

Place-based approaches to firearm violence prevention

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When there's you know certain ills, certain aspects of a neighborhood or an area that are visible from an unhealthy standpoint, the crime, the blight, and all of that, to me it sows uneasiness it puts people in a mindset of mistrust, suspicion, blame you know it brings out the biases. And all that is just not healthy you know, if for the most part an area looks good, low crime, and all those other amenities and assets are addressed then people feel better towards one another, you know. The environment plays such a huge part on the thinking of people, you know.

—Men's focus group participant, New Orleans, Louisiana

Community-built environment conditions have been shown to have a direct and indirect impact on resident health and well-being, as well as on community crime and violence rates (Branas et al., 2018; Garvin, Cannuscio, & Branas, 2013; Pearson et al., 2019). They are also fundamental contributors to community health and well-being norms (Sadler et al., 2017), including interpersonal relationships. U.S. urban ecosystems contain neighborhoods of concentrated poverty, are largely inhabited by racial and ethnic minoritized populations, and are often characterized by substandard housing, vacant properties, and dilapidated structures; few safe, clean, and green spaces for leisure and exercise; high crime; litter, and exposure to environmental toxins; an overabundance of liquor outlets, and limited availability of healthy food sources. Such neighborhoods are also more likely to have underperforming schools and fewer job opportunities, limiting educational, economic, and social mobility to potentially disrupt cycles of poverty and crime. Present-day place-based neighborhood challenges in cities across the U.S. have been shaped by historical policies and practices such as redlining, and have perpetuated stark racial and economic wealth gaps and a strong link between place and violent crime (Aaronson et al., 2021).

There is a long-standing relationship between violence and place—including firearm violence. Violence is spatially concentrated within communities across the U.S., disproportionately occurring within a select set of streets in neighborhoods experiencing disinvestment (Beard et al., 2017; Weisburd, 2015). A prior review (Kondo, Andreyeva, et al., 2018) found a growing body of research demonstrating that improving conditions in such communities (including housing, green-space, transportation, land use, and zoning) may be an impactful approach to reducing firearm violence.

Since that time, there have been numerous studies exploring the potential for neighborhood interventions in areas such as green and blue space, building and housing, commercial, situational, transportation, education and healthcare, and social infrastructure, to reduce firearm violence, specifically. The mechanisms by which these interventions may impact gun violence are explained in the Crime Prevention Through Environmental Design (CPTED) framework, and theories such as Human Territorial Functioning (Taylor et al., 1984) and Busy Streets Theory (BST) (Aiyer et al., 2015). While we touch on some, a full review of these theories is beyond the scope of this chapter. Instead, we review current evidence on how built environment approaches relate to firearm prevention.

Green infrastructure

Green infrastructure, such as trees, parks, and other maintained green spaces, has been associated with lower rates of criminal activities. Green spaces may reduce stress (Kondo, Jacoby, & South, 2018), provide lower temperatures which can decrease aggression (Anderson, 1989), and increase collective efficacy and other components of social capital (Aiyer et al., 2015). Given the inequitable distribution of quality green space in U.S. cities (Nesbitt et al., 2019), changes in green amenities may not only aid in reducing violence but also other health-promoting outcomes (Garvin, Branas, et al., 2013). Three forms of green infrastructure that have been linked to firearm violence are vacant lot greening, tree canopy or vegetation, and park access and quality.

Greening and vacant lot reuse and remediation

Abandoned parcels and buildings often have overgrown vegetation, trash dumping, and may provide opportunities for harboring illegal firearms, squatting, drug use, and other unwanted activity (Branas et al., 2012). Vacant lots and abandoned buildings are visible signs of neighborhood disorder and likely produce violence, fear, and more disorder (Ross & Mirowsky, 1999; Sampson & Raudenbush, 1999). Remediation of vacant lots has been shown to have a substantial impact on firearm violence in both experimental trials and quasiexperimental studies. Such programs typically include debris removal, planting trees and grass, installing fencing and gardens, and frequent mowing and cleanup (Fig. 1). In a randomized controlled trial of 110 geographic clusters and 541 randomly selected vacant lots in Philadelphia, Pennsylvania, Branas et al. (2018) tested the impact of a greening intervention and a less-intensive mowing and trash cleanup intervention compared to a no-intervention control condition. In neighborhoods below the city's poverty line, they observed a 17% reduction in firearm shooting incidents around lots that were greened compared to control lots and an approximately 9% reduction around lots (Moyer et al., 2019).

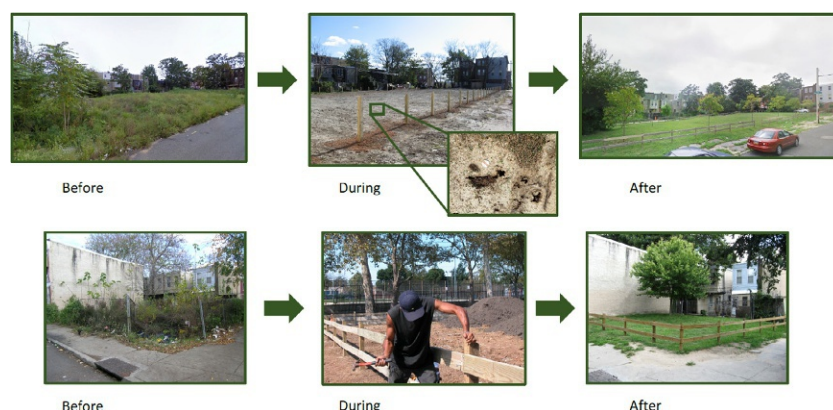


FIG. 1 Cleaning and greening vacant lot example.

Several quasiexperimental studies have also demonstrated a substantial impact of greening on firearm violence and other crimes. For example, an earlier quasiexperimental study of the same greening program in Philadelphia found consistent and significant reductions (8%) in gun assaults (Branas et al., 2011). In a comparison of vacant lot conversion into community gardens in Milwaukee, Wisconsin, compared to control vacant lots with no intervention, Beam et al. (2021) observed significant violent crime rate reductions ranging between 3.7% and 6.4% within 250m of treated lots. The impact of greening among specific populations has also been demonstrated, with an approximately sixfold lower likelihood of youth (13–20 years) homicide in areas with maintained vacant lots in a case-control study in Philadelphia (Culyba et al., 2016).

Community engagement in the greening process could lead to more or different impacts on violence. BST (Aiyer et al., 2015) holds that engaged residents can help improve physical environments and build social connections that deter crime and violence. In a quasiexperimental study over a 5-year period in Flint, Michigan, Heinze et al. (2018) observed approximately 40% fewer assaults and violent crimes on streets where vacant lots were maintained by community members compared to vacant lots on streets that were left alone. Similarly, in Youngstown, Ohio, Kondo et al. (2016) found a greater impact on violent crimes around community reuse of lots compared to contractor-greened lots, and Gong et al. (2022) observed greater declines in violent crime on street segments around intervention lots that received community-engaged maintenance compared to no treatment. Furthermore, in Baltimore, Maryland, Kvit et al. (2022) found a lower incidence

(8 crimes/km²) of violent crimes around city block groups with community-engaged and initiated greening compared to control block groups. Community engagement may aid in the sustainability of such greening programs.

One concern with greening as a prevention approach is the potential for displacement of violent crime. However, studies that have tested for displacement have not found any (Branas et al., 2018; Kondo et al., 2016) and some have even observed spill-over crime reduction effects (Kondo et al., 2016). A metaanalysis of vacant lot greening studies found an overall effect of reduction in firearm violence by approximately 5% (Sadatsafavi et al., 2022), although the impact may be greater when considering the actual implementation of these programs focused on neighborhoods of greatest needs, as well as the potential improvement in physical and mental health (South et al., 2018) and other benefits that may also be related to firearm injury and mortality.

Tree canopy/vegetation

Tree canopy and maintained vegetation may also play a protective role against firearm violence, by increasing the use of public spaces and “eyes on the street” (Coley et al., 1997; Jacobs, 1961) and social control as well as alleviating mental fatigue (Kaplan, 1987) and symptoms of it (e.g., irritability, decreased impulse control) that are precursors to violence. Research has demonstrated a significant and inverse relationship between tree canopy and violent crime nationally (Ogletree et al., 2022), as well as in select cities such as New Haven, Connecticut (Gilstad-Hayden et al., 2015), Baltimore, Maryland (Troy et al., 2012), Philadelphia (Wolfe & Mennis, 2012), and Louisville, Kentucky (El-Mallakh et al., 2022). In Chicago, Illinois, in a semirandomized design given how residents were assigned apartment locations, Kuo and Sullivan (2001) observed fewer violent and property crimes in apartment buildings with greater vegetation in their surroundings. However, each of these studies defined tree canopy or vegetation differently, which limits the ability to fully compare results or provide concrete policy recommendations.

While there are no prior intervention trials, there have been simulation studies that have examined the impact of tree canopy on firearm violence. In a six-city sample of metropolitan areas in the U.S., Jay et al. (2022) simulated the possible effects of “tree equity” programs that would raise census-tract level tree cover to a specified baseline level. The study found a 9% reduction in fatal and nonfatal shootings for each one unit standard deviation increase in the tree canopy (based on imagery data). With the simulated achievement of 40% baseline tree cover, the authors observed the largest reductions in shootings (average of 3.3 fewer shootings) within the most deprived areas compared to those in the most privileged areas (average of 0.3 fewer shootings).

