

VIEWPOINT

The New Crisis of Increasing All-Cause Mortality in US Children and Adolescents

Steven H. Woolf, MD, MPH

Department of Family Medicine and Population Health, Virginia Commonwealth University School of Medicine, Richmond.

Elizabeth R. Wolf, MD, MPH

Department of Pediatrics, Virginia Commonwealth University School of Medicine, Richmond.

Frederick P. Rivara, MD, MPH

Departments of Pediatrics and Epidemiology, University of Washington, and Seattle Children's Research Institute, Seattle; and Editor, *JAMA Network Open*.

Although life expectancy in industrialized countries has lengthened over the past century, increases in US life expectancy ceased after 2010, a trend attributed to rising mortality rates among individuals aged 25 to 64 years.¹ Although midlife mortality rates increased over the past decade, mortality rates among children and older adults continued to decrease. The COVID-19 pandemic altered this trend and resulted in a sharp increase in mortality among older adults, an unsurprising outcome. However, pediatric mortality rates also increased, and COVID-19 contributed little to this surge. This increase in all-cause pediatric mortality has ominous implications. A nation that begins losing its most cherished population—its children—faces a crisis like no other.

A close examination of mortality data for 1999-2020 and provisional data for 2021 spells out the problem.^{2,3} Between 2019 and 2020, the all-cause mortality rate for ages 1 to 19 years increased by 10.7%, and it increased by an additional 8.3% between 2020 and 2021 (Figure, A).^{2,3} These increases, the largest in decades, followed a period of great progress in reducing pediatric mortality rates. Although most of the upsurge in pediatric mortality was attributable to deaths among older

32.7%.² Likely contributors to both trends include increased access to firearms and a deepening mental health crisis among children and adolescents.⁴ Access to opioids (eg, fentanyl) also increased, and overdose death rates for individuals aged 10 to 19 years began increasing shortly before the COVID-19 pandemic.⁵

Although the pandemic did not initiate these trends, it may have poured fuel on the fire. Injury mortality at ages 10 to 19 years rose by 22.6% between 2019 and 2020. Much of this surge involved homicides, which increased by 39.1%, and deaths from drug overdoses, which increased by 113.5%. Transport-related deaths at ages 10 to 19 years, which had decreased for decades due to improved vehicle safety measures and greater use of occupant restraints, increased by 15.6% in 2020.² Among children aged 1 to 9, injuries explained two-thirds (63.7%) of the increase in all-cause mortality in 2021, including a 45.9% increase in deaths involving fires or burns.³

All youths did not face an equal risk of injury deaths. The increase in injury deaths that occurred in 2020 primarily involved males (Figure, A). Risk also varied by race and ethnicity. For example, non-Hispanic Black youths accounted for two-thirds (62.9%) of homicide victims aged 10 to 19 years; in 2021, the homicide rate among non-Hispanic Black youths aged 10 to 19 years was 6 times that of Hispanic youths and more than 20 times that of Asian/Pacific Islander non-Hispanic youths and White youths.

Even larger racial and ethnic disparities existed across sexes: the homicide rate for non-Hispanic Black males aged 10 to 19 years was 61 times that of non-Hispanic White females.³

Racial and ethnic disparities varied across injuries. Transport-related death rates at ages 10 to 19 were highest in the non-Hispanic American Indian/Alaska Native population, but rates among non-Hispanic Black youths increased, surpassing that of non-Hispanic White youths in 2019. Suicides at ages 10 to 19 years were more than twice as likely among American Indian/Alaska Native youths and non-Hispanic Black youths than suicides among non-Hispanic White youths. Non-Hispanic White youths aged 10 to 19 years have historically died at higher rates from drug overdoses, but increasing rates in the non-Hispanic Black and Hispanic populations closed the gap, reaching statistical equivalence with rates in the non-Hispanic White population in 2020.²

The increases in fatal injuries that preceded and may have been exacerbated by the COVID-19 pandemic mark a tragic reversal to years of progress in lowering pediatric mortality rates through advances in injury prevention (eg, safer automobiles, occupant restraints,

A nation that begins losing its most cherished population—its children—faces a crisis like no other.

children (ages 10-19), all-cause mortality in younger children (ages 1-9) also increased in 2021 (by 8.4%).³ Infants (<1 year) were the only age group that experienced no significant increase in mortality.

