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Annual Research Review: Youth Firearm Violence Disparities in the U.S. and Implications for Prevention

Jessika H. Bottiani[1], **Daniel A. Camacho**[1], **Sarah Lindstrom Johnson**[2], **Catherine P. Bradshaw**[1]

[1]School of Education and Human Development, University of Virginia

[2]Sanford School of Social and Family Dynamics, Arizona State University

Abstract

Research has identified the United States (U.S.) as a global outlier in its firearm ownership rates, with a correspondingly higher risk of youth firearm violence compared to other countries. The relative extent of disparities in youth firearm violence within the U.S. has been less clear. Little is known about factors in the social ecology driving these disparities and whether current firearm violence prevention approaches sufficiently address them. Method: Applying a health disparities framework, we synthesized epidemiological, sociological, and prevention science literatures, emphasizing structural inequalities in youth sociocultural positionality in life course developmental context. We also highlighted findings from national injury data and other studies regarding the magnitude and impacts of youth firearm violence disparities. Results: The burden of firearm violence varied markedly at intersections of gender, race, place, developmental stage, and homicidal or suicidal intent. Firearm homicide among Black boys and young men (ages 15–24) was an outlier levels many times greater than the rates of any other demographic group, developmental stage, or violence intent, particularly in urban settings. Recent research has operationalized structural racism and implicated historically racialized spaces as a root cause of this disparity. In contrast, elevated firearm suicide rates were found among Native and White boys and young men in rural settings; firearm-related cultural attitudes and gender socialization were points of consideration to explain these disparities. We highlighted research-based youth firearm violence preventive interventions, and emphasized gaps in efforts focused on structural and sociocultural factors. Conclusions: More explicit attention to reducing firearm homicide among Black boys and young men and firearm suicide among Native and rural White boys and young men is urgently needed and has potential to substantially lower overall rates of firearm violence in the U.S.

Keywords

Adolescence; firearm violence; prevention; structural inequality; socio-cultural influence; racial disparities

Correspondence concerning this article should be addressed to Jessika H. Bottiani, School of Education, University of Virginia, 405 Emmet Street South, Charlottesville, VA 22904-4260. jessika.bottiani@virginia.edu.

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In the United States, violent firearm-related mortality rates and number of deaths are among the highest in the world. The United States is one of few countries worldwide where the rates of both firearm homicide and firearm suicide are higher than global medians (Naghavi et al., 2018). Sadly, young people have not been spared from the nation's firearm violence problem; over the past decade (2010–2019), 72,712 children and youth (0–24) in the United States have died of violent firearm-related injuries (CDC, 2019). An assessment of the global burden of firearm mortality found that the United States accounted for more than 90% of all children and youth killed by a firearm across 23 high-income countries, with pediatric firearm mortality rates that were as many as 49 times as high as those in other countries (Grinshteyn & Hemenway, 2016). Concerningly, public health data from the 2010s suggest an uptick in firearm mortality among young people in the United States, including homicides (Cunningham, Walton, & Carter, 2018), school shootings (Kalesan et al., 2017), and suicides (Child Trends Databank, 2019; Lindsey, Sheftall, Xiao, & Joe, 2019). The late 2010s recorded the highest age-adjusted youth violent firearm death rates in nearly two decades (CDC, 2019).

America's remarkably high rates of firearm ownership have provided a compelling explanation for the national gun violence problem over the last several decades (Webster, Whitehill, Vernick, & Curriero, 2013). With a per capita civilian firearm holdings rate of 120.5 firearms for every 100 persons, the United States is an extreme outlier (Karp, 2018). By comparison, the second highest country's rate is less than half as high (Yemen, 52.8 per 100), and Canada's rate is only a third of the U.S. rate and is still ranked in the top 25 (34.7 per 100 Karp, 2018). Numerous international and U.S. studies, meta-analyses, and systematic and scoping have found that higher rates of firearm ownership and access are linked to higher firearm violence (Anglemyer, Horvath, & Rutherford, 2014; Monu-, Lee, Hemenway, Mannix, & Fleegler, 2015; Naghavi et al., 2018; Riddell, Harper, Cerda', & Kaufman, 2018; Schmidt et al., 2019), including firearm (Hepburn & Hemenway, 2004) and firearm suicide (Glenn et al., 2020; Knopov et al., 2019 Miller, Azrael, & Hemenway, 2013). Time trends similarly support this association as the rate of firearm deaths in the United States increased in the years following both an increase in firearm manufacture and purchase rates (Goldstick, Zeoli, Mair, & Cunningham, 2019; Smith et al., 2017). These trends are alarming given the United States has experienced a recent uptick in firearm sales attributed to the COVID-19 pandemic and racial violence-related social unrest, as 3 million more firearms than expected sold, translating into the highest spike in firearm purchasing in more than 20 years (Levine & McKnight, 2020).

Importantly, the high and increasing rates of firearm violence and ownership in the U.S. are not evenly distributed across the population. In fact, the risk of firearm violence, considering both homicide and suicide, varies considerably based on developmental stage, sex, race and ethnicity, and place (Cunningham et al., 2018; Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017; Grinshteyn & Hemenway, 2016), as well as location on the rural-urban continuum (Fontanella et al., 2015). Intersectional analyses of race and place have identified especially salient firearm violence disparities affecting Black and Indigenous communities (Beard et al., 2017; Dare et al., 2019; Kalesan et al., 2020; Knopov et al., 2018; Riddell et al., 2018; Wong, Bernstein, Jay, & Siegel, 2020). Despite consistently identifying

conspicuous racial disparities, firearm violence prevention research, intervention, and policy efforts have been surprisingly race-neutral in their focus.

Reflective of the state of the field, a set of scoping reviews led by the Firearm Safety Among Children and Teens (FACTS) Consortium attended relatively little to Black, Indigenous, and People of Color (BIPOC) firearm homicide and suicide, considering the scale of impacts in these communities (see Cunningham, Carter, & Zimmerman, 2019 for a summary). However, the reviews identified gaps in research important to advancing our understanding of firearm violence disparities. In particular, two of the reviews found that research examining differences in risk and protective factors for firearm carriage and firearm violence disproportionately focuses on the individual level, with less attention to other social-ecological levels (Oliphant et al., 2019; Schmidt et al., 2019). These finding were consistent with statements by the National Institutes of Health (NIH), who have emphasized that structural and sociocultural domains across societal, community, and interpersonal levels of the social ecology are key determinants of health inequalities and are woefully under-researched (Alvidrez, Castille, Laude-Sharp, Rosario, & Tabor, 2019). The NIH health disparities framework also endorses a life course developmental perspective to identify cumulative impacts of chronic exposures and intergenerational transmission of risk and protective factors (Jones et al., 2019).

Consistent with this framework, the current paper builds upon and extends the FACTS scoping reviews by overlaying a health disparities perspective that emphasizes structural and sociocultural root causes of firearm violence affecting young people in the United States at community and societal levels. We adopt an intersectional, place-based lens to identify young people in the United States at greatest risk of firearm violence, considering both homicide and suicide, over the life course. We also discuss racial disparities in firearm violence-related injury and exposure, noting the significant psychological impacts of polyvictimization and intergenerational transmission of trauma from violence exposure in BIPOC communities (Turner et al., 2019; Zimmerman & Messner, 2013). With these collective impacts in mind, we analyze determinants of firearm homicide disparities affecting Black boys and young men with attention to racial residential segregation as a structural cause and spatial barrier. Next, we explore U.S. gun culture as a contributor to high youth firearm suicide in rural areas affecting White and Indigenous youth. We then outline implications for prevention and research to close youth firearm violence disparities, highlighting the need to address sociocultural norms contributing to popular demand for firearms (Hemenway & Miller, 2013). In light of recent openings for federally funded pediatric firearm prevention research, our review suggests a pressing need to set a research agenda that identifies and implements solutions that address root causes of racial disparities in firearm violence. It is our hope that this paper will spur theory, empirical research, and the development of new prevention strategies focused on structural and sociocultural determinants needed to reduce firearm violence disparities affecting young people in the United States.