When considering increasing tree canopy as a firearm violence prevention intervention, tree-related characteristics might also play a role, as demonstrated by Lin et al. (2021) (Fig. 2). In looking at the association between street trees and crime in New York City, the authors found that characteristics of tree structure, streetscapes, and tree management

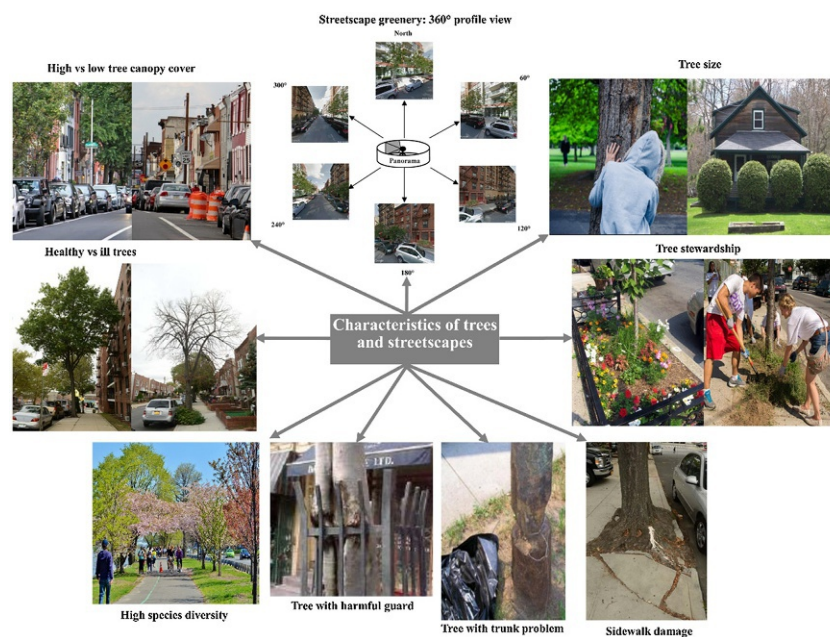


FIG. 2 Characteristics of trees and streetscapes, Lin et al. (2021).

moderated the association between street trees and crime, with some related to higher levels of crime and some to lower levels. Where vegetation limited visibility and where there were higher proportions of small-sized trees and trees with harmful guards or trunk problems, they observed a positive association with violent crime. Tree canopy cover, species diversity, and streetscape greenery were associated with lower crime rates. A similar mixed effect was observed by [Donovan and Prestemon \(2012\)](#) in a Portland, Oregon study, where they also observed a protective effect of street trees and large trees but a negative effect of small trees.

Much remains to be understood about the role of tree canopy and vegetation, and there is a great need for stronger research designs and more consistent measures moving forward.

Park access and quality

Parks are an important built environment infrastructure that can be a key public health resource, particularly for communities with limited access to private space for recreation ([Dehring & Dunse, 2006](#); [Jacobs, 1961](#)). However, there remain inequities in park access, with poor communities of color having lower park access ([Rigolon et al., 2018](#)), and parks that are often smaller, underfunded, crowded, unkept, and/or unsafe compared to other parts of the city ([Jenkins et al., 2015](#); [Sister et al., 2010](#)). The relationship between parks and violent crime is quite inconclusive, with some studies demonstrating a positive relationship between parks and crime; some an inverse or protective relationship; and some demonstrating no relationship ([Dobbs & Sakran, 2023](#); [Shepley et al., 2019](#)).

Parks often have trees and flora, and are set back from the street. They also may lack attentive guardianship, which could reduce visibility and increase the potential for crime ([Groff & McCord, 2012](#)). However, even in studies that found overall positive associations between parks and crime (including violent crime), there was significant variability based on park amenities. For example, [Groff and McCord's \(2012\)](#) seminal study of 247 parks in Philadelphia found that the presence of sporting facilities or athletic fields and outdoor lighting fixtures reduced the likelihood of crime in adjacent neighborhoods. In an examination of 60 parks and crime in Louisville, KY, [McCord and Houser \(2017\)](#) found that general amenities such as park benches, functional walkways, drinking fountains, and parking lots were associated with lower levels of crime.

Others have also stressed the importance of examining the broader neighborhood context around parks in their relationship to crime and violence. In an examination of parks and crime across nine U.S. cities, [Boessen and Hipp \(2018\)](#) found that nearby land uses such as residential areas and sociodemographic characteristics such as Latine ethnicity, younger age, and low concentrated disadvantage were associated with higher rates of crime. Similarly, [Wilcox et al. \(2004\)](#) found an interactive effect between parks and violent crime in Seattle, with lower rates of crime in unstable neighborhoods with high residential turnover.

Studies have examined the association between parks and firearm violence, specifically. In a study of 309 parks in Detroit, MI, [Breetzke et al. \(2020\)](#) found that firearm violence density was lower within parks than across Detroit as a whole, but marginally higher in areas surrounding the parks. They also observed no effect modification by surrounding neighborhood sociodemographic characteristics but did find that parks with higher levels of greenness and more tree cover had higher rates of firearm violence.

Given the nascency of studies on parks and violent crime, and the challenges with interventions at the park level given the scope necessary, there has been very little research on park-based interventions. However, several innovative programs across the country have observed significant reductions in crime rates ([D'Agostino et al., 2019](#)), which makes the case that further research should look at how interventions at the park level may be associated with firearm violence specifically. Overall, research suggests a complicated but promising role of parks in reducing violence and potentially gun violence, either directly or indirectly, but additional research and intervention designs are warranted.

Building and housing infrastructure

Changes to building and housing infrastructure have also been shown to have positive impacts on firearm violence. These have taken many forms, but we review three promising approaches here—remediation of vacant homes and buildings, building demolitions, and public housing changes.

Vacant building remediation

Like vacant parcels, vacant buildings can foster community violence and firearm violence in particular, given that such buildings may be a site for drug use and storing firearms ([Accordino & Johnson, 2000](#); [MacDonald, 2015](#)). Mechanistically,

however, the impact of such vacant property on resident fear and feelings of neglect, reduced collective efficacy, stress, and increased poor mental health may also lead to increased rates of violence in areas with such neighborhood deterioration. Even small remediation or treatment of such structures has been shown to have a substantial impact on firearm violence, and we provide the following three examples from Philadelphia.

Kondo et al. (2015) examined the impact of a Doors and Windows Ordinance that required abandoned building owners to install working doors and windows in all structural openings (or face significant fines). The quasiexperimental study found significant reductions in overall crimes, total assaults, firearm assaults, and nuisance crimes around buildings that were remediated ($n = 676$) or permitted for renovation ($n = 241$) compared to randomly matched control buildings that were not remediated ($n = 676$) or permitted for renovation ($n = 964$). Similarly, in a cross-sectional panel time-series analysis of Philadelphia's Basic Systems Repair Program (BSRP), which provides low-income homeowners with grants to repair structural damage to their homes, South et al. (2021) observed a 21.9% decrease in total crime, a 19.0% decrease in assault, a 22.6% decrease in robbery, and a 21.9% decrease in homicide on block faces of homes who took part in the BSRP compared to blocks with homes wait-listed but who did not receive the support. In a three-arm cluster randomized trial of vacant building remediation that included a full remediation arm, a trash clean-up only arm, or control arm (see Fig. 3 for examples of building remediation), South et al. (2023) observed significant reductions in weapons violations (−8.4%) and firearm assaults (−13.1%) in full remediation compared to control clusters. They did not observe significant differential change in firearm violence in the trash cleanup clusters compared to control clusters. There was no evidence of displacement of firearm violence.



FIG. 3 Vacant and abandoned home remediation examples.

Demolitions

Dilapidated, abandoned buildings remain common in U.S. industrial manufacturing cities that experienced substantial population loss during the second half of the 20th century, but also elsewhere with the foreclosure crisis and rising housing costs (Immergluck, 2016), as well as the COVID-19 pandemic (Balemi et al., 2021). The impact of demolishing such buildings has been shown to reduce violence, including firearm violence.

In a quasiexperimental study examining a large-scale demolition program that started in 2014 in Detroit, demolishing over 10,000 buildings in its first 3 years, Jay et al. (2019) observed an 11% reduction in fatal and nonfatal firearm assaults in matched block groups that received more than five cumulative demolitions by the end of the previous quarter, compared to similar units that received less treatment. There also appeared to be a threshold effect, whereby the reduction in firearm assaults was greatest for locations receiving a moderate number of demolitions (between 6 and 12) compared to locations receiving a high number of demolitions (13 and over). No evidence of spatial displacement of firearm assaults was observed. Similarly, in Buffalo, New York, Wheeler et al. (2018) tested the impact of residential housing demolitions from 2010 to 2015 on parcels receiving a demolition to propensity score matched control parcels and found significant (up to 90%) reduction in part 1 violent and nonviolent crimes at the microlevel, with reductions up to several blocks away.

Not only may the quantity of demolitions matter in their impact on violent crime, but as with other place-based interventions, the effect and the duration of the effect may be moderated by other factors in the neighborhood. Jay et al. (2021) examined moderators of the demolition-firearm violence relationship in Rochester, New York. Using a quasiexperimental approach, they found that each demolition was associated with a 14% reduction in fatal and nonfatal shootings the year following demolition and a 2% reduction in shootings per year for each cumulative demolition, but with variation by built environment characteristics. Denser areas with higher street connectivity and greater mixed use had following-year but not long-term effects, while areas with lower density, more residential and with larger parcel sizes and less development had long-term effects but not following-year effects.

Despite several strong studies linking building demolition to firearm and other violence reduction, others have not observed such effects (Kagawa et al., 2022; Spader et al., 2016), and there is still much to learn about this promising and also fairly low-cost approach to violence prevention.

Public housing changes

Public housing in its original form has been shown to concentrate poverty (Goering et al., 1997) and crime (Freedman & Owens, 2011), fueling their deconcentration which began in the 1960s (Hogan, 1996). These changes, while infrequently examined, have been shown to impact crime, as well as low-income rental housing development.

Demolitions specific to public housing have been shown to reduce violent crime, as demonstrated by Aliprantis and Hartley (2015). In a case-crossover design, they observed a 4.4% decrease in homicides in Chicago following the demolition of 161 high-rise public housing units, at the site of the demolition. While they found some displacement of crime, it was less than the gains on crime reduction following demolition.

Large-scale, high-density complexes were the historic public housing norm, prior to the 1960s (Hogan, 1996). Scattered site housing is small-scale, affordable, low-density housing, and can include new housing or refurbishing of vacant homes. Such housing grew with the federal government's Low-Income Housing Tax Credit (LIHTC)—one major source of financing for such housing—which also increased credits for Qualified Census Tract (QCT) areas that are lower in income. Such housing has been linked to decreased crime rates. In a quasiexperimental county-level study of 29,870 LIHTC projects between 1987 and 2007, Freedman and Owens (2011) found significant reductions in violent crime in the poorest communities (~2% reduction). At a smaller geographic level, in an adjusted interrupted-time series difference-in-differences approach, Woo and Joh (2015) observed significant reductions in total crimes (0.51 incidents per 100 residents) and violent crimes (0.16 incidents per 100 residents) within 2000 ft of LIHTC sites in Austin, Texas between 2000 and 2009. However, preexisting trends in crime in the LIHTC sites could have been one explanation for findings. Similarly, in an examination of crime around 38 dispersed public housing sites that opened in Denver during 1992–95, Santiago et al. (2003) observed a significant decrease in total crimes after the construction of scattered-site public housing units.