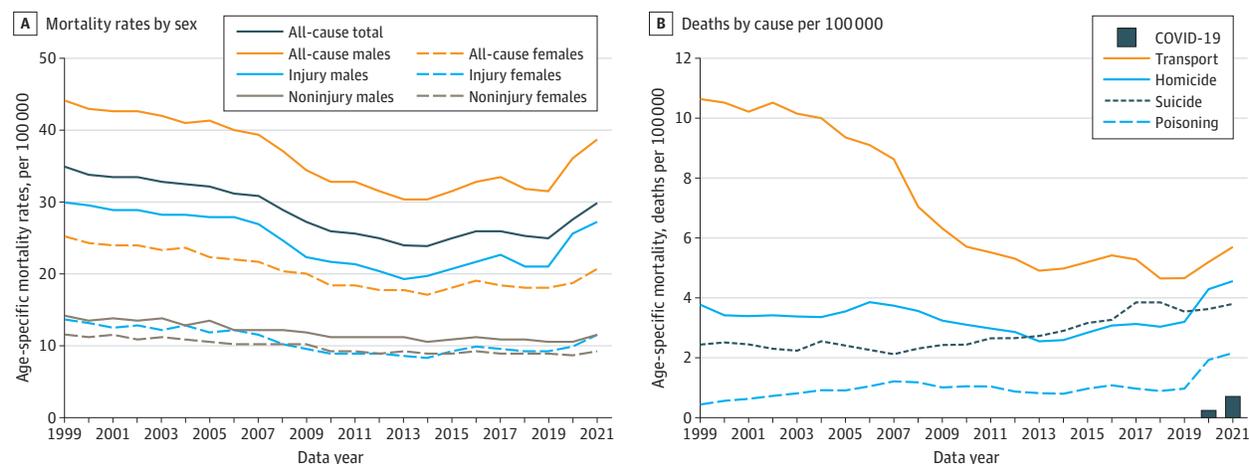
As panel B of the Figure demonstrates, this reversal in the pediatric mortality trajectory was caused not by COVID-19, but by injuries. In 2020, the COVID-19 mortality rate at ages 1 to 19 years was 0.24 deaths per 100 000, but the absolute increase in injury deaths alone was nearly 12 times higher (2.80 deaths per 100 000). As a group, mortality for all remaining causes of death other than injuries and COVID-19 (ie, all pediatric diseases combined) declined by 0.33 deaths per 100 000.² COVID-19 mortality rates at ages 1 to 19 years nearly doubled in 2021 but explained only 20.5% of that year's increase in all-cause mortality.³

The increase in pediatric injury deaths predates the COVID-19 pandemic (Figure, B). Suicides among individuals aged 10 to 19 years began to increase in 2007, and homicide rates in this age group began increasing in 2013. Between these nadirs and 2019, the eve of the COVID-19 pandemic, mortality rates for suicide increased by 69.5% and homicide rates increased by

Corresponding

Author: Steven H. Woolf, MD, MPH, Department of Family Medicine and Population Health, Virginia Commonwealth University School of Medicine, 830 E Main St, Ste 5035, Richmond, VA 23298-0212 (steven.woolf@vcuhealth.org).

Figure. All-Cause, Injury, Noninjury, COVID-19, and Selected Injury Mortality Rates, Ages 1 to 19 Years, 1999-2021



A, The term *injury* refers to all external causes of morbidity and mortality *International Classification of Diseases, Tenth Revision (ICD-10)* codes V01-Y89. Injuries involve multiple mechanisms including transportation, firearms, and poisoning. Since 2016, more than 90% of poisoning deaths at ages 10 to 19 years have resulted from unintentional drug overdoses. *Noninjury* includes all other causes of death (*ICD-10* codes A00-U99) including pediatric diseases.

B, Indicates mortality rates for COVID-19 (*ICD-10* code U07.01) and the leading causes of injury deaths at ages 1 to 19: transportation (*ICD-10* codes V01-V99),

homicide (*ICD-10* codes X85-Y09), suicide (*ICD-10* codes X40-X84), and poisoning (*ICD-10* codes X40-X49). Suicide refers to deaths resulting from intentional self-harm. Deaths from unintentional poisoning, such as those resulting from unintentional drug overdoses or alcohol poisoning, are considered distinct from suicides involving drugs. A large proportion of suicides and homicides are classified as firearm-related deaths.

Source, Centers for Disease Control and Prevention WONDER database.^{2,3}

bicycle helmets, smoke detectors) and the prevention and treatment of lethal pediatric diseases (eg, prematurity, neoplasms, congenital disorders). These advances have reduced pediatric deaths, but the recent increase in all-cause mortality means that these gains are now being entirely offset by injuries, primarily those involving violence, self-harm, and drug misuse.

Research and policy efforts to address the underlying causes—eg, depression, suicidality, opioid use, systemic racism, widening inequities, societal conflict—are urgently needed, as is system redesign to provide help for people affected by these conditions. US children and adolescents have experienced a significant increase in mental illness and suicidality in recent years but diminished access to mental health services and a growing shortage of mental health and substance abuse professionals, especially in rural areas.⁶ The pandemic strained the US health care system at large, disrupting routine and specialty care for pediatric patients. Widening social ineq-

uities, segregation, and structural racism are likely precipitants of increasing violence in Black communities⁷ and must be mitigated to reduce death rates.

Firearms play a central role in this crisis. They are the leading cause of death among youths aged 1 to 19 years and accounted for nearly half (47.8%) of the increase in all-cause mortality in 2020.² Current efforts to understand gun violence, overcome political gridlock, and enact sensible firearm policies are not progressing with the speed that pediatric suicides and homicides require.⁸

Medicine and public health have made remarkable progress in lowering pediatric mortality rates, but the lives they have saved are now endangered by manmade pathogens. Bullets, drugs, and automobiles are now causing a youth death toll sufficient to elevate all-cause mortality rates, the largest such increase in recent memory. Without bold action to reverse the trend, children's risk of not reaching adulthood may increase.

ARTICLE INFORMATION

Published Online: March 13, 2023.
doi:10.1001/jama.2023.3517

Conflict of Interest Disclosures: Dr Woolf receives partial funding from grant UL1TR002649 from the National Center for Advancing Translational Sciences outside the submitted work. Dr Rivara receives funding from the National Institutes of Health outside the submitted work. No other disclosures were reported.

REFERENCES

1. Woolf SH, Schoemaker H. Life expectancy and mortality rates in the United States, 1959-2017. *JAMA*. 2019;322(20):1996-2016. doi:10.1001/jama.2019.16932
2. Centers for Disease Control and Prevention. CDC WONDER database. About underlying cause of death, 1999-2020. Accessed February 2, 2023. <https://wonder.cdc.gov/ucd-icd10.html>
3. Centers for Disease Control and Prevention. CDC WONDER database. About provisional mortality statistics, 2018 through last month. Accessed February 2, 2023. <https://wonder.cdc.gov/mcd-icd10-provisional.html>
4. Mojtabai R, Olfson M, Han B. National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics*. 2016;138(6):e20161878. doi:10.1542/peds.2016-1878
5. Tanz LJ, Dinwiddie AT, Mattson CL, O'Donnell J, Davis NL. Drug overdose deaths among persons aged 10-19 years—United States, July 2019-December 2021. *MMWR Morb Mortal Wkly Rep*. 2022;71(50):1576-1582. doi:10.15585/mmwr.mm7150a2
6. Division of Adolescent and School Health, Centers for Disease Control and Prevention. Youth Risk Behavior Survey: Data Summary and Trends Report, 2011-2021. Accessed February 21, 2023. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf
7. Schleimer JP, Buggs SA, McCort CD, et al. Neighborhood racial and economic segregation and disparities in violence during the COVID-19 pandemic. *Am J Public Health*. 2022;112(1):144-153. doi:10.2105/AJPH.2021.306540
8. Winker M, Rowhani-Rahbar A, Rivara FP. US gun violence and deaths. *BMJ*. 2020;368:m1074. doi:10.1136/bmj.m1074