Racial Disparities in Firearm Violence

National studies of child and youth violent firearm injury and mortality show that older youth disproportionately bear the burden of firearm-related injury and mortality relative to younger children (Fowler et al., 2017). Specifically, the firearm mortality rate of youth ages 15–24 is more than 10 times as high as children ages 10–14 (17.2 vs. 1.6 per 100,000). Youth ages 15–24 comprise 94% of the 7,947 young people (0–24) who died of firearm violence in the United States in 2019 (CDC, 2019). A life course perspective specifically identifies youth (15–24) as the stage of life with the most precipitous spike in risk of both firearm homicide and suicide (CDC, 2019; Grinshteyn & Hemenway, 2016). In addition, boys and young men in the United States are much more likely to be harmed by firearm violence than girls and young women. Across the life course, boys and men are more likely to suffer unintentional injuries from a firearm in early childhood and to die of firearm homicide and suicide in adolescence and adulthood (Cunningham et al., 2018; Fowler et al., 2017; Grinshteyn & Hemenway, 2016). Boys and young men in the United States also have much higher rates of firearm violence perpetration than girls and young women. Roughly 90% of the known 12- to 24-year-olds who committed homicide with a firearm in 2014 were boys and young men (Puzzanchera, Chamberlin, & Kang, 2016). In short, no single attribute is more consistently predictive of firearm violence victimization and perpetration than being male (Mankowski, 2013).

Given these considerably higher rates of firearm violence based on sex and developmental stage, our review of racial and ethnic disparities in youth firearm homicide and suicide below focuses on boys and young men in their teens and early twenties. It is important to hone in on this subset of the population at highest risk because examining aggregated rates across sex and age can mask important differences based on race and ethnicity. Due to sparse reporting on racial disparities in firearm violence with an intersectional focus on male youth in the United States, we supplement our review of the literature with data from the Centers for Disease Control and Prevention’s Web-based Injury Statistics Query and Reporting System (WISQARS) fatal injury and violence data. Unless specifically indicated otherwise, all data reported reflect mortality rates and counts from 2014 to 2019 (the last five years available).

Youth Homicide

Epidemiological research consistently shows that the lives of Black boys and young men are lost to firearm violence at many times the rate of their peers in the United States, with homicide largely explaining this gap (Cunningham et al., 2018). Firearm homicide rates among Black children and adolescents are approximately two to four times that of Latinx and Indigenous peers and 10 to 14 times that of White and Asian American peers (Fowler et al., 2017). Firearm homicide is the leading cause of Black youth mortality in the United States; age- adjusted firearm homicide rates among Black non- Hispanic boys and young men ages 15–24 were 74.1 per 100,000 from 2014 to 2019, translating to 15,257 lives lost to firearm homicide in this period (CDC, 2019). Youth also experience higher levels of risk of gun violence victimization in Black communities by law enforcement (Alang et al., 2017; Kahn, Goff, Lee, & Motamed, 2016); 174 Black boys died of firearm injuries resulting

from legal intervention from 2014 to 2019 (CDC, 2019). In Figure 1, we used WISQARS data (CDC, 2019) to graph racial and ethnic disparities in firearm homicide among boys and young men over the past two decades, showing the magnitude and persistence of the racial disparity in firearm homicide affecting Black boys and young men. The figure also shows that firearm homicide rates are elevated for Indigenous male youth in comparison to White and Asian and Pacific Islander boys and young men, and of note, that rates of firearm homicide among Latino male youth have decreased steadily over the past twenty years.

Several studies have reported higher rates of youth firearm homicides and assaults in urban neighborhoods, particularly those impacted by high levels of community distress and poverty (e.g. Tracy et al., 2019). In Figure 2, we show age-adjusted male youth firearm homicide mortality rates across the United States (top map) and list age-adjusted firearm homicide mortality rates by region and urbanization (metro versus nonmetro) disaggregated by race and ethnicity for Black, Indigenous, Latino, Asian and Pacific Islander, and White male youth. These data highlight the degree to which firearm homicides among Black boys and young men are emplaced in metro areas across all four regions of the United States, but with particularly high rates in metro areas of the Midwest and the South.

Although suicide rates shown in Figure 2 (bottom map) appear more widespread, this is attributable to rural areas (with larger county designations) having higher suicide prevalence, which we discuss further below. The staggering degree of inequity in firearm fatalities shouldered by Black boys young and young men in this country is made evident by a life course view of firearm violence disparities, shown in Figure 3. Notably, the close alignment of Black male firearm homicide rates with the total (aggregated) male homicide death count across the life course also suggests the extent to which Black male firearm homicide underlies the aggregated number of firearm homicides among boys and men in the United States.

Youth Suicide

Compared to youth homicide, there has been relatively less attention to racial disparities in firearm suicide. For example, Indigenous youth disproportionately die by suicide relative to other racial and ethnic groups. More than one-third (35.7%) of all Indigenous deaths by suicide are among children and youth, versus only 11.1% of White suicides (Leavitt, 2018). In fact, suicide is the leading cause of death for Indigenous 10- to 14-year-old boys and second leading cause of death for male Indigenous 15 to 24-year-olds (CDC, 2019). Firearm-specific suicide rates among Indigenous youth are not well- reported; however, an analysis of firearm suicide rates in rural counties in the United States found that the highest rates of firearm suicide were located in a cluster of counties with substantial Indigenous populations (Kalesan et al., 2020). WISQARS data also show the highest rates of firearm suicide were among Indigenous male youth relative to other racial ethnic groups: the age-adjusted rate of firearm suicide among Indigenous non-Hispanic male youth 15–24 was 20.0 per 100,000, translating to 263 lives lost from 2014 to 2019.

Despite having the highest rates of firearm suicide mortality relative to other racial and ethnic groups, the number of Indigenous male youth firearm suicide deaths is relatively few given the much smaller size of the Indigenous population in the United States,

a consequence of historical and present-day depopulation. In Figure 1, we summarize WISQARS data on racial and ethnic disparities in firearm suicide among boys and men over the past two decades (CDC, 2019); these data demonstrate that Indigenous male youth have consistently experienced the highest rates of death by firearm-related suicide, followed by White male youth. Notably, mortality rates among Indigenous male youth were particularly elevated in nonmetro areas in Midwest and West regions of the United States (see data table with the bottom map in Figure 2).

Research suggests that firearm suicide tends to be higher among White compared to Black and Latinx adolescents (Fowler et al., 2017). Age-adjusted firearm suicide rates among non-Hispanic White male youth (15–24) were 13.42 per 100,000 (2014 to 2019), translating to 10,087 lives lost during this period. Figure 2 (bottom map) suggests that firearm suicide rates are of greater concern on average in rural (nonmetro) counties, particularly in the West, among White male youth. These data are consistent with other research suggesting youth firearm suicide rates have been linked to the rural-urban continuum, with rates increasing concomitantly with increasing rurality (Fontanella et al., 2015; Goldstick, Carter, & Cunningham, 2020), whereas firearm homicide rates show less gradient across urbanicity levels (Goldstick et al., 2020). Though lower than among White youth, research has highlighted an increase in rates of suicidal behaviors among Black children and youth between 2001 and 2017 (Lindsey et al., 2019). Suicide is the third leading cause of death among Black boys and young men ages 15–24 (CDC, 2019), and firearms are known to be the leading mechanism of suicide in this subgroup (Price & Khubchandani, 2019). Age-adjusted firearm suicide rates among non-Hispanic Black male youth (15–24) were 8.45 per 100,000, translating to 1,762 lives lost from 2014 to 2019.