These public housing studies examine the ecological changes that may play a role in violence reduction. Another approach is to examine the impacts of resident relocation to higher-income areas, such as the Moving to Opportunities Study (MTO), which demonstrated some impact on crime among youth (Kling et al., 2005). A key question has however been raised as to whether relocation is a serviceable place-based policy intervention given that some children, especially adolescent boys, were shown to be negatively affected by relocation, and that a substantial number of participants in the MTO who were offered vouchers to relocate did not opt to use them and presumably wanted to remain in situ where they already were living. Other evaluations of relocation policies have found small net effects on crime and highlight the need for support for both relocated families and receiving communities after relocation.

Commercial infrastructure

Neighborhood zoning, and commercial zoning in particular, are also potential place-based targets for firearm violence prevention. Mixing of land use to reduce violence, build social connections, and promote well-being is a common strategy (Jacobs, 1961), and is incorporated into recent theories on community empowerment and crime prevention such as BST (Aiyer et al., 2015). We focus here on three commercial uses or entities that can be considered place-based approaches to firearm violence prevention—alcohol establishments, food establishments, and more broadly, business improvement districts (BIDs).

Alcohol establishments

Alcohol establishments or outlets, including both on-site (where alcohol is purchased and consumed on-site) and off-site (where alcohol is purchased and consumed off-site) density has been linked to violence rates in several studies (Gruenewald et al., 2006; Scribner et al., 2007) alcohol outlets may increase crime and violence by: (1) expanding the physical availability of alcohol, thereby altering “routine drinking activities” or behaviors one may engage in while drinking (Stockwell & Gruenewald, 2004); (2) decreasing social organization that may deter violence (McCord & Ratcliffe, 2007); and (3) bringing high-risk drinkers together and potentially increasing the opportunity for violence (Campbell et al., 2009). Modifying the alcohol environment may be an effective place-based approach to violence prevention, including firearm violence. Modifications may include zoning restrictions or changing the physical location of alcohol establishments

(including their removal), restrictions on sales or licenses, or changes in other characteristics that may put these establishments at greater risk for hosting or potentiating violence.

Several studies have demonstrated a significant impact on violent crime and firearm violence following the removal or transformation of outlets. Following the forced closure or removal of many alcohol outlets in Los Angeles following the 1992 Civil Unrest, [Yu et al. \(2008\)](#) observed a significant decrease, lasting roughly 5 years, in assaultive violence rates in census tracts that lost outlets compared to those that did not. In an examination of several zoning changes in Baltimore that began in 2007 with the “TransForm Baltimore” initiative, [Trangenstein et al. \(2020\)](#) observed substantial impacts on violent crime. Changes involved alcohol outlet zoning: (1) requiring liquor stores located in residential zones to relocate or change the nature of their business over a 2-year period; (2) requiring bars/taverns, which function as both on- and off-premise outlets to demonstrate substantial floor space and sales devoted to onsite consumption; and (3) banning new liquor stores from opening within 300 ft of existing liquor stores (except in the downtown, tourism, and entertainment areas). The study found a reduction in alcohol outlet density by one quintile was associated with a 17% reduction in annual homicides (51 per year), and that removing liquor stores in residential zones was associated with 22 fewer homicides per year and removing both the liquor stores in residential zones and the bars/taverns operating as liquor stores were associated with 23 fewer homicides.

License restrictions are another means of reducing alcohol availability and, in turn, violent crime. The City of Richmond set temporary license restrictions in 2003, requiring convenience stores to stop selling 40- and 22-oz bottles of beer. [Masho et al. \(2014\)](#) observed significant declines in intentional injury-related ambulance trips, from 19.6 to 0 per 1000 in census tracts with the restriction compared to those without it, and a resulting increase in injury-related trips once the restriction was lifted. Many states and municipalities have blue laws that restrict alcohol sales on Sundays, but some jurisdictions have been repealing them. While some studies have found an impact of repeals on violent incidents ([Heaton, 2012](#)), others have not ([Han et al., 2016](#)).

Reducing the hours of service is another approach utilized to curb violence, with some evidence of effectiveness ([Wilkinson et al., 2016](#)). However, in some cases, the earlier closure had impacts on violence in the establishments as opposed to on the streets ([Mazerolle et al., 2012](#)). Others have tried staggering closing hours of alcohol establishments, in an attempt to reduce crowd mixing which may increase violence, but this has not been shown to be very effective ([Humphreys & Eisner, 2014](#)). Other approaches include curbing irresponsible serving practices and binge drinking ([Lugo, 2008](#)), or creating internal designs that reduce crowded spaces ([Macintyre & Homel, 1997](#)). In sum, changing alcohol environments may be an effective place-based approach to violence prevention—with several options for change, some possibly being more efficacious than others.

Food establishments and access

Food access is a term that encapsulates the geographic availability of food sources in a community. This may include food deserts, areas with limited access to affordable and nutritious food, and food swamps, areas with a high concentration of largely unhealthy food options—such as fast-food restaurants and convenience stores ([Cooksey-Stowers et al., 2017](#); [Miller et al., 2021](#); [Ver Ploeg et al., 2009](#)). The US Department of Agriculture defines food security as having consistent and dependable access to enough food to maintain a healthy and active life ([Nord et al., 2006](#); [Ver Ploeg et al., 2009](#)). It is important to note that, although low-income neighborhoods are typically food deserts, food-insecure households may or may not reside in “food deserts” ([Berkowitz et al., 2018](#)).

Food insecurity has been found to be associated with an increased incidence of gun violence within communities. [Ali et al. \(2022\)](#) tested the association between food insecurity and rates of overall gun trauma in a large, Southern city using secondary, hospital, and parish-level (county) administrative data. They found that over 60% of patients with firearm injuries at the hospital lived in counties with high food insecurity. While there was no significant difference in mortality by level of food insecurity, patients residing in these regions were more likely to be a victim of assault with Level-1 trauma activation. Additionally, there was a significant association between food insecurity and firearm injury, with each percent increase in food insecurity being related to approximately 56 firearm-related injuries per 100,000 people and a 13% increased likelihood of the injury being classified as an assault ([Ali et al., 2022](#)).

This work aligns with previous findings by [Smith and colleagues \(2020\)](#) who investigated the relationship between low food access, low food access with no vehicle, food insecurity (low food access and low income), and gunshot injury incidence at the zip-code level in Atlanta, Georgia. All three variables were significantly associated with gunshot wound incidence—with a nearly three-fold increase in the risk for low food access areas (with or without a vehicle) and a four-fold increase in risk for food insecure areas ([Smith et al., 2020](#)).

Business improvement districts

BIDs aim to revitalize urban commercial areas that began to decline in the 1950s with suburban sprawl (Loukaitou-Sideris, 2000), BIDs devote resources to safety and security (Cook & MacDonald, 2011), and may impact crime and violence via partnerships with police departments, enhanced surveillance activities, and physical improvements in public spaces (e.g., increased street lighting, benches) (Hoyt, 2005).

In the U.S., much of this work to date has been conducted in Los Angeles and Philadelphia, with demonstrated impacts on crime. In an evaluation of the effects of BIDs on crime in Los Angeles neighborhoods, Brooks (2008) observed a significant drop in the number of serious crimes reported to the police between 1990 and 2002, compared to control neighborhoods that proposed BIDs but did not adopt them. Similarly, MacDonald and colleagues found significant decreases in robbery and violent crimes in areas of Los Angeles that adopted BIDs from 1994 to 2005 (MacDonald et al., 2009; MacDonald et al., 2010). MacDonald et al.'s (2009) study found an impact on the rate of robberies and homicides but not on other types of violent crime or property crime. They also observed minimal crime displacement and substantial cost savings in the crime reduction (Cook & MacDonald, 2011). This research team also examined the benefits to residents in a household survey and found that BIDs were not associated with decreased violent crime among youth living near a BID compared to those living in other neighborhoods (MacDonald et al., 2013).

In Philadelphia, Han et al. (2017) found that compared to census tracts without BIDs, those with BIDs experienced significant declines in public graffiti, illegal dumping, and disorderly conduct in their first 5 years of existence, but the effects were not significant in later years. Calanog (2006) found that between 1997 and 2002, census tracts with BIDs compared to tracts without BIDs in Philadelphia were associated with reductions in the rates of robbery, theft, and auto theft and that these reductions were sustained over time. However, there was no impact on violent crime (specifically, murder, rape, and aggravated assault) and there was some indication of crime displacement. In an analysis of commercial areas in Philadelphia with and without BIDs, from 1999 to 2002, Hoyt (2005) found that property crimes and thefts both differentiated and predicted BID areas from non-BID areas and that there was no observed diversion from commercial areas to residential areas. However, in this study, commercial areas with BIDs were significantly larger than those without BIDs, which may have explained differences in crime rates.

While BIDs may be a potential place-based approach and investment that could reduce crime, improve property value (Garodnick, 2000), and foster collective engagement (Brooks & Strange, 2011), there is more to understand about the wider impact of BIDs on adjacent residential neighborhoods and wealth-based inequities in service delivery (Briffault, 1999; Garodnick, 2000) as well as long-term housing equity (Hoyt, 2004).

Situational infrastructure

Situational crime prevention (SCP) utilizes specific technologies, products, and procedures to reduce opportunities for crime (and often specific categories of crime) and criminal decision-making (Clarke, 1995). Two of the most commonly employed are mechanical surveillance strategies of street lighting and closed-circuit television (CCTV) cameras.

Street lighting

Street lighting may not only alter the opportunity for crime but may also increase informal social control and community cohesion, which may reduce the risk of crime (Aiyer et al., 2015; Jacobs, 1961). Increased foot traffic and cohesion can also increase the number of potential targets for crime, however (Branas et al., 2018; Cozens et al., 2005). Nonetheless, street lighting's positive effects have been demonstrated, both in experimental and quasiexperimental studies.

In the first randomized controlled trial of its kind, Chalfin et al. (2022) observed the impact of a temporary street lighting intervention in New York City's 40 public housing developments that began in 2016. Compared to housing developments not randomized to the intervention, the lighting installation in treatment development led to a 35% reduction in outdoor index crimes during nighttime hours in the 6 months after the new lights were installed, persisting over 3 years (Mitre-Becerril et al., 2022). A systematic review of quasiexperimental studies of street lighting by Welsh and Farrington (2008) found that despite mixed evidence, on average, lighting reduced crime by more than 20%. Cross-sectionally, the presence of street lighting has been associated with a four-fold lower likelihood of homicide among youth (Culyba et al., 2016).

