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Why psychopathy matters: Implications for public health and violence prevention☆

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Abstract

Psychopathy is an early-appearing risk factor for severe and chronic violence. The violence largely attributable to psychopathy constitutes a substantial portion of the societal burden to the public health and criminal justice systems, and thus necessitates significant attention from prevention experts. Yet, despite a vast base of research in psychology and criminology, the public health approach to violence has generally neglected to consider this key variable. Fundamentally, the public health approach to violence prevention is focused on achieving change at the population level to provide the most benefit to the maximum number of people. Increasing attention to the individual-level factor of psychopathy in public health could improve our ability to reduce violence at the community and societal levels. We conclude that the research literature on psychopathy points to a pressing need for a broad-based public health approach with a focus on primary prevention. Further, we consider how measuring psychopathy in public health research may benefit violence prevention, and ultimately society, in general.

Keywords

Psychopathy; Callous–unemotional traits; Violence; Violence prevention; Public health; Primary prevention

1. Introduction

“By any measure, violence is a major contributor to premature death, disability, and injury” (Mercy, Rosenberg, Powell, Broome, & Roper, 1993, p. 8) and therefore poses a serious threat to public health. Violence was identified as a public health concern in the Surgeon General's 1979 report on health promotion (U.S. Department of Health, Education, and

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Welfare, 1979) and has since been recognized as a major international public health problem by the World Health Organization (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002). In 2012, there were nearly 17,000 deaths stemming from violence in the U.S. alone (Centers for Disease Control & Prevention); a number that seems miniscule compared to global homicide rates of approximately 500,000 (Krug et al., 2002). Of course, fatal violence represents only a small fraction of the victimization that occurs each year. Violence, including physical assault, sexual violence, and child maltreatment, can result in severe injuries and serious long-term effects on the physical and mental health of victims. Violence also results in significant economic costs to individuals and nations. The World Health Organization's World Report on Violence and Health concluded that violence-related health care, law enforcement and judicial services, lost work days, and reduced productivity cost the global economy billions of U.S. dollars per year (Krug et al., 2002). In fact, the most current estimated single year cost for medical expenses and lost productivity due to homicide and nonfatal assaults reaches approximately \$61 billion in the U.S. alone (CDC).¹

Due to the impact of violence on the safety and well-being of our communities, significant resources have been devoted to responding to violence, with most efforts directed toward health care innovations to improve outcomes for victims, or criminal justice interventions to deter offenders and reduce recidivism (Mercy et al., 1993; Moore, 1995). Although critical to the violence response, these reactive approaches alone have failed to sufficiently reduce population levels of violence (Mercy & Hammond, 1999; Mercy, Krug, Dahlberg, & Zwi, 2003). For this reason, the public health system applies a proactive approach to violence focused on preventing violence before it occurs, that is, primary prevention. Primary prevention is distinctive in its focus on attempting to forestall the *initiation* of violent behavior. In this respect, primary prevention differs from secondary and tertiary prevention, which aim to reduce recidivism and ameliorate the short- and long-term effects of violence perpetration and victimization. The public health system works in tandem with the criminal justice system, which emphasizes the secondary and tertiary levels of prevention (Moore, 1995).

Whereas the primary/secondary/tertiary prevention distinction describes the timing of intervention, the distinction among universal, selected, and indicated interventions describes the intended population that the intervention will target. Universal programs are intended to reach everyone within a defined population regardless of their level of risk; selected programs are directed to a population that is at-risk for violence but has yet to engage in violent behavior; and indicated programs are those that target those showing minimal early warning signs of potential for violence (Matjasko et al., 2012). Fundamentally, the public health approach to violence prevention focuses on achieving change at the population level to provide the most benefit to the maximum number of people (Dahlberg, 2007; Hemenway & Miller, 2013). However, individual-level factors remain an important component of this approach, suggesting that prevention efforts must attend to risk factors across multiple levels of the social ecology (Matjasko et al., 2012). Moreover, psychological characteristics of individuals contribute strongly to their risk for violence, in particular when considering the

¹Updated from U.S. dollars in 2010 to U.S. dollars 2014 using consumer price index.

