Caught in the crossfire: 37 Years of firearm violence afflicting America's youth

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INTRODUCTION: Publicly available firearm data are difficult to access. Trauma registry data are excellent at documenting patterns of firearm-related injury. Law enforcement data excel at capturing national violence trends to include both circumstances and firearm involvement. The goal of this study was to use publicly available law enforcement data from all 50 states to better define patterns of firearm-related homicides in the young.

METHODS: All homicides in individuals 25 years or younger in the United States over a 37-year period ending in 2016 were analyzed: infant, 1 year or younger; child, 1 to 9 years old; adolescent, 10 to 19 years old; and young adult, 20 to 25 years old. Primary data files were obtained from the Federal Bureau of Investigation and comprised the database. Data analyzed included homicide type, situation, circumstance, month, firearm type, and demographics. Rates of all homicides and firearm-related homicides per 1 million population and the proportion of firearm-related homicides (out of all homicides) were stratified by year and compared over time using simple linear regression.

RESULTS: A total of 171,113 incidents of firearm-related homicide were analyzed (69% of 246,437 total homicides): 5,313 infants, 2,332 children, 59,777 adolescents, and 103,691 young adults. Most (88%) were male and Black (59%) with a median age of 20 years. Firearm-related homicides peaked during the summer months of June, July, and August (median, 1,156 per year; $p = 0.0032$). Rates of all homicides (89 to 53 per 1 million population) and firearm-related homicides (56 to 41 per 1 million population) decreased significantly from 1980 to 2016 ($\beta = -1.12$, $p < 0.0001$ and $\beta = -0.57$, $p = 0.0039$, respectively). However, linear regression analysis identified a significant increase in the proportion of firearm-related homicides (out of all homicides) from 63% in 1980 to 76% in 2016 ($\beta = 0.33$, $p < 0.0001$).

CONCLUSION: For those 25 years or younger, the proportion of firearm-related homicides has steadily and significantly increased over the past 37 years, with 3 of 4 homicides firearm related in the modern era. Despite focused efforts, reductions in the rate of firearm-related homicides still lag behind those for all other methods of homicide by nearly 50%. That is, while the young are less likely to die from homicide, for those unfortunate victims, it is more likely to be due to a firearm. This increasing role of firearms in youth homicides underscores the desperate need to better direct prevention efforts and firearm policy if we hope to further reduce firearm-related deaths in the young. (*J Trauma Acute Care Surg.* 2021;90: 623–630. Copyright © 2021 American Association for the Surgery of Trauma.)

LEVEL OF EVIDENCE: Epidemiological study, level III.

KEY WORDS: Firearm homicide; firearm deaths; gun violence.

Gun violence is a leading cause of morbidity and mortality in the young. Based on Centers for Disease Control and Prevention data, injury is the leading cause of death in those 1 to 44 years of age, and homicide is the third most common cause of death in 1- to 4-year-olds and 15- to 24-year-olds.[1] Breaking down violence-specific causes of death further reveals that suicide by firearm in 10- to 14-year-olds and firearm homicide in 15- to 24-year-olds again is the third leading cause of death in those age categories.[2] Furthermore, for those severely injured children who survive to reach a trauma center, the second most common cause of death is firearm injury based on National Trauma Data Bank data for those aged 0 to 19 years.[3]

A central tenet of finding solutions to firearm violence relies on the timely collection of quality data to guide interventions and policy. However, such publicly available data are extremely difficult to access.[4] Trauma surgeons have ready access to trauma registry data that provide insight into the anatomic distribution of clinical injuries and outcomes; unfortunately, such data are poor at capturing the etiology of firearm injury. Law enforcement data excel at describing gun violence to include both circumstances and types of firearms used in accidents and crimes. While the synthesis of trauma registry and law enforcement data through the implementation of a national surveillance data system is an ideal solution, such a comprehensive system does not currently exist. Therefore, the goal of this study was to use publicly available law enforcement data from all 50 states to better define patterns of firearm-related homicides in the young and to explore ways such data can highlight determinants of firearm injury to guide policy and programmatic interventions.