As with other place-based interventions, however, the impact of street lighting may vary in different environmental contexts that could be considered (e.g., type of existing lighting, population mix and heterogeneity, interaction with other environmental improvements) (Welsh & Farrington, 2008), particularly for firearm violence prevention (Muggey et al., 2022).

Closed-circuit television (CCTV) surveillance cameras

CCTV has emerged as a common crime prevention tool globally (Lai et al., 2019), although evaluation of the efficacy of this approach is lacking (Brown, 1995; Welsh & Farrington, 2008). CCTV cameras can be placed anywhere, including on personal property, but are commonly employed for crime prevention in public open spaces (e.g., city centers, parking lots, transit stations). Earlier reviews of CCTV's efficacy (Phillips, 1999) suggested that CCTV may be effective in deterring property crime, but the findings are mixed for personal and other types of crime. More recent reviews still suggest a complex picture of CCTV and crime reduction.

In a metaanalysis of 44 studies of CCTV program across several countries, Welsh and Farrington (2008) concluded that CCTV has a modest impact on crime and that it is more effective with concentrated when camera coverage, in car parks (particularly for car theft), and areas in the United Kingdom, and less effective in city centers, public housing, and public transport. They concluded that CCTV cameras did not have an impact on violent crime. Their updated review (Welsh & Farrington, 2009) suggested similar findings. It has been suggested that findings related to car parks may be due to other interventions within such settings (e.g., increased lighting, security) that may impact crime.

Evaluations in the U.S. reveal a mixed picture. For example, in an examination of crime within the viewshed of publicly funded CCTV cameras in Philadelphia, Ratcliffe and colleagues (2009) found that cameras were associated with a 13% reduction in crime compared to before camera installation, but this varied significantly by site. In Cincinnati, OH CCTV was also found to not be as efficacious as hypothesized, but they found greater results in residential areas with less mobility and limited accessibility from other high-density neighborhoods (Park, 2013). In a quasiexperimental study that examined the impact of police-monitored CCTV cameras on shootings and auto thefts, Caplan et al. (2011) observed statistically significant reductions in auto thefts within viewsheds after camera installations and significant reductions in the proportional share of shootings and auto thefts. Effects were seen in certain places, and they and others (La Vigne et al., 2011; Piza et al., 2014; Ratcliffe et al., 2009), have argued that CCTV effects should be evaluated at both micro- and macrolevels given that placement of the cameras matters.

The efficacy of CCTVs on crime may also be due to other surveillance barriers such as the lack of camera operators or differential response by police. Piza et al. (2015) conducted a randomized controlled trial that tested the impact of an additional camera operator deployed to monitor CCTV cameras and two patrol cars dedicated to exclusively responding to incidents detected on the cameras. They observed significant reductions in violent crime and social disorder in the treatment areas relative to the control areas.

As some areas are expanding coverage and upgrading to Intelligent CCTV (ICCTV) or “smart” CCTV supplemented with facial recognition and other capabilities, it will be important to continue to consider the ethical implications of this technology (Taylor & Gill, 2014).

Transportation infrastructure

The impact of transportation infrastructure on firearm violence is understudied, although research has established a relationship between transportation access and availability, and crime within the United States. While we review only a few transportation components that have been shown to impact community violence—public transportation and street connectivity—it is important to note that other aspects have been studied in relation to structural and systemic factors, illustrating the lasting impact of disinvestment on communities.

Public transportation

The introduction of public transportation infrastructure is often unpopular due to fear that it will increase crime rates. Previous research has presented conflicting findings, and more research is needed to understand whether public transportation interventions increase crime, particularly violent crime. For example, Bowes and Ihlanfeldt (2001) determined that increased transit systems were associated with increased economic development, rising property values, and increased crime. Similarly, in a time series analysis of criminal incidents following new Metropolitan Atlanta Rapid Transit Authority station openings, Poister (Cerdá et al., 2012) observed a temporary increase in reported crimes but then a decline to the preintervention levels. On the other hand, Ridgeway and MacDonald (2017) used a stepped-wedge design and found no evidence that transit station openings or disruptions in transit in Los Angeles, CA between 1990 and 2012 resulted in crime. Similarly, a quasiexperimental study looking at crime in neighborhoods with and without light rail train stations, Billings and colleagues (2011) found no difference in crime around stations. In fact, they saw a decrease in property crimes when the station was announced, which remained stable after the light rail opened.

Aspects of public transportation locations (e.g., adequate lighting) and the placement of such locations may also be utilized in place-based approaches. For example, an analysis of crime rates around a sample of 60 bus stops in downtown Los Angeles observed higher rates for bus stops near alleys, multifamily housing, liquor stores and check-cashing establishments, vacant buildings, and graffiti and litter; and lower rates around stops with good visibility of the bus stop and the existence of bus shelters (Loukaitou-Sideris, 1999).

Furthermore, more hyperlocal transportation infrastructure for pedestrians such as highlines, walkways, and greenways may also have an impact on crime and violence. While limited, many of the existing studies have examined the impact of vegetation on streets and walkways, with the majority finding that increased vegetation decreased crime (Shepley et al., 2019), but likely variable based on the type of vegetation and aspects of placement.

Street patterns and connectivity

Street patterns and connectivity may be an additional place-based approach for prevention, given that violent crimes tend to occur more on streets that are accessible and connected (Braga et al., 2011), increasing potential offenders' activity and awareness space, thereby giving them a larger selection of prospective targets and happenstance opportunities for crime. There are varying street configurations, such as no-through streets, one-way streets, and cul-de-sac designs, as well as features such as roadblocks, speed bumps, and gates that may impact the level of crime in an area.

For example, in an evaluation of a one-way to two-way street conversion in Louisville, Kentucky, Riggs and Gilderbloom (2016) observed reduced crime rates following the change. In a follow-up cross-sectional mixed methods study, Riggs and Gilderbloom (2017) found that one-way multilane streets experienced greater abandonment, lower housing values, and slower increases in property values.

Permanent traffic barriers may also reduce violent crime levels, Lasley (1996) evaluated Operation Cul-de-Sac, which involved traffic barriers in 14 streets installed by the Los Angeles Police Department in 1990. The evaluation found reduced rates of assault and murder by 15%–20% in intervention versus control areas and an increase in crime to preintervention levels when the barriers were removed. In Hartford, Connecticut, an examination of violent crime incidents 15 months postinstallation of a single street barrier on a previously violent street revealed a 33% decline in violent crime and a 50% decline on adjacent streets (Zavoski et al., 1999).

Urban revitalization efforts have also aimed at improving alleyways, a common street connector which has been associated with vacant and abandoned property and crime (Seymour et al., 2010). While research is limited, one metaanalysis found that alley gating was associated with modest but significant reductions in burglary, and little evidence of geographic displacement (Sidebottom et al., 2018).

Transportation infrastructure highlights the importance of engaging interdisciplinary and cross-sectoral collaborations at the city planning and policy levels in place-based strategies for violence prevention.

Education and healthcare infrastructure

Like other types of infrastructure previously discussed in this chapter, education and healthcare infrastructure within a community have been linked to crime and violence; however, there is a limited understanding of how these facilities are associated with firearm violence specifically.

Educational infrastructure

While criminological theories such as routine activities (Cohen & Felson, 2010) suggest that middle and high schools may generate more crime in neighborhoods, schools are important neighborhood institutions. Nonetheless, studies have demonstrated higher crime rates in areas with schools (Murray & Swatt, 2013; Willits et al., 2013) but many were cross-sectional in nature and had limited longitudinal information. School openings and closings offer a natural experiment to test the relationship between schools and crime and violence. MacDonald et al. (2018) examined in a difference-in-differences analysis, the impact of the opening of 59 charter schools and 24 public schools on crime in the surrounding neighborhoods in Philadelphia. While many effects were null, and no significant change was observed for violent crimes, the authors did find that a public school opening in an area, compared to areas where a school was always present, led to a statistically significant decline in the predicted total crime counts within a one-tenth-mile radius.

In an evaluation of Catholic school closures in Chicago, Brinig and Garnett (2012) examined incidents of crime surrounding the closures between 1990 and 96 and observed a slower decline in crime in these areas (defined by police beats) relative to areas with no closures. In a separate analysis, the authors also compared changes in crimes surrounding Catholic

schools that closed and Catholic schools that were replaced by charter schools and found no change in crime rates surrounding charter school transitions (Brinig & Garnett, 2012). However, school openings/closures are likely strongly influenced by community factors and therefore selection effects, and the impact on crime and violence may also be influenced by the level of resources within and surrounding a given school—including the location of other commercial facilities that may influence crime and violence. The quality of educational resources, including equipment, facilities management, course offerings, and student access to mental and physical health resources (i.e., counselors, nurses, etc.) significantly vary based on the fiscal resources available. As such, schools, as well as other place-based infrastructures such as transportation systems and healthcare facilities, are strong indicators of the structural investment within communities, and the quality of such environmental factors must also be considered.

In addition to openings and closings, one place-based approach to reducing violence—and firearm violence specifically—around schools has been the inclusion of Gun-Free School Zones (GFSZs), as a result of the Gun-Free School Zones Act passed by Congress in 1990 (Barrett & Brooks, 2017). The Act criminalizes possessing or discharging a firearm within a 1000-ft perimeter of a K-12 school. Like drug-free school zone laws, the Act sought to prevent gun violence beyond school campuses and into the immediate surrounding areas, and awareness of the law often comes in the form of signage on and around the school campus. Signs restricting or prohibiting certain actions have been effective at preventing several risky health behaviors such as smoking, and the recent studies on drug-free school zones have demonstrated an association with reduced crime at or near schools with such signage as well as monitoring and punishment (Gonzalez et al., 2022; Robinson & Rengert, 2006). While the GFSZ Act was intended to make schools safer, many studies have shown that it has created a zero-tolerance policy system within U.S. schools that allows for nationwide discriminatory discipline—even for ridiculous infractions such as Nerf guns or fake dance team rifles—particularly for nonwhite students, which may only further increase the risk of violence and other negative outcomes (Cerrone, 1999). Few studies, however, have examined empirically the impact of the presence of zones on firearm violence and none to date have examined the impact of signage itself. In a recent analysis, Reeping (Reeping, 2022) found that gun-free school zones had fewer crimes committed with a firearm than corresponding gun-allowing zones in St. Louis, MO in 2019 and that the conditional odds of an active shooting in an establishment that was gun-free was nearly three times lower than in a gun-allowing establishment. While much work needs to be done around the implementation of the GFSZ Act in schools and unfair zero-tolerance policies, there may still be promise for the prevention of firearm violence with such zones and signage.