Youth Injury and Exposure to Firearm Violence

In addition to increased risk of firearm mortality, racial disparities in injury and exposure to violence are pronounced. According to WISQARS data, between 2013 and 2018 an estimated 88,249 Black boys and young men ages 15–24 suffered nonfatal injuries from a firearm assault (standard error 26,033; CDC, 2019). WISQARS nonfatal injury estimates for non-Black youth were unstable due to small sample sizes and therefore not available (CDC, 2019). However, a study examining national data on firearm injury among children and youth (≤17) from 700 trauma centers from the United States in 2017 found a majority of pediatric firearm injury patients were Black (67.0%, vs. 33% White; Sakran et al., 2020). Among those injured by a firearm, the cause was more commonly firearm assault for Black youth relative to White youth (77.3% vs. 45.4%, respectively) and more commonly firearm suicide for White youth relative to Black youth (14% vs. 1%). White children and adolescents in this study had significantly higher mortality, more severe head injuries, and longer hospital stays, which was attributed to their higher proportion of suicide attempts, which were disproportionately shots to the head at home (Sakran et al., 2020).

Beyond direct victimization, Black young people are more likely to be exposed indirectly to community firearm violence, including witnessing or hearing a shooting, in comparison with peers of other races (Zimmerman & Messner, 2013). One study of urban and rural youth between the ages 2–17 found that Black children and adolescents and those living in urban

communities had significantly higher rates of witnessing gun violence (21.4% and 20.9%, respectively) and hearing gunshots in public (51.6% and 48.3%, respectively) than non-Blackand nonurban study participants (Turner et al., 2019). Another study of predominantly Black children residing in an urban context found that 75% had heard gunshots by the age of 7 years old (Hurt, Malmud, Brodsky, & Giannetta, 2001). By comparison, nationally representative survey data across race suggest the prevalence of seeing or hearing someone shot is 13% among youth ages 14–17 (Finkelhor, Turner, Shattuck, & Hamby, 2015).

Psychological Impacts of Violent Firearm Injury and Exposure

These collective, disparate impacts highlight the importance of understanding the psychological consequences of firearm violence. Due to higher rates of firearm victimization and violence exposure, urban BIPOC children and youth disproportionately encounter the developmental and psychological detriments of such exposure to gun violence (Morris, 2009; Quimby et al., 2018). There is consistent and compelling evidence that community exposure to firearm violence induces psychological distress in the short-term and contributes to lasting impacts that diminish youths' mental and behavioral health (Turner et al., 2019). In particular, poly-victimization (multiple exposures to different types of victimization), has been linked to worse mental health outcomes and increased involvement in the criminal justice system (Musci, Bettencourt, Rabinowitz, Ialongo, & Lambert, 2018; Turner et al., 2019). Unfortunately, within the most firearm violence afflicted urban communities, youth often face barriers to receiving the necessary mental health supports to disrupt community cycles of violence (Morris, 2009). By comparison, White pediatric firearm injury patients have been found to receive more psychiatric care following discharge, likely attributable to their injury intent being more frequently suicide-related (Sakran et al., 2020).

The experience of being shot or shot at is a traumatic event, which is defined as a frightening, dangerous, or violent event that poses a threat to life or bodily integrity (National Child Traumatic Stress Network, 2020). Such traumatic events can be so distressing that they overwhelm one's ability to cope in the short term and can have lasting negative impacts on social-emotional, academic, and physical development (Lubit, Rovine, Defrancisci, & Eth, 2003; SAMHSA, 2020). Direct exposure to firearm violence sensitizes children's stress-response system (e.g. hypothalamic-pituitary-adrenal axis), leaving them vulnerable to psychological disturbances when faced with subsequent stress (McLaughlin, Conron, Koenen, & Gilman, 2010). After exposure to a shooting, it is common for children and youth, as well as adults, to experience the intrusive symptoms of post-traumatic stress disorder (PTSD: Slovak & Singer, 2001), including upsetting dreams, memories, or flashbacks about the traumatic event(s), strong emotional and physiological responses to trauma-related cues, avoidance of trauma-related reminders, mood disturbance, and increased hyperarousal /reactivity which may manifest in irritability, difficulty concentrating, and problems sleeping (APA, 2013).

Both indirect (e.g. hearing about) and direct (e.g. witnessing, victimization) exposure to firearm violence are associated with PTSD, but more direct forms of exposure are associated with greater risk of developing PTSD and more severe symptoms (May & Wisco, 2016; Turner et al., 2019). In addition, rates of PTSD are higher among those who were firearm

injury survivors themselves (Montgomerie, Lawrence, LaMotte, & Taft, 2015). Youth firearm injury survivors are also more likely to develop depression, anxiety, substance use problems, and physical illnesses and have a higher incidence of subsequent repeat injuries (Ranney et al., 2019). The developmental timing (e.g. early or middle childhood, adolescence, and young adulthood) of trauma following direct firearm violence exposure also impacts the cognitive and social outcomes of survivors (Smith, 2015). While such a disturbance can detrimentally impact youth at any stage of development, research suggests that those who experienced interpersonal violence trauma exposure in middle childhood (6–10) specifically had symptoms of depression that were about twice as high as those exposed during adulthood (Dunn, Nishimi, Powers, & Bradley, 2017).

The psychological and emotional impact of gunrelated trauma may also manifest in self-harm, with guns providing an impulsive, highly lethal means to alleviate emotional pain that often results in suicide (Curtin, 2020). Adolescents who lost a peer to firearm suicide experienced higher rates of symptoms of depression, PTSD, and suicidal ideation after this event (Brent et al., 1993). Youth were almost twice as likely to attempt suicide themselves one year after learning about a friend's suicide (Abrutyn & Mueller, 2015). Youth also may overestimate suicidality in friends, which in turn relates to increased risk of attempted suicide (Zimmerman et al., 2016).

Exposure to youth suicide by firearm through social media, even when fictitious, may have a contagious effect on suicidal ideation and attempts (Swedo et al., 2020). This adds to the larger body of research on the social contagion of suicide, particularly when details of a death by suicide, such as weapon use, are covered by the media (e.g., Sisask & Va€rnik, 2012; Stack, 2002). Media coverage of community gun violence, as well as high-profile incidents of anti-Black racial violence and police brutality, are also associated with negative psychological impacts for Black children, youth, and their families (Armstrong & Carlson, 2019; Bor, Venkataramani, Williams, & Tsai, 2018). In addition, Black communities have been portrayed stereotypically in the media as more inclined to use guns violently and criminally (Chiricos & Eschholz, 2002), which likely hinders Black youth's positive identity development (Spencer et al., 2003).

Reducing Youth Firearm Violence with a Focus on Addressing Racial Disparities

In this section, we draw on a framework for understanding health disparities developed by the NIH (Alvidrez et al., 2019) and apply developmental theory, including Bronfenbrenner's biosocial ecological systems theory (Bronfenbrenner & Morris, 1998; see also Garbarino, 2001) in an effort to explain race- and place-based disparities in youth firearm homicide and suicide. We focus on structural and sociocultural determinants at community and societal levels of influence in the social ecology, given gaps in research at these levels (Oliphant et al., 2019; Schmidt et al., 2019). Thereafter, we discuss implications for firearm violence prevention and research to address racial disparities.