fact that as few as 5% of the population perpetrates a large or majority proportion of violent crime (Beaver, 2013; Moffitt, 1993; Vaughn, Salas-Wright, Delisi, & Maynard, 2013; Vaughn et al., 2011; Wolfgang, Figlio, & Sellin, 1972). In their seminal study in Philadelphia, Wolfgang et al. (1972) found that approximately 6% of boys from a group of 10,000 were the main perpetrators of crime and violence and were responsible for approximately 70% of all murders, rapes, and aggravated assaults. In a second cohort of 13,000 from the same city, the authors found that 7% of habitual offenders were responsible for 60% of murders, 75% of rapes, and 65% of aggravated assaults (Tracy, Wolfgang, & Figlio, 1990). These findings have been replicated in contemporary nationally representative samples, which showed approximately 5% of adolescents were responsible for approximately 30% of the most “severe” violent crimes (Vaughn et al., 2013). Beaver (2013) further reported that 5% of all families were responsible for 50% of crime, 10% of families accounted for 80% of crime, and 25% of families accounted for 100% of crime in a nationally representative longitudinal sample. Thus, strategies that involve identifying the small minority of the population at the highest risk for perpetrating the most chronic serious forms of violence, and tailoring prevention approaches for those individuals may prove fruitful in reducing violence at all levels of the social ecology. That is, targeting the few may yield maximum benefit for the greatest number of people which, ultimately, is the goal of the public health model (Dahlberg, 2007).

The public health model starts “upstream” by focusing on identifying risk and protective factors for violent behavior and developing interventions that address these factors to prevent the cascade of circumstances and behaviors that can result in violent injury and death. A number of evidence-based strategies have demonstrated impact on reducing individuals' risk for violence. Many of these strategies have also been shown to reduce the long-term costs associated with violence, such as injury, mental health, and criminal justice involvement (Drake, Aos, & Miller, 2009; Fagan & Catalano, 2013; Matjasko et al., 2012). Numerous risk and some protective factors for violence perpetration have been identified by researchers, including individual beliefs, experiences, and personality traits and characteristics of one's family, peers, and neighborhood. Many of these factors have been considered as possible points for intervention, and prevention programs that target these factors have been developed and evaluated, with varying levels of success (Drake et al., 2009; Fagan & Catalano, 2013; Matjasko et al., 2012). One strikingly significant risk factor for violence, that has rarely been addressed or considered in the primary prevention literature, however, involves the constellation of personality traits that comprise psychopathy.

In this article, we discuss why psychopathy is of considerable pragmatic importance to society. To do so, we examine the relevance of psychopathy to the public health approach to violence prevention by delineating the societal burden of psychopathy and its role as a significant risk factor for violence. We present the risk and protective factors associated with psychopathy, developmental processes predisposing to psychopathy associated violence, and the efficacy of existing treatments aimed at reducing violence perpetrated by offenders with psychopathic traits. We attempt to integrate the current state of knowledge concerning psychopathy as a risk factor for violent behavior from a public health perspective and consider whether and how increased attention to this personality disorder can inform or

improve our violence prevention efforts. We argue that psychopathy has an early genesis and may therefore necessitate intervention at early stages of life. Ultimately, this article is a call to motivate researchers in numerous fields, especially public health, psychology, and psychiatry, to consider psychopathy in their violence prevention efforts.

2. Psychopathy

Psychopathy is typically conceptualized as a loosely correlated set of interpersonal, affective, and behavioral features that includes superficial charm, social poise, dishonesty, grandiosity, guiltlessness, callousness, promiscuous sexual behavior, and poor impulse control (Cleckley, 1941; Hare, 1966; Lykken, 1995).² Psychopaths are dangerous in part because they are hybrid beings. They frequently make a positive first impression on others, rendering them adept at deception, manipulation, and outright physical aggression. Not surprisingly, this condition is commonly found in clinical and forensic settings. However, growing data indicate that psychopathy manifests along a dimension of severity (e.g., Guay, Ruscio, Knight, & Hare, 2007; Murrie et al., 2007) suggesting the presence of these traits in the general population as well. Many theorists hypothesize that deficient emotion processing, a process pivotal during early development, is the core deficit of psychopathy that disrupts “normal” socialization (Blair, 2003; Herba et al., 2007; Lykken, 1995).