Future research should also investigate specific contexts and mechanisms, such as land-use characteristics and travel patterns to schools, which may also interact with specific school settings in ways that are related to crime production and firearm violence.

Healthcare infrastructure

Although extremely understudied, the healthcare landscape and location of facilities in a community may be another place-based approach to prevention, given the role that—in addition to increased community organizations and eyes on the street may have—attending to the mental and physical health needs of a population may do for crime and violence prevention. While some healthcare locations such as hospitals, pharmacies, and drug treatment facilities have been linked to higher rates of violence around these facilities (Douglas et al., 2020; Furr-Holden et al., 2016), few studies have examined the change in such place-based facilities and crime and violence.

Given that only 26% of the US population's mental healthcare needs are met (Kaiser Family Foundation, 2018), increasing the availability and accessibility of mental health services may have an impact on crime and violence as demonstrated by Deza, Maclean, and Solomon (Deza et al., 2022), who found that increasing the number of mental healthcare offices in a community reduced crime; specifically, by 1.6 crimes per 10,000 residents.

In addition to mental healthcare facilities, there are other healthcare entities, such as community clinics, private practices, and urgent care facilities that may also help reduce crime rates within a community. In a staggered difference-in-differences analysis, examining the impact of community healthcare center openings, Marthey (2022) observed a decline in crime, especially in counties with new openings and also the expansion of Medicaid. Community-based centers also provide screening locations that may prevent the spread or escalation of violence (Schubert et al., 2023).

Social infrastructure

Social capital is defined as the norms, networks, and mutual trust that foster cooperative action among individuals and institutions (Perkins et al., 2002). Social infrastructure is the spaces and places in neighborhoods, towns, and communities that help build social capital. Public libraries, community centers, community gardens, playgrounds, parks, athletic fields,

and swimming pools are parts of the social infrastructure. They are the spaces that bring people with shared geography into the public realm (Latham & Layton, 2019).

An analysis of social and built infrastructure characteristics associated with gun crime in four U.S. cities (Muggy et al., 2022) found that schools, colleges, and universities were a repellant feature of all but one of the cities observed. It could be that these institutions promote norms, networks, and mutual trust that can prevent or mitigate the occurrence of gun violence in the neighborhoods surrounding school, college, and university campuses. This has also been examined in South Africa. A retrospective analysis of a violence prevention program through urban upgrading found that the development social infrastructure (e.g., a library, business resource center, and neighborhood information facility) and open public spaces (e.g., a square, park, and sports fields) were associated with reduced resident exposure to interpersonal violence (Matzopoulos et al., 2020).

Studies using participatory methods with adults and youth have found that places such as museums, churches, addiction recovery agencies, community recreation centers, and spaces for cultural and artistic expression, entrepreneurship, job skill training, and development were all types of the social infrastructure associated with violence mitigation and prevention (Dodginton et al., 2012; Graham et al., 2013).

Multiple studies have investigated whether social infrastructure such as basketball courts and skate parks are associated with community violence. Sport can prevent crime through two modes: averting and social change (Ekholm, 2013). The averting mode aims to deter involvement in criminal activity, while the social change mode aims to change the circumstances that cause crime and violence (Ekholm, 2013). Research on midnight basketball programs is scarce, however preliminary research on early adopters in U.S. cities found larger declines in both violent crime and property crime rates compared to cities without these programs (Hartmann & Depro, 2006). Others have argued more recently that midnight basketball programs were products of neoliberal social policy that sought inexpensive individualistic solutions to structural contributors to violence and crime in urban communities (DeLand, 2018; Hartmann, 2019). There is room for further investigation of midnight basketball and other sport as social infrastructural prevention of firearm violence prevention.

Conclusion

The evidence presented in this chapter suggests that promising, often low cost, built environmental changes can play a significant role in firearm violence prevention. Some of this research is quite well developed and perhaps more so than most other firearm violence intervention research efforts, which most often do not include randomized controlled trials or quasiexperimental study designs for entire cities. However, much of this research is still emerging for many interventions, and specifically on the impact on firearm violence, much also remains to be learned about each approach, such as where and how they work best, and under what conditions or moderating factors. Strong evaluative approaches are also needed in many areas to fully evaluate their effectiveness. Finally, this is not an exhaustive review and there are so many aspects of the built environment that may impact community safety, including the role of public art and murals for instance, and these should be examined in future work.

Also essential in the consideration of any place-based approach is the potential for further neighborhood gentrification and displacement of residents due to unforeseen and unintended effects. It is important to explore strategies to mitigate displacement, including affordable housing, engaging community members in the approaches taken, and ensuring that the development of new spaces and places is welcoming to all (Rigolon et al., 2018; Serrano et al., 2023).

Place-based approaches represent an opportunity not only to reduce violence but also other health-related and social outcomes by reinvesting in neighborhoods, and to bring together multiple sectors, including city leaders and planners, together to address complex conditions such as community firearm violence.

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Psychosocial interventions for children and adolescents with conduct problems

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In children and adolescents, conduct problems (CP) comprise a range of oppositional and antisocial behaviors that violate the rights of others and conflict with societal norms (McMahon & Frick, 2019). DSM-5-TR diagnostic categories representing CP include oppositional defiant disorder (ODD) and conduct disorder (CD; American Psychiatric Association [APA], 2022). ODD is characterized by a pattern of angry and irritable mood, and argumentative, defiant, and vindictive behaviors, whereas CD is operationalized as aggression toward people and animals, destructiveness and deceitfulness, and serious violation of rules or laws. Childhood-onset CD is also distinguished from adolescent-onset CD with age 10 as the cutoff. In the DSM-5 (and continued in DSM-5-TR), a “with Limited Prosocial Emotions” specifier was added to the CD diagnostic criteria to designate those children and adolescents who also display a callous absence of empathy and remorse, shallow or narrow affect, and deficient concern regarding performance in activities (APA, 2013, 2022). In research settings, this specifier is commonly referred to as callous-unemotional (CU) traits (Frick et al., 2014). CU traits comprise the affective facet of psychopathy, with the other three facets of psychopathy including the interpersonal facet (e.g., narcissism, manipulateness), lifestyle facet (e.g., impulsivity), and antisocial facet (e.g., antisocial behavior) (Thomson, 2019). Children and adolescents with CP and normative CU traits/psychopathy typically exhibit elevated levels of emotion dysregulation and impulsive aggression to provocation (Frick & Viding, 2009). By contrast, those with heightened CP and CU traits or psychopathy are instead discerned by a fearless temperament reflected as emotional hypoactivity and often greater aggression severity (Fanti et al., 2016; McMahon et al., 2010; Ribeiro da Silva et al., 2020).

CP are among the most common mental health difficulties experienced during childhood and adolescence with worldwide estimates placing the prevalence of CP diagnostic categories at 5.7% (Polanczyk et al., 2015). Throughout the lifespan, CP are associated with significant economic costs, elevated risk for mental and physical health problems, poorer educational and occupational outcomes, and greater violent and criminal behavior (Bevilacqua et al., 2018; Goulter et al., 2023; Rivenbark et al., 2018). Because of the severe societal burden, several psychosocial preventive and treatment interventions have been developed targeting CP. In this chapter, we begin by synthesizing the literature on evidence-based psychosocial interventions for children and adolescents with CP. We focus on family-based interventions, including parent management training (PMT), Multisystemic Therapy (MST), and Functional Family Therapy (FFT), and multicomponent interventions, with a specific focus on interventions targeting CU traits and psychopathy. In this section, we provide a brief description of the theoretical underpinnings and therapeutic components of interventions, as well as highlighting intervention effects in relation to CP, gun violence, gang affiliation, and criminal legal system-involved samples. We then briefly describe the evidence regarding tests of logic models, including key mediators (family, parenting, and child factors) and moderators (intervention, child and parent, and environmental characteristics) of intervention effects. Next, we outline the effective components of psychosocial interventions, specifically focusing on personalization across three strategies: Implementing interventions that target risk factors across multiple systems, employing modular approaches, or adapting interventions for specific subgroups. Finally, we conclude by providing recommendations for future research to address gun violence in children and adolescents.

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Overview of psychosocial interventions

Family-based interventions

Family-based interventions for CP are those that include caregivers as active participants in the intervention (Sheidow et al., 2022). The types of interventions that fall under this umbrella category include behavioral therapy, comprising PMT or Behavioral Parent Training programs, with or without child involvement; cognitive-behavioral therapy (CBT) approaches; and family therapy approaches (Sheidow et al., 2022). Many interventions use a combination of these approaches, known as multimodal interventions.

Parent management training

PMT, also known as Behavioral Parent Training, is the recommended first-line approach for treating CP in children younger than 12 years (Sheidow et al., 2022). There are several “brands” of PMT with an established evidence base, including Generation PMT—Oregon (GenerationPMTO; Forgatch & Gewirtz, 2017); Helping the Noncompliant Child (McMahon & Forehand, 2003); Incredible Years: BASIC Parenting Programs (Webster-Stratton & Reid, 2017); Parent–Child Interaction Therapy (PCIT; Zisser-Nathenson et al., 2017); PMT and Problem-Solving Skills Training (Kazdin, 2017); and Triple P-Positive Parenting Program (Sanders & Mazzucchelli, 2018). Broadly speaking, these PMT programs have consistent theoretical underpinnings, with most programs grounded in social and operant learning theories. Operant learning involves behavior learned via reinforcement and punishment processes, whereby behavior is more or less likely to reoccur based on whether it receives a positively or negatively valenced consequence (Skinner, 1953). Social learning theory describes how behaviors are observed and then imitated or modeled (Bandura, 1965). Consistent with these principles, PMT conceptualizes CP as a result of bidirectional, coercive processes that occur during parent–child interactions (Patterson, 1982). PMT aims to disrupt coercive parent–child cycles by reshaping parent behaviors and perceptions that occur in response to disruptive child behaviors. Accordingly, caregiver behaviors and responses are positioned as central to the development, maintenance, and resolution of CP. Parents are trained in behavior management strategies to monitor and supervise child behavior; provide positive reinforcement for prosocial behaviors; use differential attention approaches for socially-maintained behaviors (e.g., strategic ignoring); and implement effective, predictable, and consistent discipline strategies following disruptive behavior (e.g., time-out from positive reinforcement).