Explaining Race- and Place-Based Disparities in Youth Firearm Homicide

In many ways, the explanation for urban Black male youth homicide disparities is quite well known (Sampson, Morenoff, & Raudenbush, 2005). Black youth disproportionately grow

up in racially segregated environments where they are exposed to toxic living conditions that drive violence, including concentrated poverty (Tracy et al., 2019), community blight (Kondo, Andreyeva, South, MacDonald, & Branas, 2018), educational opportunity gaps in under-resourced schools that disproportionately discipline them (Bottiani, Bradshaw, & Mendelson, 2017; Gregory, Skiba, & Noguera, 2010), and sparse occupational opportunities (Shihadeh & Ousey, 1998), in addition to interpersonal forms of racial discrimination, which also contribute to aggression (Bogart et al., 2013). Racial disparities in violence have persisted over time due to the perceived intractability of these conditions and because exposure to violence is associated with trauma and an increased risk for subsequent victimization and perpetration, poly-victimization, intergenerational trauma, and intergenerational violence (Quimby et al., 2018; Turner et al., 2019; Zimmerman & Messner, 2013). Less well established is how the totality of these conditions, conceptualized as structural racism, relates to firearm homicide disparities.

In a paper on health equity published by the Lancet, structural racism was defined as the sum total of ways in which U.S. society engenders racial discrimination through reinforcing sectors of housing, education, employment health care, and criminal justice, in part as a consequence of the historical legacy of residential segregation under Jim Crow (Bailey et al., 2017). Residential segregation of Black youth in settings of concentrated disadvantage is the consequence of a history dating to the 1930s of redlining—the deliberate, initially legal, residential segregation of burgeoning urban BIPOC communities into underdeveloped neighborhoods with low employment and economic growth opportunities (Massey & Denton, 1993). Following the Fair Housing Act of 1968, which fought the practice of redlining, a combination of individual and institutional practices (e.g. planned municipal disinvestment) evolved over time to leave young Black and Brown people persistently, disproportionately subject to living conditions that drive health disparities (Bailey et al., 2017).

This historical perspective on structural racism and racialized spaces is novel, prompting new research linking historical discrimination with modern urban violence exposure. For example, one paper examined this association by applying a spatial analysis using a 1937 Home Owners Loan Corporation map of Philadelphia and found links to higher contemporary firearm injury rates (Jacoby et al., 2018). Other research has examined the association between a state-level indicator of residential racial segregation and found positive associations with Black firearm homicide rates and Black-White homicide rate disparities, but not with White firearm homicide rates (Knopov, Sherman, Raifman, Larson, & Siegel, 2019). Another state-level study created a state racism index comprised of five dimensions, including residential segregation, incarceration rates, educational attainment, economic indicators, and employment status, and found that it was positively related to Black-White disparities in rates of fatal police shootings (Mesic et al., 2018). In a national study using latent trajectory analysis, 275 U.S. cities were grouped based on trends in Black and White firearm homicide rates from 2000 to 2017 and found that racial residential segregation predicted differences in the magnitude of cities' firearm homicide disparities (Wong et al., 2020). These studies point to the need for intervention to focus at structural levels to redress pervasive racial inequities (Acevedo-Garcia, Osypuk, McArdle, & Williams, 2008).

Explaining Race- and Place-Based Disparities in Youth Firearm Suicide

High rates of gun ownership have been attributed to sociocultural factors such as American 'gun culture', originally defined as a distinctively American belief that the right to bear arms was 'the greatest protection of their individual rights and a firm safeguard of democracy' (Hofstadter, 1970). Many studies of gun culture since have depended on White Southernness as a measure of gun culture (Boine, Siegel, Ross, Fleegler, & Alcorn, 2020). Guns hold significance among U.S. White Southerners as symbols that represent honor, national identity, freedom, and independence (Cohen, Nisbett, Bowdle, & Schwarz, 1996). However, positive cultural attitudes toward guns are not only prevalent in the South (Kalesan, Villarreal, Keyes, & Galea, 2016), nor is gun culture uniform in nature. Research suggests there are recreational, self-defense, and Second Amendment protectionist gun subcultures, the latter two of which are believed to be on the rise (Boine et al., 2020; Yamane, 2017). Relatedly, some studies have found that cultural attitudes toward gun control are also predictive of firearm demand and purchasing (Depetris-Chauvin, 2015).

Cultural attitudes toward guns are also associated with gender socialization. Masculinity is based on notions power, self-reliance, and invulnerability (Kimmel, 2010). Firearms, represented as objects that exude force, dominance, and decisiveness within the U.S. cultural psyche (Stroud, 2012), have likewise taken on a symbolic role that permits males to perform masculinity in a manner that affirms their self-esteem (Stange & Oyster, 2000). Factors such as bullying victimization (Kimmel & Mahler, 2003), marginalization (Britton, 2011), and socioeconomic decline and inequality (Carlson, 2015; Glenn et al., 2020; Mencken & Froese, 2019), may contribute to an unhealthy form of 'toxic' masculinity that encourages men to exert power over others through aggressive action, with firearms used as a means of doing so (Feder, Levant, & Dean, 2010). For example, in many mass school shootings, White male youth who were bullied or harassed by peers for inadequate gender performance or gender nonconformity enacted firearm violence as a way to recast themselves as powerful, rather than 'wimps' (Kimmel & Mahler, 2003; Stroud, 2012). Furthermore, in peer networks in which male youth struggle to feel a sense of security, firearms may assist youth in projecting a 'tough guy image' that conveys control (Stretesky & Pogrebin, 2007).

These cultural underpinnings may help explain differences in firearm ownership by race and the rural-urban divide that have been observed, with both higher positive gun attitudes and higher gun ownership among White men living in the rural South and Midwest (Parker, Horowitz, Igielnik, Oliphant, & Brown, 2017). In a national survey, White respondents more frequently reported having access to a gun in their home than Black respondents (49% vs. 32%, respectively)—despite the fact that five times the rate of Black compared to White respondents reported having concerns about gun violence in their local communities (49% vs. 11%, respectively; Parker et al., 2017). Relatedly, 46% of those who lived in rural areas of the United States reported owning a gun, compared with 19% of those in urban areas (Parker et al., 2017).

At the same time that firearm ownership rates are higher in rural areas, suicide rates appear to be higher as well, in part due to geographic isolation (Hirsch & Cukrowicz, 2014). Although White, rural populations have not been forcibly isolated, this demographic nonetheless experiences hardship associated with lack of resources, particularly related to

educational and economic opportunity (Logan & Burdick-Will, 2017) and mental health services (Thomas, Ellis, Konrad, Holzer, & Morrissey, 2009). Living in areas characterized by income inequality, in particular, may exacerbate suicide risk for boys and transition-age male youth, given study findings showing the male-to-female firearm suicide ratio for 15- to 19-year-olds specifically was significantly larger in places where there was higher income inequality (Glenn et al., 2020). For Indigenous populations, suicide has been related to lack of occupational opportunity, often related to opioid overdose deaths and so-called ‘deaths of despair’ (Case & Deaton, 2017; Kalesan et al., 2020). For many Indigenous youth living on rural reservations, their geographic isolation is an artifact of historical racism, military campaigns, and forced relocation. Additionally, practices such as the removal of children from families to boarding schools where language and cultural ways were prohibited have resulted in losses of traditional customs (Evans-Campbell, 2008). This historical trauma impacts both mental health as well as access to education and economic opportunities (Goldston et al., 2008). These detrimental impacts need to be understood intergenerationally, as they contribute to higher levels of child abuse and parent substance use (Evans-Campbell, 2008), both risk factors for suicide.