PATIENTS AND METHODS

Data Acquisition and Construction of the Database

Supplementary Homicide Reports (SHR) files were obtained directly from the Federal Bureau of Investigation's (FBI) Crime Statistics Office (crimestatsinfo@ic.fbi.gov) for the years 1980 to 2016. Supplementary Homicide Reports files are compiled yearly by the FBI, comprise all homicides in America reported by local law enforcement agencies, and are publicly available by request from the FBI Crime Statistics Office. This analysis does not represent the beliefs or policies of the FBI. The project was given exempt status through the University of Tennessee Health Science's Institutional Review Board.

Definitions and Assumptions

The FBI's SHR Coding Guide[5] was used for all numerical codes and definitions. The FBI defines a homicide as "the willful killing of one human being by another, including murders and non-negligent manslaughters."[6] Homicide situation refers to the number of victims and/or offenders involved in criminal homicides. The terms *offenders* and *perpetrators* are used interchangeably and define the individual responsible for the victim's death. Age of victims was categorized as follows: infant is defined as 1 year or younger; child, as age 1 to 9 years; adolescents, as age 10 to 19 years; and young adults, as age 20 to

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25 years. Only those individuals 25 years or younger who were victims of firearm homicide were included in the final analysis. This study does not include self-inflicted firearm deaths because suicide is not included in the SHR data files.

Other demographic data examined included sex and race of victims and perpetrators and relationship of victim to perpetrator (i.e., within family, not family but known to victim, stranger, or unknown). The category "no family but known to victim" includes neighbors, acquaintances, boyfriend, girlfriend, ex-husband, ex-wife, employee, employer, friend, and other known to victim. Weapon types examined included handgun, rifle, shotgun, firearm type not stated, or other gun/unknown gun. Specific firearm data (e.g., caliber or type of gun) are not captured in the FBI's SHR files, and the handgun category does not differentiate between pistols and revolvers. Firearm homicide circumstances includes felony and nonfelony circumstances: felony homicide is defined as an intentional killing that occurs at the time of another crime (e.g., robbery, burglary, etc.) and nonfelony homicide where the killing does not involve the commission of another felonious crime (e.g., arguments, accidental discharge of a firearm resulting in death, justifiable homicide, etc.). In addition, because of the nature of unsolved homicides, some circumstances are not able to be determined likely because of a lack of evidence.

The FBI defines justifiable homicide as "the killing of a felon by a peace officer in the line of duty, or the killing (during the commission of a felony) of a felon by a private citizen."[5] Unites States public law defines a mass shooting as "three or more killings in a single incident."[7] Several specific circumstances constitute manslaughter by negligence: victim shot in hunting accident, gun-cleaning death (other than self-inflicted), children playing with gun, other negligent handling of gun that results in the death of another, and all other manslaughter by negligence except traffic deaths. The FBI categorizes justifiable homicide and manslaughter by negligence as nonfelony circumstances.

Seasons were defined as follows: winter as December, January, and February; spring as March, April, and May; summer as June, July, and August; and fall as September, October, and November. United States population estimates for those 25 years or younger were obtained from the Census Bureau[8] and the Centers for Disease Control and Prevention[9] and were used for calculating the rate of total and firearm homicides each year.

Statistical Analysis

All statistical analyses were done using SAS 9.4 (SAS Institute, Cary, NC). Categorical comparisons were performed using a χ^2 or Mantel-Haenszel χ^2 analysis where appropriate. Simple linear regression was used to analyze the rate of total and firearm homicides per 1 million people per year, as well as the proportion of firearm-related homicides compared with total homicides by year. Differences were considered statistically significant at a p value of <0.05.

RESULTS

Study Population

There were 246,437 total homicides in those 25 years or younger from 1980 to 2016. Of these, 171,113 (69%) were firearm related (Table 1). The majority of firearm-related homicides were classified as murder and nonnegligent manslaughter (n = 165,523, 98%), with manslaughter by negligence making up the remainder (n = 3,546, 2%). A total of 2,044 were unclassified or had missing data for this variable. Of the 171,113 victims, the majority were male, Black, ranged in age from younger than 1 year to 25 years (median, 20 years; interquartile range, 17–23 years) and included 5,313 infants, 2,332 children, 59,777 adolescents, and 103,691 young adults. Most known perpetrators were male, Black, and ranged in age from 13 to 79 years (median, 22 years; interquartile range, 19–28 years) (Table 1).