Some PMT programs also position deficits in the quality or strength of the parent–child relationship as central to the development and maintenance of CP, based on research linking attachment quality and CP (e.g., Fearon et al., 2010). Accordingly, these programs incorporate strategies to strengthen the parent–child relationship and increase parents’ capacity to sensitively respond to their child’s needs, such as regular child-directed play, parent–child communication skills, and emotion coaching (Leijten et al., 2018). PMT programs comprising both relationship-building and behavior management usually follow a two-stage approach to treatment in which (1) parents are taught relationship-building skills, which is intended to enhance the effects of the (2) behavior management phase of treatment (e.g., Helping the Noncompliant Child; Leijten et al., 2018). Consistent with their emphasis on the parent–child relationship, these programs differ from more ‘classic’ PMT programs (e.g., GenerationPMTO) by involving the parent–child dyad in most sessions. PMT programs also differ in dosage (i.e., 1–36 h; Beelmann et al., 2023), treatment modality (e.g., video materials, didactic training, role-play, in vivo coaching), and delivery format (e.g., self-directed, group, individual).

Overall, PMT has demonstrated efficacy and effectiveness in improving CP, including when delivered via telehealth (Dadds, Thai, et al., 2019; Fleming et al., 2021; Florean et al., 2020). One meta-analysis found that preventive and indicated parent training programs had significant moderately-sized effects on child CP ($d=0.47$) and parent or family outcomes ($d=0.46$) at postintervention (Beelmann et al., 2023). Effect sizes for PMT tend to increase as intervention intensity (i.e., dosage, degree of therapist involvement, child involvement) increases (Fleming et al., 2021). For example, the addition of therapist support via telephone to online, self-directed Triple P resulted in significantly greater improvement in CP than online Triple P alone (Day & Sanders, 2018). Similarly, augmenting standard PCIT with a multimedia ebook resulted in enhanced treatment effects compared to standard PCIT (Jent et al., 2021), while augmenting Helping the Noncompliant Child with an interactive mobile application resulted in superior maintenance of gains in CP during the follow-up period compared to the standard program (Parent et al., 2022). More generally, however, the evidence for the maintenance of PMT effects is mixed. Some studies reported non-significant reductions in effects for CP (follow-up period range of 1 month to 3 years; van Aar et al., 2017) and parent outcomes (follow-up period range of 1 month to 6 years; Weber et al., 2019) from posttreatment to follow-up, while studies using fixed follow-up time periods found that effect

sizes reduced over time for CP and parent outcomes (follow-up period range of 3–12 months vs. 12 months or more; [Beelmann et al., 2023](#)). Establishing the long-term effectiveness of PMT is critical given that early-onset CP are associated with detrimental long-term outcomes into adulthood ([Bevilacqua et al., 2018](#); [Goulter et al., 2023](#); [Rivenbark et al., 2018](#)). Similarly, it will be important to see how PMT can impact gun violence, given CP increases the risk for gun violence during adolescence, especially among individuals who experience socioeconomic disadvantage (e.g., [Beardslee et al., 2021](#)). To date, however, no studies have investigated whether PMT interventions reduce the risk of gun violence during adolescence.

Despite their established efficacy for younger children, behavior therapy approaches such as PMT lack an established evidence base for adolescents with CP ([Sheidow et al., 2022](#)). Indeed, there are limited evidence-based treatments for adolescents with CP but those treatments that are effective for adolescents include approaches that involve the child, parent, and family, and these are considered most effective when implemented with legal system-involved adolescents ([Sheidow et al., 2022](#)). These include Multisystemic Therapy (MST) and Functional Family Therapy (FFT).

Multisystemic therapy

One such intervention is MST ([Henggeler et al., 2009](#)), which has received empirical support for improving delinquency among 12–17-year-old adolescents with severe CP ([van der Stouwe et al., 2014](#)). Grounded in the social-ecological model ([Bronfenbrenner, 1986](#)), the core theoretical tenet of MST is that juvenile delinquency and other serious problems occur due to a complex set of risk factors from multiple individual and contextual systems that interact to increase vulnerability ([Henggeler & Schaeffer, 2016](#)). Accordingly, MST targets risk and protective factors at the level of the individual (e.g., cognitive biases), family (e.g., poor parental monitoring), peers (e.g., association with antisocial peers), school (e.g., non-attendance), and neighborhood (e.g., exposure to violence; [Henggeler & Schaeffer, 2016](#)). The MST theory of change specifies that improved family functioning impacts peer, school, and neighborhood risk factors, which in turn reduces delinquency and increases prosocial behavior ([Henggeler, 2011](#)). Accordingly, MST positions caregivers as central to the resolution of CP, incorporating strategies to improve parenting skills (e.g., monitoring and supervision, parent–child communication) and building parents’ capacity to act on risk factors operating at other system levels (e.g., communication with teachers; [Henggeler, 2011](#)). Other core elements of MST include individualization of services by targeting only relevant risk factors; implementation of services in relevant settings (e.g., home, school); flexible and consistent access to MST therapists; and ongoing quality control via supervision and outcome monitoring ([Henggeler, 2011](#)). MST is time-limited (4–6 months), intensive (40–60 h of contact with therapists), and integrates strategies from various therapeutic orientations, including family therapy, PMT, and CBT ([Henggeler, 2011](#)).

Regarding the efficacy and effectiveness of MST, meta-analytic evidence indicates that MST improves delinquency, as well as family and peer outcomes, psychopathology, substance use, and out-of-home placement, all with significant but small-sized effects ($ds = 0.14–0.29$; [van der Stouwe et al., 2014](#)). There is also evidence for the maintenance of gains following MST. For example, in an initial RCT, MST was superior to individual counseling in improving adolescent CP, mental health symptoms, and recidivism, as well as family functioning ([Borduin et al., 1995](#)). Subsequent long-term follow-ups found that participants receiving MST continued to have better recidivism outcomes at 13.7 ([Schaeffer & Borduin, 2005](#)) and 21.9 years after treatment when compared to participants in the control group ([Sawyer & Borduin, 2011](#)). However, this study was undertaken in the US, and moderation analyses indicate that effects on delinquency and out-of-home placements tended to be larger for youth in the US, as well as when adolescents were younger than 15 years, or not belonging to an underrepresented ethnic group ([Littell et al., 2021](#); [van der Stouwe et al., 2014](#)). [Littell et al. \(2021\)](#) suggested that the inconsistency in findings occurred because the services received in the US as part of the ‘treatment-as-usual’ control group were of poorer quality (e.g., [Henggeler et al., 1992](#)) compared to the quality of the control group services in other countries where universal healthcare and social services are more readily accessible, such as Canada (e.g., [Leschied & Cunningham, 2002](#)), the UK (e.g., [Fonagy et al., 2018](#)), and Sweden (e.g., [Sundell et al., 2008](#)). Moreover, there is some evidence that subgroups of adolescents may receive less benefit from MST, such as youth involved with gangs. Evidence-based interventions targeting this subgroup are critical given the robust association between gang involvement and criminal offending, including gun crime ([Pyrooz et al., 2016](#)). There is some evidence that gang-involved adolescents are more likely than their non-gang-involved peers to ‘fail out’ of MST due to poor engagement or re-arrest ([Boxer et al., 2015](#)). However, to date, no studies have investigated the effectiveness of MST for reducing gun violence or risky gun behaviors, specifically. Overall, while there is some support for the effectiveness of MST for adolescents involved in the legal system ([Sheidow et al., 2022](#)), evidence is more mixed among youth with higher criminogenic risk and specific backgrounds (i.e., ethnicity).

Functional family therapy

FFT (Alexander et al., 2013) is another family-based intervention that has received some support. FFT was developed for 11–18-year-old adolescents with moderate to severe CP, with some evidence to support its efficacy with adolescents involved in the legal system (Sheidow et al., 2022). FFT positions dysfunctional family relations as central to the development, maintenance, and resolution of adolescent CP. Accordingly, the intervention aims to understand family relationship patterns and produce behavioral change via five distinct phases: (1) Engagement, which aims to maximize the likelihood of family participation; (2) Motivation, which aims to shift family dynamics and perceptions away from anger and blame and toward hope; (3) Relational Assessment, which aims to identify the relational functions underpinning the behaviors, cognitions, and feelings of each family member; (4) Behavior Change, which aims to build new skills to achieve these relational functions adaptively; and (5) Generalization, which aims to extend new skills to the other settings to prevent relapse and enhance community support (Alexander et al., 2013). During the Behavior Change phase, intervention can involve a variety of strategies, including communication training, problem-solving, parent training, anger management, and modules focused on specific problems, such as substance use or depression (Alexander et al., 2013). In this way, FFT is grounded in a combination of systemic and cognitive-behavioral theories (Robbins et al., 2016). FFT is relatively short-term, comprising an average of 12–14 weekly family sessions delivered in the home or clinic by a small team of therapists (Robbins et al., 2016).

