traumatic Event	47%	–	0–1
Community Violence	31%	–	0–1
CPS Involvement	17%	–	0–1
Housing Insecurity	5%	–	0–1
Illness/Injury	4%	–	0–1
Food Insecurity	1%	–	0–1
Other	8%	–	0–1
Firearm Access	14%	–	0–1
Intent of Injury			
Assault	72%	–	0–1
Unintentional	23%	–	0–1
Self-harm	1%	–	0–1
Unknown/Not Reported	4%	–	0–1
Injury Setting			
House	45%	–	0–1
Street	25%	–	0–1
Vehicle	13%	–	0–1
Other	17%	–	0–1
Relationship to Shooter			
Stranger	32%	–	0–1
Acquaintance	15%	–	0–1
Family Member	10%	–	0–1
Self	9%	–	0–1
Other	11%	–	0–1
Unknown	23%	–	0–1
Type of Firearm Used			
Handgun	26%	–	0–1
Other	11%	–	0–1
Unknown	63%	–	0–1
Context of Assault (n = 116)			
Community Violence	57%	–	0–1
Bystander	9%	–	0–1
Altercation	9%	–	0–1
Other	25%	–	0–1
Context of Unintentional Injury (n = 36)			
Playing with Gun	33%	–	0–1
Handling Gun	28%	–	0–1
Gun Fell	19%	–	0–1
Other	20%	–	0–1

The FIQ also includes additional questions regarding access to firearms, the intent of the injury, and the setting of the injury. Slightly more than half of the patients (55%) reported no firearm access (i.e., access to a firearm that they own, is at their place of residence, or the residence of a close friend or family member). Most firearm injuries in the sample were intentional assaults (72%) with about one-quarter (24%) of injuries being unintentional. The most common locations of the injury were in a house (45%), street (25%), and vehicle (13%).

The questionnaire also asks about the relationship of the victim to the shooter, the type of firearm used, and the context of the injury. The most common relationship to the shooter reported was a stranger (32%), and approximately one quarter reported an unknown relationship with the shooter. While more than half of the patients reported not knowing the type of firearm used (63%), approximately one-quarter reported that a handgun was used in the injury. The most common context of assaults was the result of community violence (56%). Most unintentional injuries (80%) resulted from some misuse of the firearm (e.g., playing, handling, dropping the gun).

Discussion

The current findings are consistent with larger trends of pediatric firearm injuries and fatalities across the U.S. In 2020, for the first time, firearms surpassed automobile collisions as the number one cause of death in American children (Centers for Disease Control and Prevention, 2022).

Our research was conducted during a one-year period that witnessed an exponential increase in violence in the region we serve with the hospital recording its highest numbers of pediatric gun violence victims in a one-year period. The current study was conducted in a major metropolitan area in the southeastern region of the U.S. With increasing levels of community violence, the risk of direct or indirect physical and mental harm to children and adolescents also increases and may be a contributing factor for the significant increase in gun injuries reported in the current study.

While the reported average ACE score for the entire group was low, we attribute these findings to the fact that the current study questionnaire did not include an ACE-specific question about exposure to community violence. A separate question was included in the survey which indicated that 31% of participants experienced community violence and 56% of intentional gunshot injuries occurred in the context of community violence. Research studies have highlighted the significance of community violence exposure with subsequent victimization or criminal activity (Rowhani-Rahbar et al., 2017; Turner et al., 2019). Exposure to firearm violence during childhood and adolescence—including victimization—is a risk factor for firearm perpetration and ownership in adulthood. Consistent with a growing body of research incorporating community violence as an ACE (see Finkelhor et al., 2015a, b; Lee et al., 2017; Pachter et al., 2017) the current research highlights that community violence exposure should be included when assessing ACE exposure in childhood. We suspect that had community violence been included in the list of potential ACE exposures (FIQ Question 14), a majority of our participants, particularly those with intentional injuries, would endorse exposure to community violence as an ACE, which would significantly increase an individual's overall ACE score.

It is of critical significance to note that in our findings, most of the participants who were victims of intentional gun violence reported that the occurrence took place in the home, yet they reported having no access to firearms. This seemingly contradictory finding was due to injuries caused during a drive-by shooting, where the victims were hit by a bullet while entering their home. These data points provide evidence of the extreme exposure to community violence experienced by our participants. Children who are victims of gun violence experience not only physical pain and trauma, but also suffer short- and long-term emotional trauma, often in the form of acute stress disorder anxiety, depression, and other deleterious mental health problems.

Public Health Implications

Program models such as Cure Violence, Save Our Streets, and Chicago Cease Fire have successfully applied this approach to curb community gun violence (Picard-Fritsche & Cerniglia, 2013; Butts, et al., 2015), but more must be done to better understand the community context in which gun violence is occurring and to protect and support victims of such violence. The current research is a first step toward applying the public health approach by describing the local context, identifying risk factors, and exploring potential solutions.

For example, the current data provide substantive evidence of the critical need for integrated mental health care services for gun violence victims and their family members to attend to the critical mental health needs during a time of acute distress. In providing these services immediately following injury, experienced mental health counselors can work with patients and family members to mitigate mental health distress and suffering post-injury.

In addition to mental health counseling services, hospital-based violence intervention programs must be implemented to address individual safety planning, education in safe gun storage, need for formal connections to community- and school-based violence intervention services to reduce the risk of re-victimization and/or retaliatory violence, and long-term post-discharge case management services. Baghel and Singer (2021) go further by suggesting that healthcare providers, and physicians in particular, be trained to address gun violence during patient encounters and that these encounters should, at the very least, include discussions of firearm safety. This recommendation is supported by several medical professional organizations, including the American College of Emergency Physicians (n.d.), the American Academy of Family Physicians, and the American College of Surgeons (2013) and the American Academy of Family Physicians (n.d.), all of which have put forth statements that recognize gun violence as a public health problem and recommend that physicians and healthcare providers incorporate gun violence and/or gun safety in patient encounters.

Future Research Implications

Our study results have several implications for future research. First, since a majority of the firearm injuries experienced by our participants were from intentional community violence, it is unknown whether or how this might impact pediatric population's mental health and daily life functioning, especially considering the potential trauma caused by these injuries. Second, as a pioneering study examining the prevalence of community violence during the COVID-19, our study was conducted with participants from an urban region in the southeastern region of the U.S. To gather more comprehensive data, researchers may consider recruiting more participants from additional geographic regions for comparison. In addition, it is critical for future research studies to examine predictors of intentional versus accidental injuries in pediatric patients.

Conclusion

The current study sought to quantify and describe situations and contextual circumstances surrounding non-fatal firearm injuries within pediatric populations in the southeastern United States. A staggering number of patients (47%) reported experiencing traumatic events outside of the non-fatal firearm injury such as community violence, food insecurity, or being involved with Child Protective Services. In addition, the majority of injuries reported were intentional assaults of the patients (72%) within the patients' own home, a friend's home, or a family member's home (45%), demonstrating the high likelihood of revictimization. Most patients identified as Black (82%) and male (75%), a historically underserved population in healthcare and are less likely to have access to mental health services, and at an increased risk to experience trauma (Motley & Banks, 2018). These findings highlight the desperate need to provide integrative support for pediatric patients who have experienced non-fatal gun injuries immediately following the incident. Early prevention efforts are key to minimizing the negative long-term impacts of traumatic events on a child's mental and emotional well-being. Hospital based mental health programs are vital to providing immediate, accessible mental health support to pediatric populations given the severity of the injury, potential re-victimization of patients, and potential for long-term mental health repercussions.

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Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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