These conditions associated with suicidality in rural areas, taken together with higher rates of firearm ownership among rural households, may shed light on the higher rates of firearm suicide mortality among rural compared to urban youth (Fontanella et al., 2015; Nestadt, Triplett, Fowler, & Mojtabai, 2017). Notably, fatality rates in suicide attempts when a firearm is involved are higher (Conner, Azrael, & Miller, 2019). In particular, adolescents who initially use a firearm to self-harm are at especially high risk of dying when compared to adolescents who harm themselves using alternative methods (Olfson et al., 2018). Given access to such lethal means, higher rates of firearm ownership among rural households is a uniquely important correlate of higher rates of suicide mortality among White and Indigenous male youth in rural areas; non-firearm suicide rates are not significantly higher in rural areas (Nestadt et al., 2017). However, research on firearm ownership in Indigenous households as it relates to firearm suicide specifically is understudied, and more research is needed to understand the role of firearm access in the higher burden of suicide by firearm among Indigenous youth.

Implications for Prevention

Emergency Departments and Trauma Care Settings—For adolescents who have suffered injury by firearm violence, emergency department-based violence interventions programs which provide psychosocial and therapeutic supports postinjury have demonstrated preliminary effectiveness in reducing the occurrence of reinjury and subsequent violent activity (Cheng et al., 2008; Chong et al., 2015; Cooper, Eslinger, & Stolley, 2006). These interventions may be capitalizing on a ‘teachable moment’, a time of awareness of the possible severity of the consequences of current behaviors for both the youth and caregiver and thus change the balance of risks and benefits about violence (Cunningham et al., 2009; Johnson et al., 2007). All hospitals designated as trauma centers, by law, must have a coordinated violence prevention initiative (Lindstrom Johnson, Bradshaw, Cheng, & Wright, 2015).

Schools and Primary Practice Settings—Screening for violence exposure is another commonly used public health approach for addressing youth firearm violence. For example, one screening approach is the SaFEty Score, which stands for 'Serious fighting, Friend weapon carrying, community Environment, and firearm Threats', is focused entirely on assessing youth exposure to firearm violence, is employed in emergency department settings, and may be particularly useful for adolescents (Goldstick et al., 2017). Screening also may be done by embedding items related to firearm violence exposure in broader screening measures. Data from a randomized controlled trial found that after 9 months, children (ages 7–15) whose pediatrician had been prompted to discuss the results of their psychosocial screening exhibited decreases in aggressive and delinquent behavior (Borowsky, Mozayeny, Stuenkel, & Ireland, 2004). Additionally, many clinical and behavioral health settings are beginning to assess children's adverse childhood experiences (ACEs) involving violence exposure, particularly related to family violence (Rajan, Branas, Myers, & Agrawal, 2019). For example, where Rajan et al. (2019) suggested that firearm violence exposure should be included as an adverse childhood experience inclusive of being shot, being threatened by a firearm, seeing a shooting, hearing firearm shots, knowing a friend or family member who has been shot, or having close peers (i.e. friends or siblings) who carry a firearm, this review would extend further to include indirect exposure via news and virtual forms of social communication (e.g. Facebook, Twitter, Instagram, and YouTube) popular with young people. This may be particularly relevant for Black children and youth and their caregivers when exposed to high-profile incidents of anti-Black racial violence in the media, which can be associated with vicarious and anticipatory trauma (Armstrong & Carlson, 2019). Standardized trauma screening is a component of trauma-informed service provision that focuses on:

> (a) realization and/or acknowledgment of the extensive occurrence and effect of trauma, (b) recognition of the signs of trauma, and (c) response to trauma grounded in evidence-based practices that seek to (d) avoid retraumatization of children, families, and communities (Hanson & Lang, 2016).

In schools, primary care, and other community settings, screening and education can also be employed to assess and address firearm safety, access, and firearm carrying (Ngo et al., 2019). Approaches to identify young people who are higher risk and improve firearm safety practices in their households may contribute to less firearm carrying among adolescents (Oliphant et al., 2019). Practitioners should increase their awareness of the impact of firearm violence and firearm safety, and equip themselves to educate caregivers and adolescents about this topic. Doing so would be consistent with the encouragement by the American Academy of Pediatrics (2019) for pediatricians to discuss community exposure to firearm violence and educate caregivers and adolescents about firearm safety. Unfortunately, studies have shown that few clinicians routinely provide anticipatory guidance for patients and parents around violence prevention, partially because of a lack of comfort with the topic (Borowsky & Ireland, 1999; Sege, Hatmaker-Flanigan, Vos, Levin-Goodman, & Spivak, 2006). Clinician screening and education on firearm safety, when paired with distribution of free firearm locks, has also been associated with increases in self- reported safe firearm storage in households with young people (Rowhani-Rahbar et al., 2015).

There are also specific models to help practitioners learn to better recognize the signs of mental health crisis in young people, such as through Youth Mental Health First Aid (Y-MHFA) training. Y- MHFA teaches professionals working in community health centers and other settings, like schools, to recognize symptoms of mental illness, respond supportively to individuals in distress, and identify appropriate resources for these individuals (Jorm, Kitchener, Sawyer, Scales, & Cvetkovski, 2010). Research suggests that this training is effective in promoting practitioners' and educators' mental health literacy and providing appropriate levels of support, especially for those who have not experienced working with vulnerable youth populations (Haggerty, Carlson, McNall, Lee, & Williams, 2019; Morgan, Ross, & Reavley, 2018). To date, most evaluations and use of this program have been in high schools, particularly in reference to suicide prevention. Trainings have been extended to develop school police officers' mental health literacy in crisis situations as well (Thomas, Bradshaw, Bottiani, McDaniel, & Debnam, 2021). Recognizing signs of mental distress due to violence exposure via screening and increased mental health literacy would also allow front-line practitioners (e.g. primary care physicians, nurses, teachers, and police) to make referrals to mental health services (Borowsky et al., 2004).

Neighborhood Structure and Community-Wide Interventions—Several policy-focused recommendations have been put forward to disrupt the legacy of generations of racial residential segregation, including implementing providing mortgage assistance for home purchasing in formerly 'redlined' areas, restricting exclusionary zoning and adopting 'inclusionary zoning' policies (Gaias et al., 2017), supporting housing mobility programs like Moving to Opportunity (c.f., Clark, 2008), and addressing displacement caused by gentrification by limiting the tax abatement policies that promote gentrification and initiating longtime owner-occupancy programs (Kahlenburg & Quick, 2019). In addition, a number of community interventions have been developed with the goal of disrupting urban community violence exposure disproportionately affecting Black youth. For example, some community-based approaches have focused on reducing disorder through blight reduction, such as vacant lot cleaning and improvements to dilapidated buildings and abandoned property, as well as 'greening' programs. Recent studies have demonstrated promising effects of these approaches on neighborhood firearm violence (e.g. Aiyer, Zimmerman, Morrel-Samuels, & Reischl, 2015; Branas et al., 2011; Kondo et al., 2018; Ngo et al., 2019). Another community-wide, public health approach includes youth street outreach, community norming, and group deterrence, as employed in Cure Violence and Group Violence Intervention. Studies of these and other similar types of models have demonstrated promising impacts on youth violence in several large cities and neighborhoods, like Chicago and Baltimore (e.g. Butts, Roman, Bostwick, & Porter, 2015; Webster et al., 2013). Both approaches involve leveraging community resources (e.g. violence disruptors, law enforcement, social service providers) to engage the youth most at risk of perpetrating and suffering from firearm violence. Another initiative, Caught in the Crossfire, pairs assault-injured adolescents with a similarly experienced paid mentor from the community who can communicate to change beliefs and norms as well as provide tangible support around education and jobs needs. Participants in the program were less likely to be arrested or have any criminal involvement (Becker, Hall, Ursic, Jain, & Calhoun, 2004). Programs like Cure Violence also attempt to shift local norms related to using firearms in retaliation or as a

means to resolve interpersonal conflict, which recent studies have shown can be effective (Milam et al., 2016; Milam, Furr-Holden, Leaf, & Webster, 2018). These models aim to have a community-wide impact on firearm violence, which may both directly and indirectly impact youths' exposure to violence as well; however, these programs need to be tested more specifically with children and adolescents (Ngo et al., 2019).