Meta-analytic data supports that FFT outperformed no treatment ($d=0.48$) and alternative and well-defined treatments ($ds=0.35$ – 0.75 ; e.g., CBT) in improving behavioral and substance use outcomes (Hartnett et al., 2017). However, FFT was not superior to treatment-as-usual strategies, which was perhaps related to the intensity or specialization of these services, although this meta-analysis was limited by a small number of eligible studies and heterogeneity in outcome constructs (e.g., recidivism, drug use; Hartnett et al., 2017). Overall, research on FFT appears to support its capacity to reduce juvenile delinquency, with more modest effects on substance use, placement in out-of-home care, and hospitalization (Weisman & Montgomery, 2019). There is also some support for the generalizability of these effects outside the US. For example, in a community study of 687 families living in Denmark, participation in FFT was associated with small to moderately sized improvements in parent- and adolescent-rated CP, family functioning, and school engagement (Vardanian et al., 2020). However, consistent with both the Hartnett et al. (2017) meta-analysis and MST literature, a study comparing FFT to high quality treatment-as-usual services provided in the UK did not find better outcomes for families randomly allocated to FFT, although both groups significantly improved in offending and CP (Humayun et al., 2017). A nascent evidence base supporting the potential of FFT adapted to address difficulties associated with gang involvement suggests that personalization of care may enhance the effectiveness of standard FFT. Unlike MST, FFT was specifically adapted to address the needs of adolescents involved or at risk of involvement with gangs. Called FFT-Gangs (FFT-G; Thornberry et al., 2018), this adaptation retains the core components of standard FFT but also involves greater pre-treatment preparation through engagement, as well as a specific focus on addressing ongoing pressure from school and neighborhood (e.g., replacing links with gang members with prosocial peers and community resources; Thornberry et al., 2018). The results of an initial RCT comparing FFT-G to treatment-as-usual were mixed. FFT-G more effectively reduced criminal offending for adolescents at high risk of gang involvement than treatment-as-usual (i.e., regular probation and referral to an alternative family therapy program), although it did not appear to be more effective at reducing the level of gang membership (Thornberry et al., 2018). For adolescents at low risk of gang involvement, there were few significant differences between the FFT-G and treatment-as-usual group in recidivism outcomes (Thornberry et al., 2018). While results generally favored FFT-G over treatment-as-usual, methodological issues (e.g., sample size, contamination of study conditions) likely affected the strength of the findings. While FFT-G was designed to target gang involvement, there are no studies testing its effectiveness on gun violence and risky gun behaviors. This is true of family-focused interventions for CP more generally, with little known about effective methods for reducing gun violence at the individual level (Huey & Satinsky, 2023).

Multicomponent interventions

Multicomponent interventions typically include a family-based intervention plus individual skills training, such as CBT approaches (e.g., social-information processing and problem-solving skills training), to address social-cognitive processing styles (McCart & Sheidow, 2016). As children transition into adolescence, peer interactions become increasingly important, and social-cognitive models posit that high-risk children are more likely to encode social information from these interactions as hostile (i.e., hostile attribution bias; Lochman & Dodge, 1994). These children also tend to apply maladaptive solutions to social problems and overestimate the success of aggressive solutions. Several multicomponent interventions have been implemented within school settings; however, these school-based interventions vary with respect to being prevention versus treatment focus and universal versus targeted in scope.

Incredible years

The Incredible Years is a well-validated training series for parents, teachers, and children, which aims to promote social and emotional skills and prevent and treat behavioral problems (Webster-Stratton & Reid, 2017). As noted, Incredible Years: BASIC comprises a PMT component, which includes video demonstrations of parenting skills shown to groups of parents, including psychoeducation about child development, social learning, and positive parent–child relationships principles (Webster-Stratton, 2006). A school-focused adjunctive module was also developed to foster children’s self-confidence, school readiness, and academic success (Webster-Stratton & Reid, 2017). In addition, founded on research linking parental interpersonal factors and child CP, a 10–12 session ADVANCE adaptation was specifically designed to target parent conflict issues (e.g., sessions on personal self-control and communication; Webster-Stratton, 2006). When children enter school, difficulties with peer and teacher interactions can heighten CP, and thus, the 6-day group-format Incredible Years teacher training program aims to promote teachers’ classroom management skills, use of effective discipline, and ability to teach social and problem-solving skills, as well as foster positive relationships with students and parents (Webster-Stratton & Reid, 2017). Finally, the Dinosaur School program comprises small groups of children who receive a social and problem-solving skills intervention for 2 h per week for 22 weeks (Webster-Stratton & Reid, 2017). Through seven main components (i.e., introduction, empathy and emotion, problem solving, anger control, friendship skills, communication skills, and school skills), the training aims to strengthen children’s self-regulation strategies, emotional awareness, self-confidence, and social skills.

Regarding the efficacy and effectiveness of Incredible Years, most research has focused on the BASIC program. One meta-analysis found that Incredible Years improves parent-reported ($d=0.30$) and observed ($d=0.37$) CP (Menting et al., 2013), while an individual participant data meta-analysis showed that Incredible Years had effects on both parent-reported CP ($d=0.35$) and ADHD ($d=0.30$; Leijten et al., 2018). Unlike MST, some evidence has demonstrated the cross-cultural effectiveness of Incredible Years (Leijten et al., 2016). In support of its multicomponent approach, studies have shown that combining the PMT program with child and teacher components resulted in enhanced effects (for a review, see Webster-Stratton & Reid, 2017). Critically, there is also evidence that Incredible Years is beneficial for children from homes with a family history of antisocial behavior and disrupts the development of serious antisocial behavior. For example, one study found equivalent improvements in child CP across groups characterized as with and without familial histories of externalizing behaviors (Presnall et al., 2014). Another study demonstrated that participation during early childhood was associated with lower levels of substance use, delinquency, and criminal legal system involvement commensurate with national norms during adolescence (Webster-Stratton et al., 2011), although gun violence was not assessed.

Coping power

Coping Power is an indicated intervention comprising both parent and child components targeting CP among early adolescents (ages 8–14 years; Lochman et al., 2019). The program has been adapted for implementation within both school and clinic settings serving as both targeted preventive intervention and treatment for children identified by parent and teacher ratings on CP. Like MST, Coping Power is grounded in ecological and developmental theories suggesting that children’s behavior is the consequence of both contextual influences (i.e., family context) and individual characteristics (i.e., social cognitive processing) (Bronfenbrenner, 1986). Typically delivered in a small group format, parents attend 50–75-min group sessions every 2–3 weeks for 16 sessions. Sessions span topics on child academic skills, stress management, positive parenting behaviors, antecedent control and discipline, and family communication and problem-solving techniques (Lochman et al., 2019). In the original school-based format, children attend 34 50–60-min small group sessions weekly for two academic years, as well as individual sessions every 4–6 weeks. Child sessions focus on academic skills, emotional awareness and coping, perspective-taking, social problem-solving, and deviant peer affiliation (Lochman et al., 2019). In clinic settings, abbreviated 15–25 session versions have been implemented with success (e.g., van de Wiel et al., 2007).

Several studies have found support for the efficacy and effectiveness of Coping Power in reducing child CP. For example, in one study, high-risk aggressive boys were randomly allocated to either the child component-only, a combined child and parent components, or a no treatment control group (Lochman & Wells, 2004). Children who received either child component-only or combined components displayed fewer delinquent behaviors and less substance use at 1-year follow-up, relative to children in the control condition. Notably, intervention effects were greater in the combined condition. In a clinical sample, Dutch children with disruptive behavior disorders were randomly assigned to receive Coping Power or standard family therapy (van de Wiel et al., 2007). Although both groups showed significant improvements in CP, children allocated to Coping Power demonstrated greater reductions in overt aggression at posttreatment and 6-month follow-up. The children who received Coping Power also demonstrated lower levels of substance use 4 years later, relative to the care as usual group (Zonneville-Bender et al., 2007). Regarding the theory of change, evidence indicates that the risk for

antisocial behavior was mediated by decreases in children's hostile attributions and increases in anger control (Lochman & Wells, 2002). Regarding long-term effects, children allocated to Coping Power showed greater reductions in CU traits and substance use compared to children in the control condition 6 years after treatment initiation (Muratori et al., 2019). However, studies are yet to examine whether participation in Coping Power reduces risk for gun violence.

Fast track

Another multicomponent intervention that has a school-based component is Fast Track (Conduct Problems Prevention Research Group [CPPRG], 2020). Compared to Incredible Years and Coping Power, Fast Track was more comprehensive and implemented over a 10-year period. Between 1991 and 1993, 55 high-risk schools were selected based on crime and poverty rates of their communities across four sites (Durham, NC; Nashville, TN; rural Pennsylvania; and Seattle, WA; CPPRG, 2020). Within each site, clusters of schools were randomly assigned to intervention or control conditions. Also grounded in ecological and developmental theories emphasizing multiple influences on child behavior, Fast Track targeted two critical points in development: School entry and emerging adolescence. In elementary school (grades 1–5), the intervention targeted CP within the home and school, social-cognitive and problem-solving skills, peer relations, academic skills, and the family-school relationship. Parent and child group interventions were conducted during a 2-h enrichment program. These sessions included social skill training 'friendship groups' (Bierman et al., 2017), parent-training groups, and guided parent-child interaction sessions (McMahon et al., 1996). Paraprofessionals also provided academic tutoring, as well as peer-pairing sessions to improve friendships. In addition, a universal intervention (a modified, grade-level version of the Promoting Alternative Thinking Strategies [PATHS] curriculum; Greenberg et al., 2011) was provided to the classrooms in intervention schools through the elementary school years to promote social and emotional competence. The universal intervention included weekly teacher consultation for lessons and classroom behavior management (Bierman et al., 2017). During the middle and early high school phase (grades 6–10), there were three standard prevention activities: The middle school transition program, parent and youth groups on adolescent topics, and youth forums. Adolescent developmental issues were addressed with four meetings for parents and youth during grade 6. Parent groups focused on issues such as positive involvement and monitoring, and youth groups focused on issues such as coping with peer pressure. Parents and youth met together in groups to address romantic relationships and sex education, substance use, and vocational goal setting. In grades 7 and 8, eight Youth Forums were held with youth in small groups to address vocational opportunities, budgeting and life skills, job interview skills, and summer employment opportunities. In grades 7–10, individualized intervention plans were developed and implemented with each youth, based on regular assessments of risk and protective factors, conducted three times each year.

Participation in the Fast Track intervention was associated with lower levels of CP and associated behaviors across several developmental periods. Throughout elementary school, parents and teachers reported less aggressive and oppositional defiant behavior among children receiving the intervention relative to children in the control groups (CPPRG, 1999, 2002). In addition, the Fast Track intervention was associated with reduced self-reported delinquency in grade 9, as well as decreased parent-reported CD diagnoses in grades 3 through 12 among those with the highest kindergarten-assessed risk of CP (CPPRG, 2007, 2011). Relative to the high-risk control group, youth assigned to the intervention were less likely to have juvenile arrest records, and a decreased probability of being in a higher severity-weighted juvenile arrest group through the end of high school (CPPRG, 2010). A decomposition of treatment effects showed that Fast Track's impact on crime outcomes (aged 12–20 years) was largely accounted for by increases in childhood social and self-regulation skills (Sorensen et al., 2016). Analyses through age 25 found that the intervention was effective in reducing externalizing and internalizing psychopathology, substance use problems, and substance and violent crime (Dodge et al., 2015).

Interventions for callous-unemotional traits and psychopathy

Considering the evidence that children with CP and CU traits (CP+CU) are at risk of the worst outcomes (Frick et al., 2014), including that CU traits longitudinally predict the frequency of gun carrying and the likelihood of using a gun during a crime (Robertson et al., 2020), maximizing treatment effects for this subgroup has been a priority of intervention researchers. To date, treatment adaptations for children with CP+CU aim to target the unique risk factors involved in the development and maintenance of CU traits. These risk factors have generally fallen into three categories: Socioaffective deficits, punishment insensitivity and reward dominance related to temperamental fearlessness, and low parental warmth. Evidence for the effectiveness of treatment adaptations for CP+CU over standard interventions is mixed (Fleming, 2023). Regarding socioaffective deficits, Dadds et al. (2012) targeted emotion recognition deficits by augmenting PMT with emotion recognition training, finding that the combined treatment outperformed standard PMT in improving empathy

and CP among 6–16-year-old clinic-referred children with CP+CU. In contrast, a study comparing Emotion-Processing Skills Training targeting emotion recognition and perspective-taking to treatment-as-usual in a voluntary military-style program among adolescents with CP+CU found that this training was not superior for improving CP (Lui et al., 2019). Critically, neither of these targeted interventions successfully improved emotion recognition, the putative mechanism of change (Dadds et al., 2012; Lui et al., 2019). Similarly, Dadds, English, et al. (2019) found that PMT augmented with a module targeting reciprocated parent–child eye gaze did not outperform standard PMT in improving CP, nor was it successful in producing sustained improvement in parent–child eye gaze in 3–8-year-old clinic-referred children with CP+CU. Regarding treatment adaptations designed to capitalize on punishment insensitivity and reward dominance, there is little evidence that targeting this risk factor alone produces outcomes better than standard behavioral interventions (e.g., Waschbusch et al., 2020). Finally, an adaptation of PCIT for CP+CU, called PCIT-CU (Fleming & Kimonis, 2018), was developed to target all three risk factors (socioaffective deficits, punishment insensitivity, and low parental warmth). In an open trial and RCT of 3–7-year-old clinic-referred children with CP+CU, PCIT-CU produced improvement in parent-rated CP (Fleming et al., 2022; Kimonis et al., 2019) and observed child compliance (Kimonis et al., 2019), and was superior to standard PCIT in sustaining improvement in CP during a three-month follow-up period (Fleming et al., 2022). However, improvements in emotional skills (e.g., recognition) and parental warmth following PCIT-CU have yet to be investigated. Moreover, PCIT-CU may be less effective for children with secondary-type CU traits (Fleming et al., 2023); that is, CU traits that co-occur with higher levels of anxiety, theoretically emerging following exposure to trauma or maltreatment during early childhood (Craig et al., 2021). Consideration of primary and secondary variants of CU traits and psychopathy in treatment contexts is critical given secondary CU/psychopathy is associated with a more complex and severe clinical profile and worse longitudinal outcomes compared to the primary variant, including some evidence that secondary CU/psychopathy predicts greater offending and involvement in violent crime (Goulter, Craig, et al., 2021; Robertson et al., 2018).

Adaptations for the broader construct of adolescent psychopathy have also targeted motivation with promising outcomes (e.g., Ribeiro da Silva, Rijo, Salekin, et al., 2021). High scores on self-reported measures of psychopathy have been associated with high-stable levels of CP in community youth and faster time to violent and nonviolent recidivism among legal system-involved youth (Goulter et al., 2018; Goulter, Cyr, et al., 2021). Recent treatment adaptations targeting adolescent psychopathy, such as Compassion Focused Therapy, are founded on evolutionary theories positing that humans have an innate set of motivations to survive and form affiliative bonds (Gilbert, 2019). These motivations are regulated by three emotional regulation systems: the threat system, processing threat detection and protection; and the drive system, guiding positive experiences to survive and thrive; and the soothing system, allowing social bonding and distress management. According to Compassion Focused Therapy, mental health problems, including psychopathy, arise when these systems are unbalanced often in response to experiences of adversity interplaying with other genomic and neurobiological factors (Gilbert, 2019; Murray et al., 2018). Grounded in Compassion Focused Therapy, the PSYCHOPATHY.COMP program encompasses four modules (i.e., the basics of our mind; our mind according to Compassion Focused Therapy; compassionate mind training; and recovery, relapse, and prevention) designed to restore balance across these systems and promote compassion in detained youth (Ribeiro da Silva, Rijo, Salekin, et al., 2021). In one controlled trial, youth allocated to the program showed greater decreases in psychopathy scores, relative to control participants receiving treatment-as-usual, and these effects were maintained at 6-month follow-up (Ribeiro da Silva, Rijo, Brazão, et al., 2021). Recent findings have demonstrated that these treatment effects may be mediated by changes in heart rate variability (Sousa et al., 2023). Indeed, accumulating evidence has revealed physiological activity as a critical factor in antisocial behavior (Fanti et al., 2019; Goulter et al., 2019; Thomson et al., 2019). Future intervention research is encouraged to incorporate multiple levels of analysis, including physiological indices, in assessment batteries.

Testing logic models of psychosocial interventions

Mediation

Identifying the mechanisms and mediators that account for treatment-related changes in outcomes of interest is an important undertaking. Consistent with theoretical models of family-based intervention for CP, research supports improved parenting practices and family functioning as significant treatment mediators (Forehand et al., 2014; Mestre et al., 2022). However, this finding is not consistent across studies (Fagan & Benedini, 2016; Forehand et al., 2014), emphasizing the importance of considering alternative mediators. Other parenting-related variables with support as mediators include reduced parental stress, improved parent–child relationship, and shifts in maladaptive parental cognitions (Beelmann et al., 2023). Beyond parenting variables, reduced affiliation with deviant peers, school engagement (Mestre et al.,

2022), and changes in children's socioemotional and cognitive skills (e.g., emotion regulation, problem-solving) have also been identified as potential mediators of improved CP (Lochman & Wells, 2002; Mestre et al., 2022; Sorensen et al., 2016).

Moderation

Moderators inform for whom or under what conditions an intervention is effective (Kraemer et al., 2002). An absence of moderation, when sufficiently powered, indicates the generalizability of intervention effects across subgroups or settings. Several intervention, child and parent, and environmental characteristics have been identified as significant moderators of interventions targeting child CP (for a brief report, see McMahon et al., 2021). Regarding intervention characteristics, treatment relative to universal prevention and a greater number of protocol sessions has a greater effect on child outcomes (Flores et al., 2020; Menting et al., 2013). One of the most robust moderators of treatment effects is the child's initial severity of CP (e.g., Leijten et al., 2020; Menting et al., 2013). Moderation findings by child age and sex/gender have been somewhat mixed (e.g., Gardner et al., 2019; Ward et al., 2016). Conversely, for parental characteristics, sex/gender has been identified as a significant moderator, such that father engagement in PMT and MST was associated with greater benefit in child CP outcomes (McCart & Sheidow, 2016). Encouragingly, some systematic work has suggested that PMT may generalize across a wide range of family risk factors (e.g., parental age, psychopathology, substance use, family/marital conflict, life stress; Dedousis-Wallace et al., 2021). Regarding environmental and sociodemographic factors, as mentioned, there is some evidence of moderation by location for MST (effects tend to be larger in US vs. non-US samples; van der Stouwe et al., 2014), whereas published research indicates that Incredible Years has consistent effects across countries and socioeconomic characteristics (Leijten et al., 2016; but see also Leijten et al., 2013).

Advancing treatment effects via personalization

In recent decades, attention has increasingly focused on enhancing engagement and efficacy/effectiveness outcomes of youth psychotherapy via treatment personalization (Ng & Weisz, 2016). Three key strategies have been used to personalize interventions for children with CP. First, interventions targeting risk factors across multiple systems have been implemented, especially among legal system-involved youth. For example, MST targets risk factors across individual, family, school, and community systems via individualized treatment designed to address maintaining factors specific to an individual's case conceptualization (Henggeler & Schaeffer, 2016). Second, modular treatments such as the Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or CP (MATCH; Chorpita & Weisz, 2009) have been developed to address multiple problems in a flexible approach over time, consistent with the high prevalence of comorbidity and problem flux in presentations of youth psychopathology. Modular therapists use decision flowcharts to select and sequence treatment modules taken from evidence-based interventions for each domain of psychopathology for each individual client (Chorpita & Weisz, 2009). Finally, treatment personalization has also occurred via novel treatment adaptations for specific subgroups of youth with CP (Ng & Weisz, 2016), whereby treatments are adapted or modified to address subgroup-specific risk factors or clinical features. Examples include adapting interventions for children with CP+CU, as well as enhancing the cultural, racial, and ethnic sensitivity and relevance of interventions for minoritized youth via wholesale cultural adaptations of standard interventions or use of cultural assessment to inform intervention tailoring (Sanchez et al., 2022).

Recommendations for addressing gun violence

Unfortunately, there is little to no research that has investigated the efficacy of standard or personalized interventions reviewed in this chapter to prevent or reduce gun violence. However, multiple forms of violence, including gun violence, share overlapping risk factors (Wilkins et al., 2014), which suggests there is hope that existing strategies that impact CP and violence may be effective for gun violence prevention and treatment. Future research assessing outcomes of family-based interventions and multicomponent interventions is encouraged to incorporate measures assessing gun violence to advance our current understanding of the impact of these well-validated interventions for preventing or reducing gun violence. Given CU traits/psychopathy are typically associated with severe and persistent aggression and violence (Thomson et al., 2020) and are linked to an increased risk of gun violence (Thomson, 2022), it will be important to test whether treatment adaptations targeting risk factors unique to this subgroup reduce gun violence. If not, it may be necessary to refine these adapted treatments to specifically target the (unique) mechanisms involved in gun violence and risky gun behavior among youth with CU traits or psychopathy. Indeed, it is critical that the field continues to test the mechanisms by which these interventions achieve their effect (i.e., mediators), as well as understanding the limitations of interventions

(i.e., moderators). This will be important as new research sheds light on psychosocial risk and protective factors for gun violence. Taken together, this intervention literature underscores the importance of treatment personalization for enhancing efficacy/effectiveness outcomes. Congruent with other forms of violence, gun violence emerges across intersecting systems. Psychosocial interventions targeting comorbid externalizing and internalizing problems, tailored to specific identities, and operating across settings relevant to gun violence may represent our best efforts for addressing this critical issue. Intervention at the level of the individual and microsystem must also occur alongside exosystem and macrosystem change achieved via community- and policy-level prevention efforts.

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