The most common relationship between a victim and offender was unknown at 43% likely secondary to inadequate evidence. When a relationship could be established and captured in the SHRs, the most common perpetrator was not family but was known to the victim (34%), followed by strangers (18%) and, finally, within family at 5%.

The most common firearm-related homicide situation involved a single victim and single offender (50%), followed by a single victim and unknown number of offenders (32%), single victim and multiple offenders (13%), multiple victims with a single offender (2%), multiple victims with unknown number of offenders (2%), and multiple victims with multiple offenders (1%).

The median number of firearm-related homicides per year in those 25 years or younger demonstrated seasonal changes, with a clear peak in the summer months of June, July, and August (1,156; $p = 0.0032$). Conversely, the lowest number of deaths overall occurred in the winter months of December, January, and February (Table 2).

Weapon Type

Handguns, which include pistols and revolvers, accounted for the vast majority of firearms used in youth homicides over the study period (77%), followed by firearm type not stated at 11%,

TABLE 1. Firearm-Related Homicide Demographics

Total homicides, ≤25-y-old	246,437
Firearm homicides, n (%)	171,113 (69)
Nonfirearm homicides, n (%)	75,324 (31)
Victim race, n (%)	
Black	100,933 (59)
White	65,359 (38)
Asian	2,319 (1.5)
Indian	772 (0.5)
Unknown	1,730 (1)
Victim sex, n (%)	
Male	150,077 (88)
Female	20,765 (12)
Perpetrator race, n (%)	
Black	64,638 (37.5)
White	44,375 (26)
Asian	1,566 (1)
Indian	536 (0.5)
Unknown	59,998 (35)
Perpetrator sex, n (%)	
Male	107,906 (63)
Female	4,828 (3)
Unknown	58,379 (34)

TABLE 2. Firearm-Related Homicides by Season

Season, n (%)	
Winter	40,276 (23)
Spring	41,152 (24)
Summer	46,691 (27)
Fall	42,994 (25)

shotguns at 6%, rifles at 5%, and other gun at 1%. Shotgun use decreased over the study period and accounted for 11.7% of deaths in 1980 compared with 1.6% of deaths in 2016 ($p < 0.0001$). Similarly, the proportion of deaths attributable to rifles decreased from 8.6% in 1980 to 2.7% in 2016 ($p < 0.0001$). Of the 75,324 non–firearm-related deaths in those 25 years or younger, the most common weapons were knife or cutting instrument at 42.3%, personal weapons (i.e., beating by hands and feet) at 19.6%, and other weapon (i.e., type of weapon not designated or unknown) at 17.5%.

Firearm Homicide Circumstances

The majority of firearm-related homicide circumstances in youth were attributable to nonfelony circumstances (55%), followed by felony circumstances (16%) and unable to determine (29%). Manslaughter by negligence accounted for only 2% of total firearm-related deaths in those 25 years or younger with negligent handling of gun being the most common at 1.2%. A comprehensive list of all circumstances leading to firearm-related deaths in America's youth over the past 37 years can be found in Table 3.

When examining the circumstances associated with firearm-related deaths by age category, the majority in all categories were due to unknown circumstances (range, 18.3–48.7%). Of categorizable felony and nonfelony circumstances, the three most common for each age category include the following:

- Infants: other arguments (15.8%), other circumstances (10.2%), and robbery (3%)
- Children: other circumstances (37.2%), other arguments (13.9%), and children playing with gun (9.4%)
- Adolescents: other arguments (20.6%), juvenile gangland killings (14.1%), and other circumstances (10.7%)
- Young adults: other arguments (24.4%), other circumstances (8.6%), and robbery (6.8%).

All categories of justifiable homicide, which accounted for 5% of total circumstances, are listed in Table 4. The most common justifiable homicide circumstances in those 25 years or younger were felon killed in commission of a crime (44%), felon attacked police officer (26%), and felon attacked civilian (12%).

Firearm Homicide Trends

While the greatest absolute number of firearm homicides in America's youth occurred in 1994 (n = 7,394), rates of all homicides decreased from 89 to 53 per 1 million population ($\beta = -1.12$, $p < 0.0001$) as did firearm-related homicides from 56 to 41 per 1 million population ($\beta = -0.57$, $p < 0.0001$) over the study period. Conversely, simple linear regression identified a statistically significant increase in the proportion of firearm-related homicides (out of total homicides) from 63% in 1980 to 76% in 2016 ($\beta = 0.33$, $p < 0.0001$) (Fig. 1).

DISCUSSION

This analysis gives a portrait of interpersonal firearm violence focused on the young over the past 37 years from 1980 to 2016. The data show that the majority of victims and offenders are Black and White males in their early 20s. Most victims were not family members but were somehow known to their killers. Of those individuals 25 years or younger who were killed by firearms over the study period, the vast majority are adolescents and young adults. Handguns remain the most common firearm used in youth deaths with significant decline in the use of rifles and shotguns since 1980. Most instances of firearm violence in youth involve a single victim and single offender, with multiple

TABLE 3. Firearm-Related Homicide Circumstances

Total firearm homicides	171,113
Total felony circumstances, n (%)	26,962 (16)
Robbery	10,557 (6.2)
Narcotic drug laws	9,522 (5.6)
Other — not specified	3,175 (2)
Suspected felony type	1,926 (1)
Burglary	751 (0.4)
Gambling	250 (0.2)
Motor vehicle theft	235 (0.1)
Larceny	176 (0.1)
Rape	213 (0.1)
Prostitution and commercialized vice	64 (0.04)
Other sex offense	65 (0.04)
Arson	27 (0.02)
Abortion	1 (0)
Total nonfelony type circumstances, n (%)	93,491 (55)
Other arguments	38,764 (23)
Other nonfelony circumstances	16,774 (9.8)
Juvenile gang killings	15,373 (9)
Argument over money or property	2,829 (1.7)
Brawl due to influence of alcohol	2,101 (1.2)
Lover's triangle	1,747 (1)
Gangland killings	2,407 (1.4)
Brawl due to influence of narcotics	1,416 (0.8)
Sniper attack	173 (0.1)
Institutional killings	12 (0.01)
Child killed by babysitter	14 (0.01)
*Manslaughter by negligence, n (%)	3,546 (2)
Negligent handling of gun	2,055 (1.2)
Children playing with a gun	1,085 (0.6)
Other manslaughter by negligence	210 (0.1)
Victim shot in hunting accident	133 (0.08)
Gun cleaning death	63 (0.04)
*Justifiable homicide, n (%)	8,335 (5)
Felon killed by police	4,510 (3)
Felon killed by private citizen	3,825 (2)
Unable to determine circumstances	50,660 (29)

*Manslaughter by negligence and justifiable homicide are both considered nonfelony circumstances and are included in the 55%.

TABLE 4. Justifiable Homicide Circumstances

Total Justifiable Homicides, n (%)	8,335 (5)
Felon attacked police officer	2,161 (26)
Felon killed in commission of a crime	3,663 (44)
Felon attacked a civilian	991 (12)
Not enough information to determine	700 (8)
Felon resisted arrest	313 (4)
Felon attacked fellow police officer	228 (3)
Felon attempted flight from a crime	279 (3)

victims (a proxy for mass shootings) accounting for only 5% of total youth firearm deaths. Most deaths occurred in the summer months of June, July, and August suggesting that, when youth are not in school, they are more susceptible to activities that lead to firearm death.

Overall, the good news is that the rate of both total and firearm-related homicides in youth have decreased over the study period, although the reduction in firearm-related homicides still lags behind all other methods by nearly 50%. The bad news is that, if a young person in America is killed by another today, it is more likely to be with a gun (i.e., the proportion of firearm homicides in comparison with all homicides has increased), with three of four homicides firearm-related in the modern era.