Firearm Policy Reforms—Increased gun restriction and gun safety policy appear to be a well-justified public health measure for the U.S. population as a whole (Webster & Wintemute, 2015). Policy research on firearm purchase and access restrictions show links to reduced firearm mortality among children and youth (Monuteaux, Azrael, & Miller, 2019). A recent scoping review found that enactment of child access prevention laws (CAPS laws), which penalize adults when children gain access to their guns, reduced youth firearm suicides (Zeoli et al., 2019). A systematic review found that U.S. policies strengthening background checks and requiring a permit to purchase a firearm were associated with lower rates of firearm homicide (Lee et al., 2017). However, another study disaggregating outcomes by race found that Black firearm-related fatality and homicide rates were largely unaffected by firearm restriction policies (Resnick et al., 2017). These mixed results suggest the need for research to identify effective aspects of firearm restriction and safety policies specific to homicide on Black youth firearm homicide and assault-related injury. Overall, there is a need for more rigorous research to understand the effectiveness of U.S. firearm access policy on child and youth firearm mortality (Cunningham et al., 2019). Firearm legislation is a contentious topic and clearer scientific evidence is needed to back policymaker decision-making, yet research has been limited by lack of funding for research.

Regardless of effectiveness, firearm restriction policies have been overturned in the past with reference to the Second Amendment of the U.S. Constitution, which protects the right of citizens to keep and bear arms (U.S. Const. amend. II). Of note, the powers of this Amendment have only expanded in scope in the last two decades. Specifically, in 2008, the Supreme Court determined that the Second Amendment could be interpreted to protect individuals' rights to possess and use handguns for self-protection in their home, and in 2010, a Supreme Court ruling limited state and local restrictions on the right to bear arms (Vernick, Rutkow, Webster, & Teret, 2011). Although the latter may be viewed as a race-neutral ruling, its impact was to overturn a ban on handguns in the densely Black-populated District of Columbia that the National Association for the Advancement of Colored People urged the Court to uphold (Johnson, 2013; Vernick et al., 2011). In another example of ostensibly race-neutral policy during this same time period, 'stand your ground' laws, which provide a legal justification for people to use deadly force to defend themselves against subjective threats in public spaces, were increasingly adopted by states, mostly in Southern and Midwest regions of the United States (e.g. Florida Statutes Title XLVI Chapter 776). Several studies on outcomes of 'stand your ground' laws have identified measurable racial biases in the success of this defense, including one study finding leniency in convictions when the victim is a person of color (Ackermann, Goodman, Gilbert, Arroyo-Johnson, & Pagano, 2015).

Media Campaigns—In a letter to the *American Journal of Medicine*, Gollub and Taleb (2016) wrote 'the most effective public health actions to be taken must address the gun culture—the *demand*—as well as the easy *supply* of guns to US citizens', (p.1), consistent with prior conclusions drawn by firearm violence prevention researchers (e.g. Hemenway & Miller, 2013). Gallup historical trends in the 2000s and 2010s show a rise in the percent of respondents who believed that having a gun in the home makes it a safer place to be (35 to 63%; Gallup, 2018). Public awareness-raising campaigns, similar to those have been used in tobacco use prevention and control, have the potential to affect both attitudes toward firearms as well as attitudes toward firearm legislation. Such prevention efforts to address sociocultural norms contributing to popular demand for firearms and permissive firearm legislation could include media campaigns focused on behavior change related to firearm ownership, safe storage, and safe use (Hemenway & Miller, 2013).

Conclusions and Implications

In understanding and preventing racial disparities in youth firearm violence and its effects, a key barrier to progress has been a lack of federal public health funding, both for programming and research. Public health research on firearm violence has been highly restricted at federal levels (Betz, Ranney, & Wintemute, 2016; Rajan et al., 2019), particularly as it relates to pediatric populations (Alcorn, 2017). However, a Congressional clarification that the federal government has authority to conduct research into the causes of firearm violence and allocate funds for this purpose have opened a window of opportunity for more systematic research on firearm violence (Rostron, 2018). Several research groups have formed (e.g. the NIH-funded Firearm Safety Among Children and Teens [FACTS] Consortium) to begin to systematically address research gaps (Ranney et al., 2019). This review underscores the need for health disparities and life course developmental perspectives in identifying and addressing gaps in pediatric firearm violence prevention research. To accomplish this, attention to structural and sociocultural levels of the social ecology cannot be overlooked (Oliphant et al., 2019; Schmidt et al., 2019).

Specifically, a critical conclusion and recommendation of this review is that multisector, place-based initiatives that address structural factors related to poverty and the built environment in under-resourced segregated neighborhoods are needed (Aiyer et al., 2015; Kondo et al., 2018; Ngo et al., 2019). Solutions that address root causes of structural racism (Bailey et al., 2017; Wong et al., 2020) merit more research attention for addressing racial disparities in child and adolescent firearm violence. A complicating factor for policy-driven prevention efforts and active engagement in firearm prevention programming is that firearm culture can also influence adult and youth political beliefs related to firearm control and safety policy (Parker et al., 2017). Thus, firearm culture has the potential to exert societal influence beyond individual and local group norms and behaviors. This dynamic is another future research area and may inform targeted prevention efforts.

While rigorous randomized controlled studies focused specifically on firearm violence as the outcome are relatively rare due in part to historical legislative restrictions on firearm violence research (Cunningham et al., 2019), there is, nonetheless, a large and relevant body of research on effective youth violence prevention programming, which includes

reduced risk for and reduced consequences of firearm violence. These studies show that interventions and solutions to address the impact of child and youth firearm violence need to be multicomponent, tailored to address young people's diverse developmental needs, and present in multiple contexts (Lindstrom Johnson, Low, & Bradshaw, 2018). Important too is attention to the developmental timing of intervention. Although we have highlighted the disproportionately high rates of firearm homicide and suicide among youth ages 15–24, suggesting a focus on adolescence and emerging adulthood as a particularly important developmental period, a life course perspective (Jones et al., 2019) and a broader frame on social determinants of violence encourage intervention across the life course (Lindstrom Johnson et al., 2018). Intervention prior to adolescence is particularly important to disrupt the effects of exposure to violence, given research indicating the need for attention to the impacts of exposure in middle childhood (Dunn et al., 2017). Moreover, the growing body of research on the significance of adverse childhood experiences highlights the importance of early experiences on the neurobiology of trauma (Felitti et al., 1998).

Taken together, the public health impact of firearm violence disparities affecting children and adolescents cannot be overstated. The extant research highlights the need for additional consideration of sociocultural, structural, interpersonal, and individual factors across multiple levels in order to effect a change in U.S. firearm culture and disparate rates of youth firearm violence. This topic necessitates widespread attention and increased investment in multisector, developmentally tailored, prevention- focused policy and programming that explicitly targets underlying structural and sociocultural determinants of firearm violence disparities. Without sensitivity to the complexity of these root causes, efforts to stem disparities in youth firearm violence are not likely to result in substantial or sustainable improvements.