Psychopathy is often mistakenly thought (see Berg et al., 2013) to be largely or entirely synonymous with Antisocial Personality Disorder (APD), a related diagnostic category recognized by the American Psychiatric Association's (2013) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). Nevertheless, a wealth of research indicates that APD correlates only moderately with the classic definition of psychopathy (e.g., Cleckley, 1941) as assessed by clinical diagnostic measures. Indeed, the two conditions probably bear substantially disparate implications for violent and criminal behavior (Hare, 2003; Lilienfeld, 1994). Generally, less than one quarter of individuals with APD meet research criteria for psychopathy (Blair, Mitchell, & Blair, 2005). The conflation of these constructs is common and has arisen, in part, due to the ever-changing conceptualization and terminology related to the construct in the DSM iterations.

3. Psychopathy and violence

The societal impact of psychopathy is substantial and pervasive. Using updated aggregate cost estimates of crime from Anderson (1999), Kiehl and Hoffman (2011) estimate the annual cost of psychopathy to the criminal justice system to approach \$460 billion. Psychopathy is one of the strongest *dispositional* predictors of aggression and violence (Aharoni & Kiehl, 2013; Dolan & Doyle, 2000; Monahan et al., 2001; Neumann & Hare,

²A two-factor conceptualization of psychopathy (Factor 1 = emotional detachment and Factor 2 = Social Deviance/Antisocial Behavior) was largely accepted by researchers for many years (Hare, 1991; Harpur, Hare & Haskian, 1989), but debate about the factor structure of the construct has arisen from factor analytic research conducted on the family of Psychopathy Checklist measures most frequently used to assess psychopathy. Cooke and Michie (2001) proposed a model which parsed the two factors into three: (1) *Arrogant Deceitful Interpersonal Style*, (2) *Deficient Affective Experience*, and (3) *Impulsive Irresponsible Behavioral Style*. In turn, Hare (2003) proposed a four-facet model in which the original two factors each comprised two subfacets. Factor 1 was split into the *Interpersonal* and *Affective* facets, whereas Factor 2 was split into the *Lifestyle* and *Antisocial* facets. Despite the emergence of new structural models, all are similar in that they generally tap the same content while differing in their manner of structuring the content. Moreover, debate about the structure has not degraded the whole scale validity of these measures.

2008) and has been shown to forecast violence in forensic, psychiatric, community, collegiate, and youth populations (Reidy, Shelley-Tremblay, & Lilienfeld, 2011). The mere relation of any risk factor to violence is of obvious importance; however, psychopathy, in particular, is one of the most pertinent factors for violence. Psychopaths perpetrate some of the most severe acts of violence, in turn resulting in greater injury and death (Coid & Yang, 2011; Porter, Woodworth, Earle, Drugge, & Boer, 2003; Reidy et al., 2011); they are at least five times more likely to recidivate violently than non-psychopathic offenders (Serin & Amos, 1995); and they commit twice as many violent crimes as nonpsychopathic offenders (Hare, 1999; Hare & Jutai, 1983; Hare & McPherson, 1984; Porter, Birt, & Boer, 2001). Adolescents evincing psychopathy traits are at heightened risk for becoming violent offenders who persist to become violent adults (Forsman, Lichtenstein, Andershed, & Larsson, 2010; Lynam, 1997; Lynam, Miller, Vachon, Loeber, & Stouthamer-Loeber, 2009). Experts estimate that psychopaths, who make up 15–25% of prison populations and approximately 1% of the general population (Blair et al., 2005; Hare, 1996; Kiehl & Hoffman, 2011), commit a disproportionate amount of violent crime in the general population (Coid & Yang, 2011; Hare, 1996, 1999; Hare & McPherson, 1984; Kiehl & Hoffman, 2011). This disproportionate responsibility for violence harkens back to the criminological data demonstrating that a small minority of the population commits the majority of violence (Beaver, 2013; Moffitt, 1993; Tracy et al., 1990; Vaughn et al., 2011, 2013; Wolfgang et al., 1972). In fact, in a test of the overlap between Wolfgang's "severe 5%" and psychopathy, Vaughn and DeLisi (2008) concluded that "psychopathic traits are analogous to career criminality" (p. 39), a view echoed by Lynam (1996) who identified the "fledgling psychopath" as the chronic offender of tomorrow. It is clear that psychopathy has a substantial impact on violence in the general population despite a low prevalence rate when assessed categorically using standard measurement instruments (e.g., Coid & Yang, 2011). Thus, data demonstrate that psychopathic behavior constitutes a grave societal concern associated with significant public costs, including victim services, criminal prosecutions, incarceration, and post-release monitoring.