The strength of the analysis is that it illuminates the circumstances surrounding firearm deaths in the young, which in turn offers potential solutions to address the causes of these deaths. Overall, almost one third of circumstances of all deaths in those 25 years or younger over the past 37 years were unable to be determined (Table 3), suggesting that a significant amount of firearm homicides are unsolved. Possible reasons for this include poorly resourced homicide divisions within local police departments, that certain circumstance categories make it hard to obtain witness or case information (e.g., gang members may be less inclined to give known information about a death) or a genuine lack of evidence. The majority of circumstances in all four age categories were also attributable to unknown circumstances; in addition, in each age category, the generic classification of "other nonfelony circumstances" was also in the top three circumstances of each age category. This finding highlights the limits of the SHR reporting system and its lack of granularity in describing circumstances surrounding gun deaths and underscores the need for targeted intervention efforts by age of victim, including the need for better data collection at the local, state, and national levels and, ideally, a system that integrates trauma center and law enforcement data prospectively. Such a comprehensive data collection system would allow the synthesis of circumstantial and clinical variables, which would further assist in targeting more focused interventions based on age and circumstances. Our group has repeatedly argued for this, and our experience with integrating law enforcement and clinic data has shown how difficult this can be.[4,10,11] Ultimately, a national prospective gun violence database that synthesizes law enforcement, clinical, vital statistics, and coroner/medical examiner data is the goal, but this faces numerous logistical, technological, and political challenges. Modeling such a system on local and state examples of the weapons-related injury and surveillance systems is a practical starting point.[12]

While gun ownership has been shown to increase the risk for homicide,[13,14] as well as accidental gun deaths,[15] only 2% of all firearm homicides in the current study could be categorized as accidental (i.e., manslaughter by negligence). However, a 2015 survey revealed that approximately 7% of American children live in homes where a firearm is stored loaded and unlocked, which was more than double the amount in 2002.[16] Therefore, gun safety among youth is a critical point of intervention because of opportunities for prevention in the preevent period. There is good evidence that gun locks and safe storage practices contribute to preventing gun deaths.[17] Other strategies include screening families about gun ownership, counseling families at the individual level during health care visits on safe storage practices, and educational programs in schools (e.g., preventing carriage of weapons in schools) and the community (e.g., hunter's safety courses).[18]

Juvenile gang killings accounted for a significant amount of firearm deaths in adolescents (14.1%) and 9% of overall

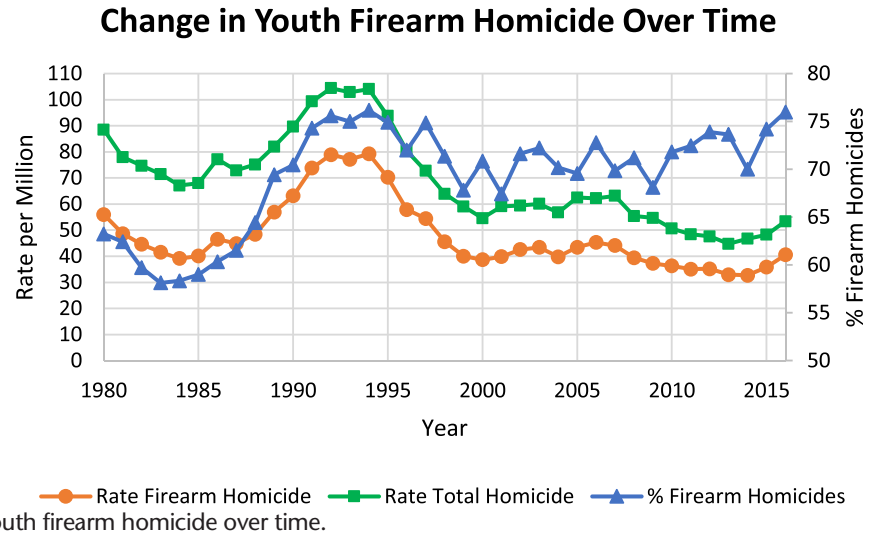

Figure 1. Change in youth firearm homicide over time.

firearm homicide circumstances in this study (the FBI defines a juvenile gang as one composed of those younger than 18 years[19]). Gang membership can be difficult to quantify, and these percentages are likely gross underestimates of a much larger problem that should be targeted for interventions.[20] Both hospital-based violence intervention programs[21] and community violence interruption models[22] have been instrumental in curbing gang violence, but these interventions occur after a violent event. Primary strategies to prevent gang violence should therefore focus on strengthening families, schools and summer programs, improving community supervision (especially of at-risk youth), education for teachers and parents on how to manage disruptive youth, and interpersonal skills development to prevent youth from joining gangs and learn nonviolent ways to resolve conflicts.[23] Further strategies to address youth violence more generally include promoting family environments that support healthy development, providing quality education early in life, strengthening youth's skills, connecting youth to caring adults and activities through mentorship and after-school programs, and creating protective community environments.[24]

Based on results from this study, the majority of victims and perpetrators of youth gun deaths in America since 1980 have been among Black males (Table 1). This finding highlights the effects of entrenched systemic racism in American society that drives disparities in ways that our country, in light of recent events and based on several hundred years of history, is just now beginning to address. When asking ourselves as surgeons and policymakers about strategies to prevent gang violence and strategies that target youth violence more generally (examples listed in preceding paragraph), we must acknowledge the implicit biases we may hold and our nation's despicable history of slavery and institutionalized inequality in preventing forward progress.[25] As an example, we must understand how policies such as redlining and rezoning have marginalized inner city Black communities making it virtually impossible to improve education or offer after school programs for at-risk youth that might deter a reliance on violence. More rigorous research on how structural racism has tangibly contributed to America's gun violence epidemic is needed. In addition to research, the American College of Surgeons Task Force on Racial Issues has recommended efforts to further address structural racism in the field of surgery and American society by achieving a just and inclusive environment, cultural competency, diversity in the workforce, and advocacy and legislative reform.[26]

While this study shows that the rate of firearm-related homicide has decreased over the 37-year study period, continued efforts to curb gun violence must continue at the public health, law enforcement, community, and legislative levels. Ultimately, adequately addressing youth gun violence and death will require changes in legislation that targets the criminal use of firearms. It is not possible to disinvent the gun nor is it necessary to limit gun sales and ownership to law-abiding citizens. We agree with the American Association for the Surgery of Trauma[27] and the American Pediatric Surgery Association[3] that legislative action promoting universal background checks on all gun sales, limiting access to high-capacity magazines and military-style assault weapons, and denying anyone with a violent past access to guns will assist in further decreasing gun crime. Such policy efforts in combination with ongoing research and a multifactorial approach that addresses poverty, racism, unemployment, and nonviolent conflict resolution will have an impact on this unique American problem, now and in the future.

LIMITATIONS

There are several limitations to this study. First, because of its retrospective design, there is the possibility of selection bias and unevaluated differences that could be due to unknown confounding variables. Every effort was made to avoid coding and data cleaning errors, but because of the original format of the SHR files, there is a possibility this occurred. At the local police department level, data could have been misclassified, but this is likely a rare event. This study is an aggregate national analysis of firearm homicide only and does not include deaths from firearm suicides, which constitute two thirds of all gun deaths in the United States each year.[28] Finally, this study was designed to offer a comprehensive, national view of youth gun deaths over a 37-year period and was not designed to analyze differences between geographic regions, states, or cities over time.

CONCLUSION

For those 25 years or younger, the proportion of firearm-related homicides has steadily and significantly increased over the past 37 years, with nearly three of four homicides being firearm-related in the modern era. Despite focused efforts, reductions in the rate of firearm-related homicides still lag behind those for all other methods of homicide by nearly 50%. That is, while the young are less likely to die from homicide today, for those unfortunate victims, it is more likely to be due to a firearm. This increasing role of firearms in youth homicides underscores the desperate need to better direct prevention efforts and firearm policy if we hope to further reduce firearm-related deaths in the young.

AUTHORSHIP

N.R.M. and L.J.M. conceived the study. N.R.M., M.A.C., D.D.H., and L.J.M. performed data acquisition, data cleaning, and data analysis. N.R.M., R.H.L., D.D.H., and L.J. M. completed a literature search, and N.R.M. and L.J.M. drafted the initial article. All authors performed the critical revision of the article and participated in the data interpretation and writing.

DISCLOSURE

The authors declare no conflict of interests.

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DISCUSSION

DENNIS VANE, M.D., M.B.A. (Wadmalow Island, South Carolina): Thank you. This is an interesting study that really dissects the incidence of homicides and gun-related homicides in our young.

The authors indicate that these have statistically decreased over the past 37 years; however, percentage of gun-related homicides calculated against homicides in the general population have increased.

The study is timely as issues of mass shootings have been on the increase and daily reports of gun violence seem to be appearing in the newspapers. I have a couple of questions for the authors.

First, you report that the data is incidence per million population. Is this calculation done on the population as a whole or the population of individuals under 25 for each of those years? And why did you use this metric?

If you really go down and calculate the actual number of gun-related homicides for the population under 25, it actually appears, doing the statistics for 1980 and then 2016, that this number has been stable, being just under 5,000 a year. This seems to indicate a steady number of incidents per year.

Also, why did you include the age groups up to 25? The young adults in that age group are (glitch) group from younger children.

The next question really regards to the conclusions and sort of is a statement rather than a question. The authors indicate that the recommendation is to run universal background checks on all gun sales. This is important, as we already heard from other authors, to close the loophole of private sales and sales at gun shows.

In addition, the mandatory reporting of stolen guns needs to be included in this requirement because that's another loophole where guns are appearing on our streets.

Somehow we have to get a handle on the distribution of firearms in the population that avoids present screening.

As all trauma surgeons including pediatric surgeons are well aware, the incidence of gunshot sounds in our emergency rooms has exploded. Deaths may be stable, but injuries are clearly not.

In an article by JAMA published in by the CDC in 2012, prior to the defunding of gun-related research, this point was made that although gunshot deaths seems to be decreasing – and that was questionable – gunshot injuries were not and were, in fact, increasing.

Should we, in addition to strengthening our inadequate regulations on guns, also address possession of military-grade weapons intended to maim and hurt large numbers of individuals, not particularly kill anybody, and their availability to our civilian population?

Additionally, were the authors able to get any data on mass shootings in this period?

Again, Nathan, thank you for the opportunity to review this really important paper and I look forward to listening to your answers.

NATHAN MANLEY, M.D., M.P.H., M.S. (Memphis, Tennessee): Thank you, Dr. Livingston, for moderating this session. Thank you to the AAST. And thank you, Dr. Vane, for your thoughtful questions and comments.

To answer your first question, yes, the "per million" population calculations for the rates and for the incidence were for those less than or equal to 25 years old.

I think that the important thing that this paper shows is that over time, from 1980 to 2016, that incident in total firearm homicides or the rate in total firearm homicides, as well as those in firearm homicides, has decreased over that time period with the rate being half of fast in firearm homicides, meaning that more kids are being killed with guns.

And that's what our proportion statement shows over the same time period, from 1980 to 2016, and that's why we used that metric as a contrast, that if a kid, if a younger person in this country dies today that it's more likely to be due to a gun, with three-fourths of all deaths in our young, less than or equal to 25 years old, being with a firearm, which really highlights the problem.

Moving on to your second question, we included up to 25. If you look at our numbers there is really small numbers in infants, the children categories, and the adolescent categories.

And I appreciate your point about this really being a different demographic but it's also an important demographic in that it also shows us by identifying the specific circumstances, other targets for intervention that we can target in the future.

And with regard to your last question and comment about where do we go from here and what kind of legislation can we implement, we 100 percent agree with you that universal background checks are paramount, that stolen guns must be reported.

And I think that for something – and, personally, and something that we've come to realize studying this problem over several years is that we need better data.

And right now we're kind of scraping the bottom of the barrel and using – I mean this is retrospective data available from the Federal Bureau of Investigation.

It's not nationally prospective surveillance data that we're capturing in real-time that would really help us identify risk factors and that sort of thing in real-time.

I was pleased to read the other day that the American College of Surgeons, the Committee on Trauma, was just granted a $700,000 to actually identify individual community factors for non-lethal firearm injuries to try to get at in trauma centers and with collecting various forms of data to try to get at the root causes of this and specific things that we can do in our communities to target and limit this problem, especially among our young.

And with regard to mass shootings, you know 5 percent of deaths in this study were due to multiple victims. Now that doesn't necessarily mean that that would qualify as a "mass" shooting. There is various definitions.

But there is a paper that will be presented by one of my faculty members later in this meeting, and I think early next week, that will elucidate the issue of mass shootings more.

JEFFREY S. HAMMOND, M.D. (Somerville, New Jersey): Does the FBI data require that the cases be closed with prosecution? What happens to open cases or unsolved cases? Are they in this database? How are FA deaths that are unresolved accounted for?

NATHAN MANLEY, M.D., M.P.H., M.S. (Memphis, Tennessee): Specifically, no, like unsolved, I mean the death has to be documented and it has to be closed for it to be included in this data.