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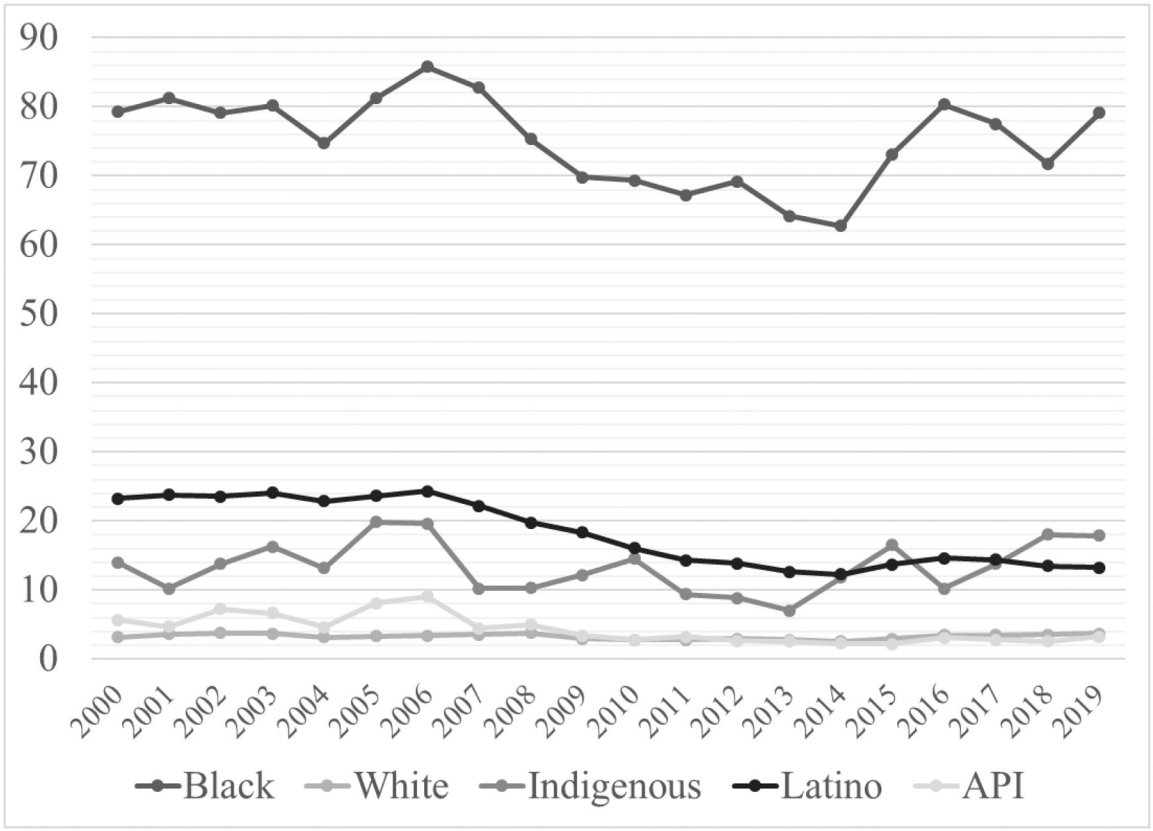


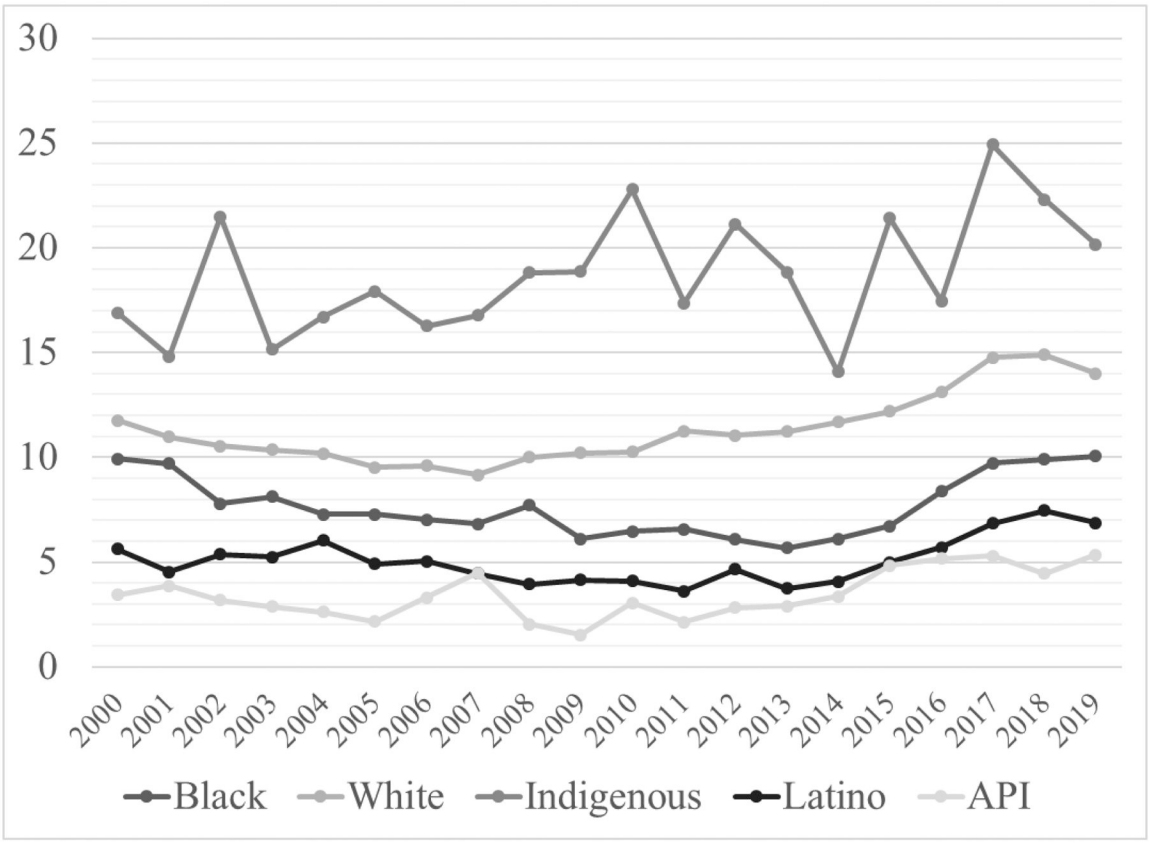
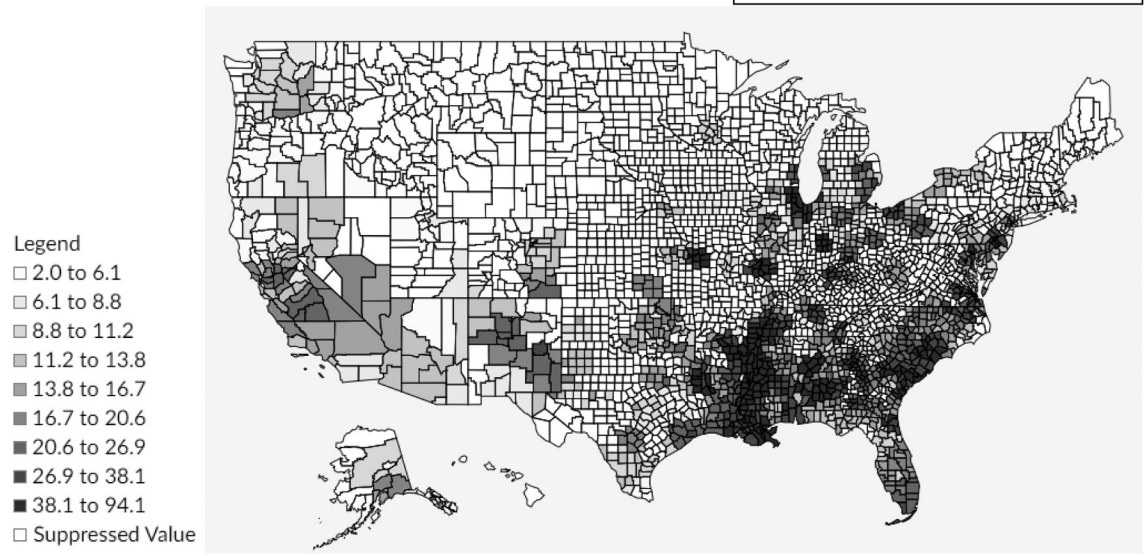


Figure 1.

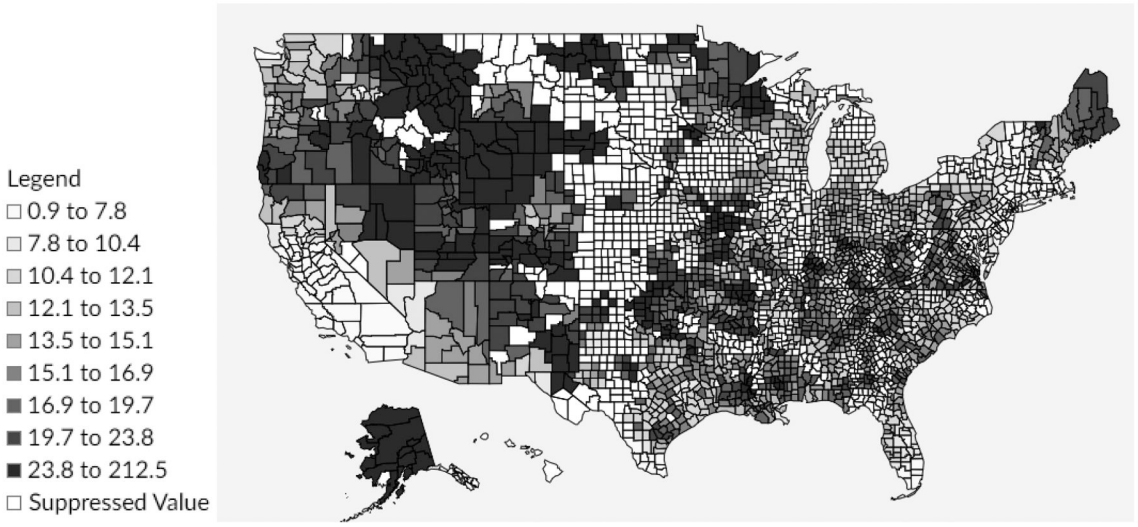
Disparities by race and ethnicity in age-adjusted per capita firearm homicide (top, scale 0 to 90) and suicide (bottom, scale 0 to 30) rates among U.S. male youth ages 15–24 from 2000 to 2019. API = Asian and Pacific Islander. Data source is WISQARS (CDC, 2019)

Male Youth 15-24 Firearm Homicide



	Northeast		South		Midwest		West	
Homicide	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro
Black	58.8	2.3*	73.3	51.2	119.0	15.8	54.5	12.4*
White	1.66	1.0*	4.6	5.0	3.0	2.2	3.1	2.5
Indigenous	6.4	0.0*	11.4	21.4	11.4*	11.8*	17.5	14.6
Latino	10.8	3.5*	11.8	6.9	19.0	3. 4*	16.2	9.7
API	0.7*	0.0*	3.1	2.3*	2.8			

Male Youth 15-24 Firearm Suicide



	Northeast		South		Midwest		West	
Suicide	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro
Black	3.7	8.8*	9.5	7.2	10.3	9.2	8.2	10.4*
White	5.8	14.8	15.2	18.8	12.1	17.4	13.7	25.8
Indigenous	4.9*	8.4*	14.5	14.8	9.0*	24.2	16.4	44.1
Latino	1.7	7.5*	6.9	7.9	6.0	7.0	5.9	16.2
API	1.7	0.0*	6.9	10.5*	4.3	3.9*	4.9	6.9*

Figure 2.

Across the United States by county designation with geospatial smoothing for the years 2014–2019, maps show age-adjusted per capita rates of firearm homicide (top) and suicide (bottom), for all male youth ages 15–24. Data tables show firearm homicide and suicide rates disaggregated by race for male youth 15–24 by U.S. region and 2013 urbanization (collapsed) classification for years 2014–2019.

*Rates based on 20 or fewer deaths may be unstable. API = Asian and Pacific Islander.Data source WISQARS (CDC, 2019)

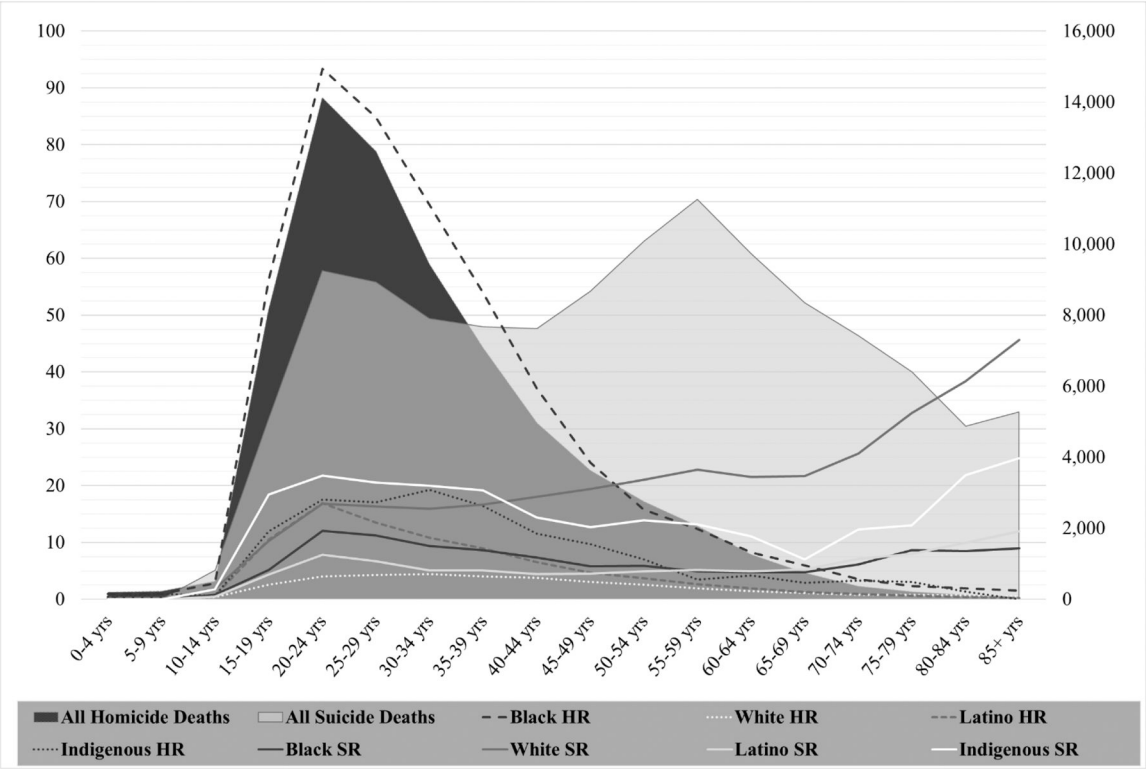


Figure 3.

Life course racial and ethnic disparities in crude per capita violent firearm death rates (line graph) and number of deaths (area graph) from 2014–2019. HR = Homicide Rate, SR = Suicide Rate. Data source is WISQARS (CDC, 2019)