4. Measuring psychopathy

The mostly frequently used measure for the assessment and diagnosis of psychopathy in forensic circles is the expert-rater device known as the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 2003) and its derivatives, the Psychopathy Checklist: Screening Version (Hart, Cox, & Hare, 1995) and the Psychopathy Checklist: Youth Version (Forth, Kosson, & Hare, 2003). The Psychopathy Checklist comprises 20 items that assess the interpersonal, affective, developmental, and behavioral symptoms of the disorder. The Psychopathy Checklist is completed by conducting an extensive review of all available information about the client (i.e., education records, social worker reports, police reports, etc.). Whenever possible the collateral information is accompanied by detailed interview with the client. The two sources of information are then used by trained clinicians to score the client on the 20 items on the Psychopathy Checklist according to strict guidelines provided in the test manual (Hare, 2003). The resulting summary score ranges from 0–40 and typically an individual who scores over 30 (top 20%) will merit a 'high' score or diagnosis of psychopath.³

While the measurement of psychopathy originated largely in the adult forensic setting with the PCL-R and its predecessor, there has been a proliferation of reliable and validated psychopathy measures for use with general populations and adolescent populations that are less resource intensive and can be completed by the individual, parents, teachers, or clinicians (for a review of psychopathy measures see Kotler & McMahon, 2005; Lilienfeld & Fowler, 2006). Whereas the PCL-YV is used to assess psychopathy traits in adolescents ages 12–17, the Antisocial Process Screening Device (APSD; Frick & Hare, 2001) is a 20-item informant rating scale used to measure conduct and psychopathic traits in children ages 6–13. Trait indices are derived from parents' ratings, teachers' ratings, or a combination of both. This instrument was designed as a downward extension of Hare's PCL-R. Additionally, a growing literature supports the use of multiple self-report measures for the assessment of psychopathy traits. For example, the Self-Report Psychopathy Scale (SRP-III; Paulhus, Neumann, & Hare, in press), the Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) and Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) and its successor Psychopathic Personality Inventory—Revised (PPI-R; Lilienfeld & Widows, 2005) have all shown concurrent validity and prediction of violent and aggressive behavior (Reidy et al., 2011). Likewise, researchers have developed methods of detecting these traits in young children (but see Edens, Skeem, Cruise, & Cauffman, 2001, for scientific and ethical concerns), allowing for less resource-intensive methods of measuring and surveilling these traits across developmental periods (Trouton, Spinath, & Plomin, 2002; Viding, Blair, Moffitt, & Plomin, 2005). The development of such measures has created a vehicle for the measurement of psychopathy outside of clinical and forensic settings.

That said, there is lively debate in the psychopathy literature as to how much psychopathy *per se* adds to the prediction of future violence above and beyond pre-existing violence (e.g., Hare & Neumann, 2010; Skeem & Cooke, 2010a,b). This issue is pragmatically important given that the PCL-R and its derivatives themselves contain measures of antisocial behavior (Skeem & Cooke, 2010a). Nevertheless, evidence suggests that the affective deficits of psychopathy, such as callousness and guiltlessness, contribute to the prediction of physical aggression above and beyond the other features of psychopathy, including its associated antisocial and criminal lifestyle features (e.g., Hall, Benning, & Patrick, 2004, Reidy et al., 2011). Additionally, emerging data suggest that psychopathic traits (such as callousness and a paucity of deep social emotions) measured in adolescence predict aggressive behavior in adulthood incrementally (albeit modestly) over both concurrent and pre-existing antisocial and aggressive behavior (e.g., Forsman et al., 2010). Moreover, we should be careful not to confuse the issue of whether (a) psychopathy *measures* predict violence with the issue of whether (b) psychopathy as a *construct* plays a role in the etiology of violence. Although the debate about the predictive utility of psychopathy measures is important for practical reasons within the criminal justice system (e.g., predicting recidivism for parole determinations), it does not necessarily vitiate the importance of the construct in understanding the etiology and prevention of violence for the public health system.

³The PCL-SV comprises 12 items scored from 0–24 with a score of 18 considered a high score.

5. Psychopathy across the lifespan

In the public health model of violence prevention, the primary prevention of violence generally requires intervening early in life. Thus, it is imperative we determine if and how psychopathy manifests across the lifespan so that we can effectively prevent violence and intervene as early as possible in high-risk individuals. There is apposite hesitation by researchers and clinicians to apply the term “psychopath” to children and adolescents alike (Edens et al., 2001; Seagrave & Grisso, 2002). Despite displaying a relatively stable course in adults, personality is believed to be more malleable in children and adolescents (Buss, 1995; Roberts & DelVecchio, 2000). Additionally, pronounced levels of certain psychopathic traits (e.g., impulsivity, irresponsibility, sensation-seeking) may reflect normative transient behaviors in developing youth. As such, applying a label of such a disorder could pathologize largely normative behavior among developing youth (e.g., Edens et al., 2001). Therefore, before we extend this construct downward to juvenile populations, it is important to establish the presence of psychopathic traits in child and adolescent populations and the stability of such traits across developmental stages. From a public health standpoint, the ability to prevent future violence hinges on our ability to recognize precursors of psychopathic traits in early development, where early intervention and prevention approaches can be implemented most effectively.

A rapidly evolving body of empirical evidence suggests that psychopathic characteristics in children and adolescents may manifest as *callous-unemotional* (CU) traits (Frick, 2007; Frick & Ellis, 1999; Loeber, Burke, & Pardini, 2009; Porter & Porter, 2007) reflecting underlying deficits in empathy and affective processing (Blair, 2006; Lynam & Gudonis, 2005). In research on Conduct Disorder and delinquency more broadly, there is a widely recognized distinction between youth who evince severe conduct problems early in childhood and those who demonstrate onset of antisocial behavior in adolescence (Moffitt, 1993). Relative to the adolescent onset group, the childhood-onset group demonstrates a persistent and severe pattern of violent offending well into adulthood (Frick, 2007; Frick & White, 2008). CU traits are a pertinent demarcation between these two groups. Consistent with research on adult psychopaths (e.g., Hart & Hare, 1997) these traits of impoverished affect appear to designate a particularly violent type of juvenile who offends earlier with greater severity, chronicity, and diversity in type of violence and victim (Forth & Book, 2007; Frick, 2007; Porter & Porter, 2007).

Recent data have additionally proffered evidence of the stability of psychopathic traits across significant time periods. As a whole, data from longitudinal studies suggest that psychopathic traits are generally fairly stable, not only within childhood and adolescence, but across childhood and adolescence into adulthood (e.g., Barry, Barry, Deming, & Lochman, 2008; Blonigen, Hicks, Krueger, Patrick, & Iacono, 2006; Dadds, Fraser, Frost, & Hawes, 2005; Frick & White, 2008; Forsman, Lichtenstein, Andershed, & Larsson, 2008; Frick, Kimonis, Dandreaux, & Farrell, 2003; Loney, Taylor, Butler, & Iacono, 2007; Lynam, 1997; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007; Lynam et al., 2009;

⁴For the sake of brevity, we use the terms CU traits and psychopathy interchangeably to refer to psychopathic traits, although it should be born in mind that psychopathy is probably broader than this core set of traits.

Obradovic, Pardini, Long, & Loeber, 2007; but see Skeem, Polaschek, Patrick, & Lilienfeld, 2011, for caveats). The implication of these findings, and perhaps more important than the stability of actual personality traits, is the stability of the violent behavior these traits predict. For example, Lynam et al. (2009), Lynam, Miller, et al. (2009) showed that psychopathy traits at age 13 predicted a variety of criminal arrests at age 18 and 26. Similarly, Salekin (2008) found that psychopathy traits were predictive of both violent and general recidivism from adolescence into adulthood even after controlling for numerous risk factors associated with criminal offending. Overall, the data suggest that psychopathy traits identified in adolescence are associated with violence and crime as adults even after controlling for numerous risk factors associated with criminal offending (e.g., Forsman et al., 2010; Gretton, Hare, & Catchpole, 2004; Lynam et al., 2009, Lynam, Miller, et al., 2009; McMahon, Witkiewitz, Kotler, & The Conduct Problems Prevention Research Group, 2010; Salekin, 2008).

Collectively, most research findings support the contention that psychopathy traits in juveniles broadly resemble those of adult psychopathy (Lynam, 1997; Lynam, Loeber, & Stouthamer-Loeber, 2008). Furthermore, they suggest that youths identified as possessing marked CU traits are most at risk to become the adult offenders who perpetrate severe and chronic acts of violence. In other words, evidence for CU traits supports the contention that we can reliably identify those likely to become chronic violent offenders at an early age and intervene before the onset of violence.

Despite the general stability of psychopathy across developmental stages, some evidence suggests potential malleability in the developmental trajectories and violent outcomes for at least a subset of youth. For example, Fontaine, