

Trends in Homicide Rates for US Children Aged 0 to 17 Years, 1999 to 2020

Rebecca F. Wilson, PhD; Beverly L. Fortson, PhD; Hong Zhou, MS, MPH; Bridget H. Lyons, MPH; Kameron J. Sheats, PhD; Carter J. Betz, MS; Janet M. Blair, PhD, MPH; Shannon Self-Brown, PhD

IMPORTANCE Homicide is a leading cause of death among children in the US.

OBJECTIVE To examine trends in child homicide rates and characteristics most commonly associated with these deaths.

DESIGN, SETTING, AND PARTICIPANTS In this cross-sectional study, the study team used National Vital Statistics System WONDER mortality data for 38 362 homicide victims aged 0 to 17 years for 1999 to 2020 and National Violent Death Reporting System data for child homicide victims for 2003 to 2019 in 45 states, Washington, DC, and Puerto Rico. WONDER data are based on death certificates for US residents. National Violent Death Reporting System data include characteristics of violent deaths, linking information from death certificates, and law enforcement, coroner, and medical examiner reports.

EXPOSURES Child homicide was defined using underlying cause-of-death codes U01 to U02, X85 to Y09, and Y87.1 from the *International Classification of Diseases, Tenth Revision, Clinical Modification*.

MAIN OUTCOMES AND MEASURES Trends in homicide rates per 100 000 children were tested using joinpoint regression analysis; differences in rates from 2019 to 2020 were evaluated using z tests. Circumstances of child homicides were described.

RESULTS This study included 38 362 homicide victims (69.4% male). The overall child homicide rate (per 100 000 children) has increased annually, on average 4.3% since 2013, with a precipitous rise from 2019 to 2020 (2019 rate, 2.2; 2020 rate, 2.8; overall increase of 27.7%). Homicide rates recently increased significantly for boys (2018 rate, 2.9; 2020 rate, 4.1; overall increase of 16.1%), 6- to 10-year-olds (2014 rate, 0.5; 2020 rate, 0.8; overall increase of 5.6%), 11- to 15-year-olds (2018 rate, 1.3; 2020 rate, 2.2; overall increase of 26.9%), 16- to 17-year-olds (2018 rate, 6.6; 2020 rate, 10.0; overall increase of 19.0%), Black children (2012 rate, 5.9; 2018 rate, 6.8; 2020 rate, 9.9; overall increase of 16.6% from 2018 to 2020), Hispanic children (2014 rate, 1.6; 2020 rate, 2.2; overall increase of 4.7%), children in the South (2013 rate, 2.1; 2020 rate, 3.5; overall increase of 6.4%), and in rural (2011 rate, 1.8; 2020 rate, 2.4; overall increase of 3.2%) and urban areas (2013 rate, 1.9; 2020 rate, 2.9; overall increase of 4.4%). Since 1999, homicide rates have decreased for girls (1999 rate, 1.9; 2020 rate, 1.5; overall decrease of 1.4%), infants (1999 rate, 8.7; 2020 rate, 6.6; overall decrease of 1.3%), 1- to 5-year-olds (1999 rate, 2.1; 2020 rate, 1.8; overall decrease of 1.0%), Asian or Pacific Islander children (1999 rate, 2.0; 2020 rate, 0.5; overall decrease of 4.4%), White children (1999 rate, 1.5; 2020 rate, 1.3; overall decrease of 0.7%), and children in the Northeast (1999 rate, 2.0; 2020 rate, 1.7; overall decrease of 1.4%). Homicides of children 10 years or younger were most commonly precipitated by abuse/neglect, perpetrated by parents/caregivers. Homicides of 11- to 17-year-olds were most commonly precipitated by crime and arguments and perpetrated by someone known to them, especially friends and acquaintances.

CONCLUSIONS AND RELEVANCE The decline in homicide rates for some geographic and child demographic groups is encouraging; however, rates recently increased across several subpopulations, with some racial and ethnic disparities persisting for more than 20 years. More targeted strategies are needed to (1) protect 6- to 10-year-olds, 11- to 17-year-olds, and children in certain geographic areas and (2) urgently address firearm violence, racism, and inequities at the root of youth violence.

JAMA Pediatr. doi:10.1001/jamapediatrics.2022.4940
Published online December 19, 2022.

[+ Editorial](#)

[+ Supplemental content](#)

Author Affiliations: Division of Violence Prevention, National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention, Atlanta, Georgia (Wilson, Lyons, Sheats, Betz, Blair); US Department of Defense, Sexual Assault Prevention and Response Office, Alexandria, Virginia (Fortson); Division of Injury Prevention, National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention, Atlanta, Georgia (Zhou); Georgia State University, School of Public Health, Atlanta (Self-Brown).

Corresponding Author: Rebecca F. Wilson, PhD, Division of Violence Prevention, National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention, 4770 Buford Hwy NE, MS F-64, Atlanta, GA 30341 (ysp2@cdc.gov).

Homicide is a leading cause of death among children aged 0 to 17 years in the US,¹ disproportionately affecting boys, older children (eg, 16- to 17-year-olds), infants (ie, children younger than 1 year), and children of color (ie, American Indian or Alaska Native, Black, and Hispanic children).²⁻⁴ Research has linked increased risk of children experiencing violence to multiple factors (eg, having an unrelated adult in the household, residential segregation, poverty, racism).⁵⁻¹⁰ This study examines trends in homicide rates for children aged 0 to 17 years and characteristics most commonly associated with these deaths.

Methods

In this cross-sectional study, national data on child homicides for 1999 to 2020 came from death certificate (DC) data from the US Centers for Disease Control and Prevention's publicly available National Vital Statistics System (NVSS) WONDER data.¹¹ Child homicide was defined as the death of a child aged 0 to 17 years, using underlying cause-of-death codes U01 to U02, X85 to Y09, and Y87.1 from the *International Statistical Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)*. Crude rates per 100 000 children were calculated using US Census bridged-race population estimates.¹² Age-adjusted rates were calculated using the 2000 standard US population. Child homicide rates are stratified by sex, age group (younger than 1 year [ie, infants], 1 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 17 years), race and ethnicity, US Census region (eMethods 1 in the [Supplement](#)), and urban and rural classification (eMethods 2 in the [Supplement](#)). Age categories were chosen due to age variation in homicide risk in children in the US. Race is a social construct and not a biological driver for disparities;¹³ thus, we examined child race and ethnicity as indicators, not drivers, of inequities and disparities. Annual rates for 2019 to 2020 were presented to examine recent changes in child homicide rates, whereas rates for 1999 to 2020 examine long-term trends over time (eTable in the [Supplement](#)). z-Tests were used to analyze differences of homicide rates between 2019 and 2020. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines.

Using the National Cancer Institute's joinpoint regression software, version 4.9.1.0,¹⁴ joinpoint regression was used to test the significance of trends from 1999 to 2020; the regression model used a weighted least-squares regression with inverse-variance weighting. Statistical significance was defined at $P < .05$.

Data from the US Centers for Disease Control and Prevention National Violent Death Reporting System¹⁵ (NVDRS) were used to examine characteristics and circumstances surrounding child homicides for 2003 to 2019. NVDRS is a surveillance system that collects information on violent deaths, including homicides. Data are obtained from DCs and law enforcement and coroner/medical examiner reports and entered into the NVDRS web-based system.¹⁵ Extensive details on NVDRS methodology can be found elsewhere.¹⁵ Data for child homicides in NVDRS come from 45 states/jurisdictions (eMethods 3 in the

Key Points

Question What are the recent changes and long-term trends in homicide rates for children aged 0 to 17 years and precipitating circumstances and characteristics most commonly associated with these deaths?

Findings In this cross-sectional study of 38362 homicide victims, homicide rates for some geographic and child demographic groups declined; however, rates recently increased across several subpopulations.

Meaning According to these findings, child homicides are a preventable public health problem, warranting immediate attention.

[Supplement](#)). A descriptive analysis was used to describe characteristics and circumstances of child homicides.

Results

Recent Changes in Child Homicide Rates (NVSS, 2019 to 2020)

The overall age-adjusted child homicide rate (per 100 000 children) in 2020 was 2.8, representing a 27.7% significant increase from 2019 ([Table 1](#)). From 2019 to 2020, the homicide rate significantly increased for boys (2019 rate, 3.1; 2020 rate, 4.1; year-to-year increase of 30.4%), girls (2019 rate, 1.2; 2020 rate, 1.5; year-to-year increase of 20.4%), 11- to 15-year-olds (2019 rate, 1.4; 2020 rate, 2.2; year-to-year increase of 52.2%), 16- to 17-year-olds (2019 rate, 7.0; 2020 rate, 10.0; year-to-year increase of 43.3%), Black children (2019 rate, 7.5; 2020 rate, 9.9; year-to-year increase of 32.6%), Hispanic children (2019 rate 1.7; 2020 rate, 2.2; year-to-year increase of 27.1%), and White children (2019 rate, 1.1; 2020 rate, 1.3; year-to-year increase of 24.3%), children in the South (2019 rate, 2.7; 2020 rate, 3.5; year-to-year increase of 32.6%) and Midwest regions (2019 rate, 2.7; 2020 rate, 3.4; year-to-year increase of 27.6%), and children in urban areas (2019 rate, 2.2; 2020 rate, 2.9; year-to-year increase of 29.8%).

Long-term Trends in Child Homicide Rates (NVSS, 1999 to 2020)

During 1999 to 2020, 38 362 children aged 0 to 17 years were homicide victims ([Table 1](#)). The overall child homicide rate decreased significantly, a mean of 5.6% annually during 2007 to 2013, and has increased a mean of 4.3% annually since 2013 ([Figure, A](#)). For boys, the homicide rate decreased significantly, a mean of 3.8% annually during 1999 (3.6) to 2003 (3.2) and 5.0% during 2006 (3.7) to 2013 (2.6) but increased 16.1% during 2018 (2.9) to 2020 (4.1). Among girls, the homicide rate decreased significantly, 1.4% annually during 1999 (1.9) to 2020 (1.5).

Homicide rates for infants and 1- to 5-year-olds decreased significantly by an average 1.3% and 1.0% annually during 1999 (8.7; 2.1) to 2020 (6.6; 1.8), respectively ([Figure, B](#)), whereas rates for 6- to 10-year-olds increased significantly, 5.6% annually during 2014 (0.5) to 2020 (0.8) after declining a mean of 1.7% annually during 1999 (0.8) to 2014

Table 1. Number, Percentage, and Age-Adjusted Rates^a for Homicides of US Children by Demographic and Geographic Characteristic, National Vital Statistics System, 1999 to 2020

Characteristic	1999-2020, No. (%)	2019 vs 2020		Age-adjusted rate ^a		% Change (2019 vs 2020) ^b
		No. (%)		2019	2020	
		2019	2020	2019	2020	
Total	38 362 (100.0)	1611 (100.0)	2059 (100.0)	2.2 (2.1 to 2.3)	2.8 (2.7 to 2.9)	27.7 ^c
Sex						
Boys	26 630 (69.4)	1179 (73.2)	1540 (74.8)	3.1 (3.0 to 3.3)	4.1 (3.9 to 4.3)	30.4 ^c
Girls	11 732 (30.6)	432 (26.8)	519 (25.2)	1.2 (1.1 to 1.3)	1.5 (1.3 to 1.6)	20.4 ^c
Age, y ^d						
<1 (Infants)	6672 (17.4)	263 (16.3)	246 (11.9)	7.0 (6.1 to 7.8)	6.6 (5.8 to 7.4)	-5.3
1-5	8799 (22.9)	330 (20.5)	354 (17.2)	1.7 (1.5 to 1.8)	1.8 (1.6 to 2.0)	8.4
6-10	2766 (7.2)	135 (8.4)	162 (7.9)	0.7 (0.6 to 0.8)	0.8 (0.7 to 0.9)	19.8
11-15	6896 (18.0)	303 (18.8)	460 (22.3)	1.4 (1.3 to 1.6)	2.2 (2.0 to 2.4)	52.2 ^c
16-17	13 229 (34.5)	580 (36.0)	837 (40.7)	7.0 (6.4 to 7.6)	10.0 (9.3 to 10.7)	43.3 ^c
Race and ethnicity ^e						
American Indian or Alaska Native, non-Hispanic	592 (1.6)	26 (1.6)	28 (1.4)	3.6 (2.2 to 5.0)	4.0 (2.5 to 5.5)	11.3
Asian or Pacific Islander, non-Hispanic	749 (2.0)	36 (2.2)	25 (1.2)	0.8 (0.6 to 1.1)	0.5 (0.3 to 0.8)	-35.5
Black, non-Hispanic	17 525 (45.9)	823 (51.1)	1096 (53.3)	7.5 (6.9 to 8.0)	9.9 (9.3 to 10.5)	32.6 ^c
Hispanic	8137 (21.3)	321 (20.0)	411 (20.0)	1.7 (1.6 to 1.9)	2.2 (2.0 to 2.4)	27.1 ^c
White, non-Hispanic	11 168 (29.3)	403 (25.0)	495 (24.1)	1.1 (0.9 to 1.2)	1.3 (1.2 to 1.4)	24.3 ^c
US Census region ^f						
Region						
1 (Northeast)	4550 (11.9)	159 (9.9)	194 (9.4)	1.4 (1.2 to 1.6)	1.7 (1.4 to 1.9)	22.1
2 (Midwest)	9266 (24.2)	413 (25.6)	527 (25.6)	2.7 (2.4 to 2.9)	3.4 (3.1 to 3.7)	27.6 ^c
3 (South)	16 261 (42.4)	759 (47.1)	1012 (49.2)	2.7 (2.5 to 2.8)	3.5 (3.3 to 3.7)	32.6 ^c
4 (West)	8285 (21.6)	280 (17.4)	326 (15.8)	1.6 (1.4 to 1.8)	1.8 (1.6 to 2.0)	16.6
Urban-Rural classification ^g						
Urban	33 841 (88.2)	1398 (86.8)	1816 (88.2)	2.2 (2.1 to 2.3)	2.9 (2.7 to 3.0)	29.8 ^c
Rural	4521 (11.8)	213 (13.2)	243 (11.8)	2.1 (1.9 to 2.4)	2.4 (2.1 to 2.7)	13.4

^a Rates per 100 000 children are age adjusted to the 2000 US population standard. Data to examine trends in child homicide rates for Puerto Rico were not available.

^b Calculated percent change for 2020 vs 2019 is based on the exact rate before rounding.

^c Significant at $P < .05$ for z test.

^d Crude rate per 100 000 children.

^e Race and ethnicity are listed as reported on the death certificate. Excludes decedent records with missing and unknown race and ethnicity.

^f US Census region, Region 1 (Northeast): Connecticut, Maine, Massachusetts,

New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; Region 2 (Midwest): Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; Region 3 (South): Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington DC, and West Virginia; and Region 4 (West): Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

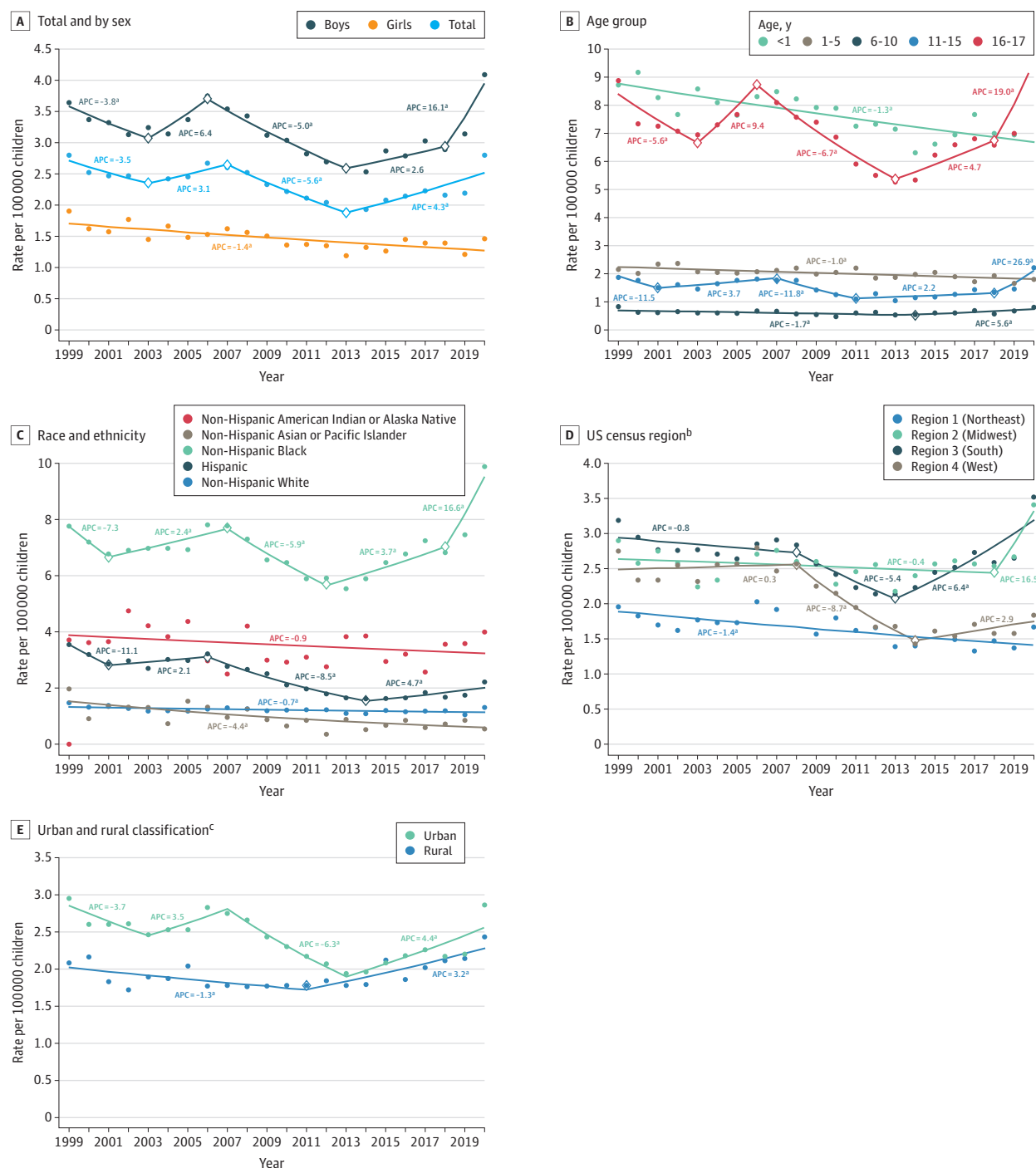
^g The following 2013 urbanization code was used for urban and rural areas: Urban (Large Central Metro, Large Fringe Metro, Medium Metro, and Small Metro); Rural (Micropolitan [Nonmetro] and NonCore [Nonmetro]).

(0.5). During 2018 (1.3) to 2020 (2.2), the homicide rate increased significantly for 11- to 15-year-olds, 26.9% annually. The homicide rate for 16- to 17-year-olds decreased significantly, a mean of 5.6% and 6.7% annually during 1999 (8.9) to 2003

(7.0) and 2006 (8.8) to 2013 (5.3), respectively, but increased 19.0% annually during 2018 (6.6) to 2020 (10.0).

During 1999 to 2020, homicide rates for Asian or Pacific Islander and White children decreased significantly, a mean

Figure. Trends of Homicide Rates Among US Children Aged 0 to 17 Years by Demographic and Geographic Characteristics, National Vital Statistics System, 1999 to 2020



Rates are age-adjusted to the population in the 2000 US Census for all characteristics, except for child age categories. All cross signs indicate joinpoints. Model-estimated annual percent changes (APC) indicate the magnitude and direction of significant trends in child homicide rates.

^a Statistical significance of regression modeled results is indicated as $P < .05$.

^b US Census region, Region 1 (Northeast): CT, ME, MA, NH, NJ, NY, PA, RI, and VT; Region 2 (Midwest): IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, and WI; Region 3 (South): AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, DC, and WV; and Region 4 (West): AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, and WY. Two age-adjusted rates for the Northeast Census region are not displayed (years 2008 and 2015) due to age-specific data suppressed by US Centers for Disease Control and Prevention WONDER. A sensitivity analysis demonstrates that the estimated APC would consistently equal -1.4% and remain statistically significant over the possible range of suppressed values.

^c Urban (Large Central Metro, Large Fringe Metro, Medium Metro, and Small Metro); Rural (Micropolitan [Nonmetro] and NonCore [Nonmetro]).

of 4.4% (1999 rate, 2.0; 2020 rate, 0.5) and 0.7% (1999 rate, 1.5; 2020 rate, 1.3) annually, respectively (Figure, C). The homicide rate for Black children increased significantly, a mean of 2.4% annually during 2001 (6.8) to 2007 (7.8), decreased 5.9% annually during 2007 (7.8) to 2012 (5.9), and increased 3.7% and 16.6% annually during 2012 (5.9) to 2018 (6.8) and 2018 (6.8) to 2020 (9.9), respectively. The homicide rate for Hispanic children decreased significantly a mean of 8.5% during 2006 (3.2) to 2014 (1.6) but increased significantly 4.7% annually during 2014 (1.6) to 2020 (2.2).

The child homicide rate in the Northeast region decreased significantly a mean of 1.4% annually during 1999 (2.0) to 2020 (1.7), and the rate in the South increased 6.4% annually during 2013 (2.1) to 2020 (3.5) (Figure, D). The child homicide rate in rural areas increased significantly a mean of 3.2% annually during 2011 (1.8) to 2020 (2.4), after decreasing significantly, 1.3% annually during 1999 (2.1) to 2011 (1.8) (Figure, E). The child homicide rate in urban areas increased significantly a mean of 4.4% annually during 2013 (1.9) to 2020 (2.9) after decreasing significantly 6.3% annually during 2007 (2.8) to 2013 (1.9) (Figure, E).

Weapon Type, Injury Location, and Perpetrator (NVDRS, 2003 to 2019)

During 2003 to 2019, NVDRS captured 9881 homicide victims aged 0 to 17 years (Table 2). Children aged 16 to 17 years (2683 children [85.8%]), 11 to 15 years (1197 children [75.0%]), and 6 to 10 years (338 children [44.4%]) were most commonly killed by a firearm, whereas infants (463 infants [24.1%]) and 1- to 5-year-olds (637 children [25.8%]) were most commonly killed by personal weapons (eg, hands, fists, feet). When injury location was known, homicides of infants (1636 infants [85.0%]), 1- to 5-year-olds (2101 children [85.0%]), 6- to 10-year-olds (627 children [82.3%]), and 11- to 15-year-olds (835 children [52.3%]) most commonly occurred at a house or apartment. The 2 most common injury locations of homicides of 16- to 17-year-olds were a street or highway (1119 children [35.8%]) and house or apartment (1068 children [34.2%]).

A suspected perpetrator was known in 64.1% of child homicides with most of these perpetrators being male (79.3%). Seven hundred thirty-seven infants (47.7%) and two hundred fifteen 6- to 10-year-olds (34.9%) were killed by their father, whereas 603 1- to 5-year-olds were killed by their mother's male companion (ie, boyfriend, stepfather) (29.6%). Among 11- to 15-year-old victims, stranger, acquaintance, other person known to victim, and father were the 4 most common perpetrators. Children aged 16 to 17 years were most often killed by an acquaintance (306; 24.7%). When perpetrator age was known, infants and 11- to 17-year-olds were most often killed by perpetrators aged 18 to 24 years, respectively, whereas 1- to 10-year-olds were most often killed by perpetrators aged 25 to 44 years.

Precipitating Circumstances (NVDRS, 2003 to 2019)

Precipitating circumstances were identified in 79.4% of child homicides (Table 3). Caregiver abuse/neglect was the most common precipitator of 1517 homicides of infants ([88.9%]), 1735 homicides of 1- to 5-year-olds (79.7%), and 360 homicides of 6- to

10-year-olds (56.3%). Intimate partner violence (IPV) and family relationship problems precipitated in 872 (11.0%) and 362 (7.7%) of child homicides, respectively, with a greater proportion of these circumstances occurring in homicides of 6- to 10-year-olds than among other age groups. Across child age groups, an argument preceded homicides in proportions that ranged from one hundred twenty-nine 6- to 10-year-olds (21.9%) to seven hundred sixty-nine 16- to 17-year-olds (32.3%). A larger proportion of homicides of 16- to 17-year-olds (766 [32.1%]), 11- to 15-year-olds (369 [30.1%]), and 6- to 10-year-olds (175 [29.7%]) than among infants and 1- to 5-year-olds were precipitated by another crime. Homicides of 11- to 17-year-olds were disproportionately precipitated by community violence-related circumstances (eg, drive-by shooting).

Discussion

Overall Patterns

Homicide is a leading cause of death among children in the US.¹ Study findings highlight child homicide as a public health concern, warranting immediate attention. After favorable downward trends during 2007 to 2013, the overall child homicide rate has since steadily increased, with a marked increase observed in 2020 relative to 2019. The recent increase might be partly driven by the general trend in firearm-related homicides,^{16,17} which rose 47.7% for children in 2020 from 2019.² Firearm was the most common weapon type used in child homicides in this study. The precipitous rise in child homicides in 2020 has also been attributed to a confluence of factors associated with the COVID-19 pandemic that increased risk of experiencing violence.¹⁸⁻²⁰ For example, from 2019 to 2020, firearm sales, domestic violence, and parental risk factors for maltreatment perpetration (eg, poor mental health, social isolation, lack of childcare) increased,¹⁸⁻²⁰ all factors that might elevate risk of experiencing violence.

Child Victim's Sex

As seen in this study and mortality data, homicide rates were higher for boys compared with girls.² The elevated risk of homicide for boys is most pronounced in late adolescence.² The high prevalence of experiencing violence among boys compared with girls has been explained by factors such as impulsivity, gender role socialization, increased access to firearms, and perceived or real higher levels of aggression in males.²¹⁻²³

Child Victim's Race and Ethnicity

Homicide rates for Asian or Pacific Islander and White children have steadily declined since 1999, whereas rates for Black and Hispanic children have steadily increased since 2012 and 2014, respectively. Across all racial and ethnic groups and data years, Black children consistently had the highest homicide rate. American Indian or Alaska Native children experienced a nonstatistically significant decrease in homicide rates during 1999 to 2020 but for most data years had the second highest rate compared with other racial and ethnic groups. Numerous studies attribute racial and ethnic disparities in experiencing violence to racism and social and structural

Table 2. Number and Percentage^a of Homicides of Children, Weapon Type, Injury Location, and Perpetrator, by Child Victim's Age: National Violent Death Reporting System, 43 States,^b Washington, DC, and Puerto Rico, 2003 to 2019

	No. (%)	Child age group, y					
Characteristic	<1 (Infants)	1-5	6-10	11-15	16-17	Total	
Weapon type							
Firearm	59 (3.1)	343 (13.9)	338 (44.4)	1197 (75.0)	2683 (85.8)	4620 (46.8)	
Personal weapons (eg, hands, fists, feet)	463 (24.1)	637 (25.8)	47 (6.2)	21 (1.3)	31 (<1.0)	1199 (12.1)	
Blunt instrument	362 (18.8)	471 (19.1)	43 (5.6)	48 (3.0)	39 (1.2)	963 (9.7)	
Sharp instrument	30 (1.6)	102 (4.1)	69 (9.1)	151 (9.5)	232 (7.4)	584 (5.9)	
Hanging, strangulation, suffocation	194 (10.1)	166 (6.7)	85 (11.2)	53 (3.3)	43 (1.4)	541 (5.5)	
Shaking (eg, shaken baby syndrome) ^c	288 (15.0)	117 (4.7)	27 (3.5)	20 (1.3)	6 (<1.0)	458 (4.6)	
Poisoning	85 (4.4)	102 (4.1)	24 (3.1)	14 (<1.0)	4 (<1.0)	229 (2.3)	
Intentional neglect (eg, starving a baby)	87 (4.5)	72 (2.9)	18 (2.4)	9 (<1.0)	6 (<1.0)	192 (1.9)	
Fire or burns	18 (<1.0)	88 (3.6)	44 (5.8)	23 (1.4)	11 (<1.0)	184 (1.9)	
Drowning	56 (2.9)	61 (2.5)	15 (2.0)	3 (<1.0)	6 (<1.0)	141 (1.4)	
Other (eg, taser, fall, electrocution, motor vehicles, exposure)	71 (3.7)	90 (3.6)	29 (3.8)	13 (<1.0)	26 (<1.0)	229 (2.3)	
Unknown	212 (11.0)	222 (9.0)	23 (3.0)	44 (2.8)	40 (1.3)	541 (5.5)	
Injury location							
House or apartment	1636 (85.0)	2101 (85.0)	627 (82.3)	835 (52.3)	1068 (34.2)	6267 (63.4)	
Street or highway	22 (1.1)	29 (1.2)	12 (1.6)	380 (23.8)	1119 (35.8)	1562 (15.8)	
Motor vehicle	35 (1.8)	73 (3.0)	31 (4.1)	73 (4.6)	249 (8.0)	461 (4.7)	
Parking lot, public garage, or public transport	8 (<1.0)	9 (<1.0)	7 (<1.0)	45 (2.8)	139 (4.4)	208 (2.1)	
Natural area	9 (<1.0)	34 (1.4)	21 (2.8)	49 (3.1)	81 (2.6)	194 (2.0)	
Park, playground, sports or athletic area	4 (<1.0)	11 (<1.0)	6 (<1.0)	29 (1.8)	128 (4.1)	178 (1.8)	
Commercial or retail area	10 (<1.0)	8 (<1.0)	5 (<1.0)	42 (2.6)	74 (2.4)	139 (1.4)	
Hotel or motel	34 (1.8)	33 (1.3)	6 (<1.0)	11 (<1.0)	11 (<1.0)	95 (<1.0)	
Preschool, school, college, or school bus	18 (<1.0)	5 (<1.0)	2 (<1.0)	19 (1.2)	24 (<1.0)	68 (<1.0)	
Other location ^d	38 (2.0)	41 (1.7)	12 (1.6)	48 (3.0)	130 (4.2)	269 (2.7)	
Unknown	111 (5.8)	127 (5.1)	33 (4.3)	65 (4.1)	104 (3.3)	440 (4.5)	
Perpetrator ^e							
Child's biological father	737 (47.7)	490 (24.0)	215 (34.9)	115 (12.8)	30 (2.4)	1587 (25.0)	
Child's biological mother	421 (27.3)	447 (21.9)	126 (20.5)	65 (7.2)	17 (1.4)	1076 (17.0)	
Mother's male companion (ie, boyfriend, stepfather)	174 (11.3)	603 (29.6)	83 (13.5)	79 (8.8)	44 (3.5)	983 (15.5)	
Other person known to victim ^f	40 (2.6)	92 (4.5)	39 (6.3)	117 (13.0)	224 (18.0)	512 (8.1)	
Acquaintance ^g	0 (0.0)	36 (1.8)	17 (2.8)	119 (13.3)	306 (24.7)	478 (7.5)	
Stranger	7 (<1.0)	29 (1.4)	24 (3.9)	123 (13.7)	234 (18.9)	417 (6.6)	
Other family member ^h	33 (2.1)	103 (5.0)	56 (9.1)	43 (4.8)	32 (2.6)	267 (4.2)	
Friend	0 (0.0)	0 (0.0)	7 (1.1)	94 (10.5)	137 (11.0)	238 (3.8)	
Babysitter	105 (6.8)	103 (5.0)	1 (<1.0)	0 (0.0)	1 (<1.0)	210 (3.3)	
Sibling	14 (<1.0)	41 (2.0)	37 (6.0)	65 (7.2)	31 (2.5)	188 (3.0)	
Rival gang member ⁱ	0 (0.0)	0 (0.0)	0 (0.0)	41 (4.6)	92 (7.4)	133 (2.1)	
Intimate partner ^j	0 (0.0)	0 (0.0)	0 (0.0)	34 (3.8)	93 (7.5)	127 (2.0)	
Father's female companion (ie, girlfriend, stepmother of child) ^k	7 (<1.0)	64 (3.1)	7 (1.1)	0 (0.0)	0 (0.0)	78 (1.2)	
Foster parent	6 (<1.0)	32 (1.6)	4 (<1.0)	2 (<1.0)	0 (0.0)	44 (<1.0)	
Perpetrator sex ^l							
Male	1026 (65.4)	1442 (68.5)	500 (75.6)	1086 (90.7)	1901 (96.2)	5955 (79.3)	
Female	542 (34.6)	664 (31.5)	161 (24.4)	111 (9.3)	76 (3.8)	1554 (20.7)	

(continued)

Table 2. Number and Percentage^a of Homicides of Children, Weapon Type, Injury Location, and Perpetrator, by Child Victim's Age: National Violent Death Reporting System, 43 States,^b Washington, DC, and Puerto Rico, 2003 to 2019 (continued)

Characteristic	No. (%)					
	Child age group, y					
	<1 (Infants)	1-5	6-10	11-15	16-17	Total
Perpetrator age, y ^m						
<18	64 (5.3)	65 (3.8)	49 (8.8)	289 (29.7)	370 (24.7)	837 (14.0)
18-24	576 (47.6)	553 (32.2)	73 (13.1)	299 (30.8)	731 (48.7)	2232 (37.4)
25-44	532 (44.0)	1013 (58.9)	343 (61.5)	267 (27.5)	321 (21.4)	2476 (41.5)
≥45	38 (3.1)	89 (5.2)	93 (16.7)	117 (12.0)	79 (5.3)	416 (7.0)
Total	1925 (100)	2471 (100)	762 (100)	1596 (100)	3127 (100)	9881 (100)

Abbreviation: NVDRS, National Violent Death Reporting System.

^a Percentages might not total 100% due to rounding.^b Data from 45 states/jurisdictions that reported information to NVDRS during 2003 to 2019 were included in this analysis. These jurisdictions included Alaska, Maryland, Massachusetts, New Jersey, Oregon, South Carolina, and Virginia (2003 to 2019); Colorado, Georgia, North Carolina, Oklahoma, Rhode Island, and Wisconsin (2004 to 2019); Kentucky, New Mexico, and Utah (2005 to 2019); Ohio (2011 to 2019); Michigan (2014 to 2019); New York (2015 to 2018); Hawaii (2015, 2016, 2019); Arizona, Connecticut, Kansas, Maine, Minnesota, New Hampshire, and Vermont (2015 to 2019); Illinois, Indiana, Iowa, Pennsylvania, and Washington (2016 to 2019); California, Delaware, Nevada, Puerto Rico, Washington DC, and West Virginia (2017 to 2019); Alabama, Louisiana, Missouri, and Nebraska (2018 to 2019); Montana, North Dakota, and Wyoming (2019).^c Older children who died from shaken baby syndrome were shaken as infants or toddlers and succumbed to those injuries in older age and the coroner or medical examiner indicated cause of death as shaken baby syndrome.^d Other location includes (in descending order): abandoned house/building/warehouse, bar/nightclub, hospital or medical facility, synagogue/church/temple, industrial or construction area, supervised residential facility, railroad tracks, office building, farm, bridge, jail/prison, cemetery/graveyard/other burial ground, and other unspecified location.^e Percentage for perpetrator is based on the number of homicide victims with a known victim-to-suspect relationship (n = 6338 [64.1%]; 1544 [80.2%] aged younger than 1 year; 2040 [82.6%] aged 1 to 5 years; 616 [80.8%] aged 6 to 10 years; 897 [56.2%] aged 11 to 15 years; and 1241 [39.7%] aged 16 to 17 years). Victim-to-suspect relationship was unknown for 3543 decedents. Coroner or medical examiner and law enforcement narratives were reviewed to enhance data completeness and accuracy of perpetrator variable.^f For young children (eg, children aged younger than 5 years), Other person known to victim perpetrator category should be interpreted as it applies to the child's parent(s), guardian, caregiver, etc and not to the young child victim, as young children generally do not develop relationships independent of those introduced to them by their parent(s), guardian, caregiver, etc.^g For young children (eg, children aged younger than 5 years), "acquaintance" perpetrator category should be interpreted as it applies to the child's parent(s), guardian, caregiver, etc. and not to the young child victim, as young children generally do not develop relationships independent of those introduced to them by their parent(s), guardian, caregiver, etc.^h Other family member includes in-law, grandparent, uncle, aunt, cousin, etc. Two victims aged 17 years were reported as having been killed by their in-laws. Due to the low frequency of this perpetrator category for this age group, these 2 incidents were included in 'other family member' perpetrator category.ⁱ One victim aged 6 to 10 years was reported as being killed by a rival gang member. The incident was included in "other person known to victim" perpetrator category because the coroner or medical examiner and law enforcement narratives did not specify if the perpetrator was a rival gang member of the victim or a rival gang member of the victim's parent(s), guardian, caregiver, family member, etc.^j Intimate partner includes girlfriend or boyfriend, ex-girlfriend or ex-boyfriend, girlfriend or boyfriend (unspecified whether current or ex), and spouse. Two victims aged 17 years were reported as having been killed by their spouse.^k One victim was reported as being killed by the mother's same-sex partner. Because sex of perpetrator was dichotomized to male and female for some perpetrator categories (ie, child's biological father, child's biological mother, mother's male companion, father's female companion), that incident was included in perpetrator category father's female companion.^l Percentage for perpetrator sex is based on the number of suspects with a known value for sex (n = 7509 [76.0%]; 1568 [81.5%] aged younger than 1 year; 2106 [85.2%] aged 1 to 5 years; 661 [86.7%] aged 6 to 10 years; 1197 [75.0%] aged 11 to 15 years; and 1977 [63.2%] aged 16 to 17 years). Perpetrator sex was unknown for 2372 decedents.^m Percentage for perpetrator age is based on the number of suspects with a known value for age (n = 5961 [60.3%]; 1210 [62.9%] aged younger than 1 year; 1720 [69.6%] aged 1 to 5 year; 558 [73.2%] aged 6 to 10 year; 972 [60.9%] aged 11 to 15 year; and 1501 [48.0%] aged 16 to 17 year). Perpetrator age was unknown for 3920 decedents.

inequities disproportionately experienced by people of color.^{8-10,24,25} For example, racial residential segregation has been proposed as a fundamental cause of racial and ethnic health disparities, including experiencing violence, because of the manner in which such segregation reflects neighborhood disadvantage, inequity, and institutionalized racism.⁸⁻¹⁰ Racial residential segregation disproportionately exposes children of color to concentrated poverty, segregated and underfunded educational systems, environmental hazards, lack of safe play spaces, and limited opportunity,^{10,26} all conditions that might increase risk of experiencing violence. A recent analysis found Black and Hispanic children are 5 to 7 times more likely than White children to live in neighborhoods with very low opportunity, revealing the vastly different conditions in which US children are living.²⁷ These inequitable living conditions and neighborhood experiences, driven by structural racism,

may largely explain why racial and ethnic disparities in child homicide rates have persisted for more than 20 years. Research suggests addressing racism and social and structural inequities that increase risk of violence can have broader, population-level effects in preventing violence to children and racial and ethnic minoritized youth.^{8,28}

Inequities extend to include discriminative ways in which racial and ethnic minoritized youth are perceived by authority figures (eg, law enforcement) and society.²⁹⁻³¹ Studies show minoritized children are subjected to implicit (unconscious) dehumanization, perceived as less childlike and innocent, seen as more culpable for their actions, and afforded fewer childhood protections and benefits compared with their White peers.²⁹⁻³¹ These negative stereotypes have been found to influence disparities in child outcomes through multiple pathways, such as increases in school suspension and expulsion,

Table 3. Number^a and Percentage^b of Homicides of Children by Precipitating Circumstances; National Violent Death Reporting System, 43 States, Washington, DC, and Puerto Rico,^c 2003 to 2019

	No. (%)					
	Child age group, y					
Precipitating circumstances	<1 (Infants)	1-5	6-10	11-15	16-17	Total
Interpersonal						
Intimate partner violence related ^d	64 (4.0)	253 (12.1)	204 (33.4)	168 (13.6)	183 (7.7)	872 (11.0)
Family relationship problem ^e	48 (5.2)	119 (9.9)	70 (19.8)	67 (9.3)	58 (3.9)	362 (7.7)
Victim of interpersonal violence during past month ^f	116 (9.9)	185 (11.5)	19 (4.2)	21 (2.3)	17 (<1.0)	358 (6.0)
Life stressor						
Argument	418 (26.4)	503 (24.4)	129 (21.9)	346 (28.2)	769 (32.3)	2165 (27.6)
Crisis during previous or upcoming 2 wk	37 (2.3)	93 (4.5)	39 (6.6)	63 (5.1)	84 (3.5)	316 (4.0)
Community-related violence						
Precipitated by another crime	187 (11.8)	385 (18.7)	175 (29.7)	369 (30.1)	766 (32.1)	1882 (24.0)
Crime in progress ^g	70 (37.4)	173 (8.4)	103 (58.9)	239 (64.8)	478 (62.4)	1063 (56.5)
Gang-related	6 (<1.0)	17 (<1.0)	21 (3.6)	197 (16.1)	471 (19.8)	712 (9.1)
Drug involvement	31 (2.0)	46 (2.2)	16 (2.7)	83 (6.8)	319 (13.4)	495 (6.3)
Drive-by shooting ^f	3 (<1.0)	23 (1.4)	22 (4.9)	112 (12.5)	265 (14.5)	425 (7.1)
Physical fight (2 people, not a brawl) ^e	2 (<1.0)	6 (<1.0)	2 (<1.0)	41 (5.7)	139 (9.4)	190 (4.1)
Walk by assault ^e	2 (<1.0)	6 (<1.0)	1 (<1.0)	52 (7.2)	127 (8.6)	188 (4.0)
Brawl	0 (0.0)	0 (0.0)	0 (0.0)	32 (2.6)	87 (3.7)	119 (1.5)
Abuse and neglect-related						
Caregiver abuse or neglect led to death ^h	1517 (88.9)	1735 (79.7)	360 (56.3)	194 (15.6)	54 (2.3)	3860 (47.3)
History of child abuse or neglect ^f	191 (16.3)	331 (20.6)	65 (14.3)	49 (5.5)	15 (<1.0)	651 (10.9)
Homicide event						
Injury occurred at the victim's residence ⁱ	1362 (78.3)	1745 (76.3)	537 (75.3)	510 (34.0)	447 (15.0)	4601 (49.9)
Homicide/suicide incident	32 (1.7)	239 (9.7)	213 (28.0)	152 (9.5)	77 (2.5)	713 (7.2)
Victim was a bystander	11 (<1.0)	68 (3.3)	48 (8.1)	83 (6.8)	118 (5.0)	328 (4.2)
Mentally ill suspect	54 (3.4)	91 (4.4)	54 (9.2)	33 (2.7)	22 (<1.0)	254 (3.2)
Victim used a weapon	0 (0.0)	1 (<1.0)	2 (<1.0)	39 (3.2)	162 (6.8)	204 (2.6)
Total ^l	1581 (82.1)	2063 (83.5)	590 (77.4)	1227 (76.9)	2383 (76.2)	7844 (79.4)

^a Includes homicides with 1 or more precipitating circumstances. Total numbers do not equal the sums of the columns because more than 1 circumstance could have been present per decedent.

^b Except as noted, denominator includes those homicides with 1 or more precipitating circumstances (see total row at bottom of table). The sums of percentages in columns exceed 100% because more than 1 circumstance could have been present per decedent.

^c Data from 45 states/jurisdictions that reported information to the National Violent Death Reporting System during 2003 to 2019 were included in this analysis. These jurisdictions included Alaska, Maryland, Massachusetts, New Jersey, Oregon, South Carolina, and Virginia (2003 to 2019); Colorado, Georgia, North Carolina, Oklahoma, Rhode Island, and Wisconsin (2004 to 2019); Kentucky, New Mexico, and Utah (2005 to 2019); Ohio (2011 to 2019); Michigan (2014 to 2019); New York (2015 to 2018); Hawaii (2015, 2016, 2019); Arizona, Connecticut, Kansas, Maine, Minnesota, New Hampshire, and Vermont (2015 to 2019); Illinois, Indiana, Iowa, Pennsylvania, and Washington (2016 to 2019); California, Delaware, Nevada, Puerto Rico, Washington DC, and West Virginia (2017 to 2019); Alabama, Louisiana, Missouri, and Nebraska (2018 to 2019); Montana, North Dakota, and Wyoming (2019).

^d Denominator is homicides with a known response to intimate partner violence-related (n = 7909; 1582 aged younger than 1 year; 2095 aged 1 to 5 years; 611 aged 6 to 10 years; 1236 aged 11 to 15 years; and 2385 aged 16 to 17 years). Intimate partner violence-related homicides include deaths related to conflict or violence between current or former intimate partners and also include deaths associated with intimate partner violence that are not deaths of the intimate partners themselves (eg, a father kills his child(ren) and his estranged wife).

^e Data collected for homicides since 2013. Denominator is homicides with known circumstances during 2013 to 2019 (n = 4672; 918 aged younger than 1 year; 1208 aged 1 to 5 years; 354 aged 6 to 10 years; 721 aged 11 to 15 years; and 1471 aged 16 to 17 years).

^f Data collected for homicides since 2009. Denominator is homicides with known circumstances during 2009-2019 (n = 5951; 1175 aged younger than 1 year; 1603 aged 1 to 5 years; 453 aged 6 to 10 years; 896 aged 11 to 15 years; and 1824 aged 16 to 17 years).

^g Denominator includes those decedents involved in an incident that was precipitated by another crime.

^h Denominator is homicides with a known response to caregiver abuse or neglect led to death (n = 8153; 1706 aged younger than 1 year; 2178 aged 1 to 5 years; 640 aged 6 to 10 years; 1243 aged 11 to 15 years; and 2386 aged 16 to 17 years). 'Caregiver abuse or neglect led to death' circumstance has been collected in the National Violent Death Reporting System for decedents since 2013. The variable 'suspect was a caregiver' has been collected in NVDRS for decedents since 2003 and thus was used as a proxy to capture cases where caregiver abuse or neglect led to death for victims who died before 2013.

ⁱ Denominator is homicides with a known response to 'injured at victim's home' (n = 9218; 1739 aged younger than 1 year; 2288 aged 1 to 5 years; 713 aged 6 to 10 years; 1499 aged 11 to 15 years; and 2979 aged 16 to 17 years).

^j Circumstances were unknown for n = 2037 (344 aged younger than 1 year; 408 aged 1 to 5 years; 172 aged 6 to 10 years; 369 aged 11 to 15 years; and 744 aged 16 to 17 years); total number of homicide decedents = 9881 (1925 aged younger than 1 year; 2471 aged 1 to 5 years; 762 aged 6 to 10 years; 1596 aged 11 to 15 years; and 3127 aged 16 to 17 years).

involvement and differential treatment in juvenile justice system, and harsher treatment by law enforcement,^{29,30} all of

which may heighten risk of experiencing violence. Importantly, negative racial attitudes toward people in racial and eth-

nic minority groups can lead to differential access to a broad range of resources (eg, quality housing, economic opportunities) that mitigate risk of negative outcomes.³²

Geographic Characteristics

The child homicide rate in urban areas has increased since 2013. Homicides that occur in urban areas are often concentrated in impoverished and racially segregated minority communities, reflecting, again, the harmful effects of racism and inequity.^{8,9,33} Furthermore, children in urban areas have a higher injury rate for intentional firearm-related assaults compared with children in rural areas,³⁴ which might help explain the upward trend in homicide rates seen in urban areas.

The child homicide rate in rural areas has increased since 2011, which reflects a slower rate of increase, yet longer period of an upward trend than that of urban areas. Research suggests the spatial geography of rural areas might facilitate geographic isolation that increases risk for family violence and child abuse/neglect.³⁵ Additionally, limited employment opportunities in rural areas may lead to unemployment, thereby increasing poverty, stress associated with inadequate resources (eg, housing), and crime.^{35,36} Prevention programs that disproportionately focus on urban violence might need to be tailored to address rural violence.³⁶

The child homicide rate in the South has increased since 2013, with studies attributing elevated violence in the South to the region's history of slavery, lynching, and support of the use of corporal punishment in schools.^{37,38} Understanding how these and other proposed determinants of regional differences impact experiencing violence might help prevent child homicides.

Age Groups

Infants and Children Aged 1 to 5 Years

Homicide rates for infants and 1- to 5-year-olds have steadily declined over the last 20 years or longer; however, during most data years, infants had the second highest homicide rate compared with that of other child age groups. These downward trends coincide with concerted efforts to protect young children, including medical reform and federal legislation (eg, Maternal, Infant, and Early Childhood Home Visiting program) ensuring broader development and implementation of evidence-based programs for parents and caregivers at risk of harming young children.^{3,5,39} Multiple benefits, including the prevention of non-fatal and fatal abuse, have been found for many evidence-based parent training programs that emphasize positive parenting skills.^{5,40} Additionally, policy interventions (eg, paid family leave) have been shown to positively affect conditions (eg, poverty) that increase risk of harm to children.⁴¹

Consistent with prior research, homicides of infants and 1- to 5 year-olds were most commonly perpetrated by a parent or mother's male companion, resulting from abuse/neglect, with home being the most common place young children were killed.^{5,42} Infants and young children are especially vulnerable to homicide due to their dependency on others for care and supervision and normative display of developmentally appropriate behaviors (eg, crying).^{5,42,43} Approaches that help caregivers navigate challenging child developmental pe-

riods, strengthen family protective factors (eg, economic support), and decrease risk factors (eg, inadequate resources for childcare) have demonstrated effects in preventing harm to young children.⁵

Children Aged 6 to 10 Years

The homicide rate for 6- to 10-year-olds has been increasing since 2014. This increase might partly reflect the fact that homicide of 6- to 10-year-olds does not follow the distinctive patterns of risk seen in younger children and teens,⁴² and consequently, may result in differential access to violence prevention programs. Prevention programs that are available for 6- to 10-year-olds are often disseminated in school settings and focus on sexual abuse or peer violence (eg, bullying) prevention, with less programs available to directly target parent-child violence, unless the child exhibits significant behavioral problems.⁴⁴

Furthermore, caregiver abuse/neglect was the most common precipitator for homicides of 6- to 10-year-olds, with the father being the most common perpetrator. Additionally, when circumstances were known, a greater proportion of homicides of 6- to 10-year-olds were precipitated by IPV. High levels of conflict between intimate partners can foster stress and violence, placing children at risk of harm.⁴⁵ For families experiencing IPV, partnerships between domestic violence advocates and home visiting programs have been identified as a promising strategy to protecting younger children from harm.^{46,47} Programs that promote positive parent-child relationships for older children and include strategies for identifying and addressing families experiencing IPV, might be effective in decreasing parental stress and conflict, and, in turn, homicides of 6- to 10-year-olds.

Children aged 6 to 10 years were most commonly killed with a firearm and their deaths disproportionately co-occurred with suicide of the perpetrator. In prior research, homicide-suicide was a distinctive feature associated with paternal child homicides, particularly by firearm.⁴⁵ Research suggests reducing access to highly lethal means among persons at risk of harming themselves might be useful in preventing child homicide.⁴⁵

Children Aged 11 to 15 and 16 to 17 Years

Consistent with national data, homicide disproportionately affected older children and racial and ethnic minority boys in this study.² Over-half of homicides were among 11- to 17-year-olds, with over two-thirds being racial and ethnic minority boys (data not shown). Recent data indicate the homicide rate among Black boys aged 16 to 17 years is 73.5 per 100 000 children, which is 18 times greater than White (4.1) and 4.6 times greater than Hispanic (16.0) boys of the same age.² Research suggests racial and ethnic disparities in experiencing violence reflect the effect of racism and residential segregation on risk of violence for Black adolescent males.^{8-10,28}

Homicide rates for 11- to 15-year-olds and 16- to 17-year-olds have been increasing since 2018, with alarming spikes observed in both age groups from 2019 to 2020. The accelerated rates of increase might be explained by an increase in firearm-related homicides within these age groups² and racism and inequities that foster neighborhood violence in com-

munities of racial and ethnic minority groups.^{8,9,14,28} In this study, over three-quarters (84%) of homicides involving a firearm were among 11- to 17-year-olds, which is consistent with prior research that found from 2002 to 2014, 13- to 17-year-olds had a firearm-related homicide rate 10 times greater than that of younger children.⁴⁸

As observed in this study and prior research, children aged 11 to 17 years were more commonly killed by someone known to them, especially friends and acquaintances, and their deaths most often occurred outside of their residence or in public locations (eg, street or alley).⁴⁸ Furthermore, similar to other research, homicides of 11- to 17-year-olds, than among children aged 10 years or younger, were most commonly precipitated by arguments and community violence-related factors,⁴⁸ suggesting teens and adults are most often the targets of community violence and retaliatory acts (eg, drive-by shootings), while young children are sometimes caught in the crossfire.^{49,50} Programs and approaches that (1) change social norms through street outreach and violence interruption (eg, mediate conflicts in an attempt to reach a nonviolent resolution, (2) strengthen economic supports through job training and summer jobs, (3) improve the physical environment, and (4) connect youth to caring adults and activities, have demonstrated significant effects in decreasing crime and risk of youth violence.⁶

Limitations

This study has several limitations. First, infant deaths might go undiscovered or be misclassified (eg, undetermined intent) on the DC, leading to potential underascertainment or overascertainment of infant homicides.⁵¹ Second, NVDRS data come from 45 states/jurisdictions, limiting our ability to generalize findings beyond these states/jurisdictions. Third, NVDRS data abstractors are limited to the information included in investigative reports. Fourth, the number of homicides for American Indian or Alaska Native children might be affected by misclassification of race and Hispanic origin on DCs, which could result in an underestimate of homicide rates.⁵²

Fifth, rates were not reported when the number of homicides was less than 20, limiting our ability to report rates for all years for American Indian or Alaska Native and Asian or Pacific Islander children. Nonetheless, this study provides a comprehensive examination of child homicides over time.

Conclusions

This study highlights trends in child homicide rates for over 2 decades; especially disturbing are the stark racial and ethnic disparities in child homicide rates that have persisted for more than 20 years. Research has advanced our understanding of wide ranging and detrimental effects of racism and inequities on experiencing violence.^{8-10,24,25} Studies posit economic advancement, residential desegregation, and a shift toward anti-racism play an important role in mitigating the disproportionate burden of violence experienced by children of color.^{8,9,28,53} Facets of anti-racism include valuing and collectively investing in the well-being of all children and acknowledging the affect of historical factors on present day disparities and inequities.⁵³

Furthermore, a broad range of evidence-based programs, practices, and policies have been developed to prevent harm to younger children and teens^{3,5,6,39} but more targeted strategies might be needed to protect 6- to 10 year-olds. Moreover, the recent, but dramatic, increase in homicide rates of 11- to 17 year-olds highlights the sense of urgency in addressing firearm violence, racism, and inequities at the root of youth violence. Additionally, the child homicide rate increased in rural and urban areas; violence prevention strategies tailored for children and families in both areas are needed to prevent child homicides.

Child homicides are preventable. The decrease in homicide rates for some geographic and child demographic groups is encouraging; however, more can be done to protect all children.⁵

ARTICLE INFORMATION

Accepted for Publication: September 26, 2022.

Published Online: December 19, 2022.

doi:10.1001/jamapediatrics.2022.4940

Author Contributions: Ms Zhou and Mr Betz had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Wilson, Fortson, Zhou, Sheats, Blair.

Acquisition, analysis, or interpretation of data:

Wilson, Fortson, Zhou, Lyons, Betz, Blair, Self-Brown.

Drafting of the manuscript: Wilson, Lyons, Sheats, Blair, Self-Brown.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Zhou, Betz.

Administrative, technical, or material support:

Fortson, Zhou, Lyons.

Supervision: Wilson, Blair.

Conflict of Interest Disclosures: None reported.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official opinion of the US Centers for Disease Control and Prevention.

REFERENCES

1. US Centers for Disease Control and Prevention. Leading causes of death reports, 1981-2020. Accessed November 10, 2022. <https://www.cdc.gov/injury/wisqars/LeadingCauses.html>
2. US Centers for Disease Control and Prevention. Fatal injury reports, 1981-2020. Accessed November 10, 2022. <https://wisqars.cdc.gov/fatal-reports>
3. Wilson RF, Kleven J, Williams D, Xu L. Infant homicides within the context of Safe Haven laws—United States, 2008-2017. *MMWR Morb Mortal Wkly Rep*. 2020;69(39):1385-1390. doi:10.15585/mmwr.mm6939a1
4. Sheats KJ, Irving SM, Mercy JA, et al. Violence-related disparities experienced by Black youth and young adults: opportunities for prevention. *Am J Prev Med*. 2018;55(4):462-469. doi:10.1016/j.amepre.2018.05.017
5. Fortson BL, Kleven J, Merrick MT, Gilbert LK, Alexander SP; National Center for Injury Prevention, US Centers for Disease Control and Prevention. Preventing child abuse and neglect: a technical package for policy, norm, and programmatic activities. Accessed November 10, 2022. <https://www.cdc.gov/violenceprevention/pdf/can-prevention-technical-package.pdf>
6. David-Ferdon C, Vivolo-Kantor AM, Dahlberg LL, Marshall KJ, Rainford N, Hall JE; National Center for Injury Prevention, US Centers for Disease Control and Prevention. A comprehensive technical package for the prevention of youth violence and associated risk behaviors. <https://www.cdc.gov/violenceprevention/pdf/yv-technicalpackage.pdf>
7. Schnitzer PG, Ewigman BG. Child deaths resulting from inflicted injuries: household risk factors and perpetrator characteristics. *Pediatrics*. 2005;116(5):e687-e693. doi:10.1542/peds.2005-0296
8. Jacoby SF, Dong B, Beard JH, Wiebe DJ, Morrison CN. The enduring impact of historical and structural racism on urban violence in Philadelphia. *Soc Sci Med*. 2018;199:87-95. doi:10.1016/j.socscimed.2017.05.038

9. Wong B, Bernstein S, Jay J, Siegel M. Differences in racial disparities in firearm homicide across cities: the role of racial residential segregation and gaps in structural disadvantage. *J Natl Med Assoc*. 2020;112(5):518-530. doi:10.1016/j.jnma.2020.05.014
10. Williams DR, Collins C. Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Rep*. 2001;116(5):404-416. doi:10.1016/S0033-3549(04)50068-7
11. US Centers for Disease Control and Prevention. CDC Wonder. Accessed November 10, 2022. <https://wonder.cdc.gov/>
12. Ingram DD, Parker JD, Schenker N, et al. United States Census 2000 population with bridged race categories. *Vital Health Stat*. 2003;135:1-55.
13. Braveman P, Parker Dominguez T. Abandon "race." focus on racism. *Front Public Health*. 2021;9:689462. doi:10.3389/fpubh.2021.689462
14. National Cancer Institute. Joinpoint trend analysis software. Accessed November 10, 2022. <https://surveillance.cancer.gov/joinpoint/>
15. Wilson RF, Liu G, Lyons BH, et al. Surveillance for violent deaths—national violent death reporting system, 42 states, the District of Columbia, and Puerto Rico, 2019. *MMWR Surveill Summ*. 2022;71(6):1-40. doi:10.15585/mmwr.ss7106a1
16. Kegler SR, Simon TR, Zwald ML, et al. Vital signs: changes in firearm homicide and suicide rates—United States, 2019-2020. *MMWR Morb Mortal Wkly Rep*. 2022;71(19):656-663. doi:10.15585/mmwr.mm7119e1
17. Children's Defense Fund. Protect children. not guns. Accessed November 10, 2022. <https://www.childrensdefense.org/state-of-americas-children/soac-2021-gun-violence/>
18. Piquero AR, Jennings WG, Jemison E, Kaukinen C, Knaul FM; National Commission on COVID-19 and Criminal Justice. Domestic violence during COVID-19: evidence from a systematic review and meta-analysis. Accessed November 10, 2022. <https://build.neoninspire.com/counciloncj/wp-content/uploads/sites/96/2021/07/Domestic-Violence-During-COVID-19-February-2021.pdf>
19. Rosenfeld R, Lopez E; Council on Criminal Justice. Pandemic, social unrest, and crime in U.S. Cities: September 2021 Update. Accessed November 10, 2022. <https://counciloncj.org/wp-content/uploads/2021/10/Pandemic-Social-Unrest-and-Crime-in-US-Cities-September-2021-Update.pdf>
20. Kalil A, Mayer S, Shah R. Impact of the COVID-19 crisis on family dynamics in economically vulnerable households. Accessed November 10, 2022. https://bfi.uchicago.edu/wp-content/uploads/2020/10/BFI_WP_2020143.pdf
21. Regoeczi WC, Miethe TD. *Homicide*. In: International Encyclopedia of the Social and Behavioral Sciences (Second Edition), Elsevier; 2015:163-168.
22. Swahn MH, Hammig BJ, Ikeda RM. Prevalence of youth access to alcohol or a gun in the home. *Inj Prev*. 2002;8(3):227-230. doi:10.1136/ip.8.3.227
23. Staniloiu A, Markowitsch H. Gender differences in violence and aggression—a neurobiological perspective. *Procedia Soc Behav Sci*. 2012;33:1032-1036. doi:10.1016/j.sbspro.2012.01.279
24. Bennis M, Ruther M, Nash N, Bozeman M, Harbrecht B, Miller K. The impact of historical racism on modern gun violence: redlining in the city of Louisville, KY. *Injury*. 2020;51(10):2192-2198. doi:10.1016/j.injury.2020.06.042
25. Houghton A, Jackson-Weaver O, Toraih E, et al. Firearm homicide mortality is influenced by structural racism in US metropolitan areas. *J Trauma Acute Care Surg*. 2021;91(1):64-71. doi:10.1097/TA.0000000000003167
26. Sacks V. 5 Ways neighborhoods of concentrated disadvantage harm children. Accessed November 10, 2022. <https://www.childtrends.org/publications/5-ways-neighborhoods-of-concentrated-disadvantage-harm-children>
27. Acevedo-Garcia D, Noelke C, McArdle N. The geography of child opportunity: Why neighborhoods matter for equity. Accessed November 10, 2022. https://www.diversitydatakids.org/sites/default/files/file/ddk_the-geography-of-child-opportunity_2020v2_0.pdf
28. Nation M, Chapman DA, Edmonds T, et al. Social and structural determinants of health and youth violence: shifting the paradigm of youth violence prevention. *Am J Public Health*. 2021;111(5):528-531. doi:10.2105/AJPH.2021.306234
29. Goff PA, Jackson MC, Di Leone BA, Culotta CM, DiTomasso NA. The essence of innocence: consequences of dehumanizing Black children. *J Pers Soc Psychol*. 2014;106(4):526-545. doi:10.1037/a0035663
30. Epstein R, Blake J, González T. Girlhood interrupted: the erasure of black girls' childhood. Accessed November 10, 2022. <https://genderjusticeandopportunity.georgetown.edu/wp-content/uploads/2020/06/girlhood-interrupted.pdf>
31. Priest N, Slopen N, Woolford S, et al. Stereotyping across intersections of race and age: racial stereotyping among White adults working with children. *PLoS One*. 2018;13(10):e0205614. doi:10.1371/journal.pone.0205614
32. Williams DR, Mohammed SA. Racism and health I: pathways and scientific evidence. *Am Behav Sci*. 2013;57(8):10. doi:10.1177/0002764213487340
33. The Educational Fund to Stop Gun Violence. Community gun violence. Accessed November 10, 2022. <https://efsgv.org/learn/type-of-gun-violence/community-gun-violence/>
34. Herrin BR, Gaither JR, Leventhal JM, Dodington J. Rural versus urban hospitalizations for firearm injuries in children and adolescents. *Pediatrics*. 2018;142(2):e20173318. doi:10.1542/peds.2017.3318
35. Gallup-Black A. Rural and urban trends in family and intimate partner homicide: 1980-1999. Accessed November 10, 2022. <https://www.ojp.gov/pdffiles1/nij/grants/208344.pdf>
36. National Rural Association Policy Brief. Rural community violence: an untold public health epidemic. Accessed November 10, 2022. https://www.ruralhealth.us/NRHA/media/Emerge_NRHA/Advocacy/Policy%20documents/2017-NRHA-policy-paper-Rural-Community-Violence.pdf
37. Ward G, Petersen N, Kupchik A, Pratt J. Historic lynching and corporal punishment in contemporary Southern schools. *Soc Probl*. 2021;68(1):41-62. doi:10.1093/socpro/spz044
38. Messner SF, Baller RD, Zevenbergen MP. The legacy of lynching and southern homicide. *Am Sociol Rev*. 2005;70(4):633-655. doi:10.1177/000312240507000405
39. Health Resources and Services Administration. Maternal, infant, and early childhood home visiting program. Accessed November 10, 2022. mchb.hrsa.gov/programs-impact/programs/home-visiting/maternal-infant-early-childhood-home-visiting-miechv-program
40. Michalopoulos C, Lee H, Duggan A, et al. The mother and infant home visiting program evaluation: early findings on the maternal, infant, and early childhood home visiting program. Accessed November 10, 2022. https://www.acf.hhs.gov/sites/default/files/documents/opre/mihope_report_to_congress_final.pdf
41. Klevens J, Luo F, Xu L, Peterson C, Latzman NE. Paid family leave's effect on hospital admissions for pediatric abusive head trauma. *Inj Prev*. 2016;22(6):442-445. doi:10.1136/injuryprev-2015-041702
42. Finkelhor D, Ormrod R; US Department of Justice. Homicides of children and youth. Accessed November 10, 2022. <https://www.ojp.gov/pdffiles1/ojdp/187239.pdf>
43. Barr RG. Crying as a trigger for abusive head trauma: a key to prevention. *Pediatr Radiol*. 2014;44(4)(suppl 4):S559-S564. doi:10.1007/s00247-014-3100-3
44. Gubbels J, van der Put CE, Stams GJM, Assink M. Effective components of school-based prevention programs for child abuse: a meta-analytic review. *Clin Child Fam Psychol Rev*. 2021;24(3):553-578. doi:10.1007/s10567-021-00353-5
45. Sillito CL, Salari S. Child outcomes and risk factors in U.S. homicide-suicide cases 1999-2004. *J Fam Violence*. 2011;26(4):285-297. doi:10.1007/s10896-011-9364-6
46. Hood K, Kelly G. How can domestic violence (DV) programs partner with home visiting programs to better support survivors and their children? Accessed November 10, 2022. <https://vawnet.org/news/how-can-domestic-violence-dv-programs-partner-home-visiting-programs-better-support-survivors>
47. Agu N, Michael-Asalu A, Ramakrishnan R, et al. Improving intimate partner violence services in home visiting: a multisite learning collaborative approach. *J Soc Serv Res*. 2020;46(4):439-451. doi:10.1080/01488376.2019.1582452
48. Fowler KA, Dahlberg LL, Haileyesus T, Gutierrez C, Bacon S. Childhood firearm injuries in the United States. *Pediatrics*. 2017;140(1):1-11. doi:10.1542/peds.2016-3486
49. Corley C. More children caught in the crossfire amid Chicago street shootings spike. Accessed November 10, 2022. <https://www.npr.org/2016/08/01/488191775/children-fall-victim-as-street-shootings-rise-in-chicago>
50. Hutchinson B. Two children caught in crossfire of quadruple Cincinnati shooting. Accessed November 10, 2022. <https://abcnews.go.com/US/children-caught-crossfire-quadruple-cincinnati-shooting/story?id=78254895>
51. Crume TL, DiGuiseppi C, Byers T, Sirotnak AP, Garrett CJ. Underascertainment of child maltreatment fatalities by death certificates, 1990-1998. *Pediatrics*. 2002;110(2 Pt 1):e18. doi:10.1542/peds.110.2.e18
52. Arias E, Xu JQ, Curtin S, Bastian B, Tejada-Vera B. Mortality profile of the non-Hispanic American Indian or Alaska Native population, 2019. Accessed November 10, 2022. <https://www.cdc.gov/nchs/data/nvsr/nvsr70/NVSR70-12.pdf>
53. Jones CP. Addressing violence against children through anti-racism action. *Pediatr Clin North Am*. 2021;68(2):449-453. doi:10.1016/j.pcl.2021.01.002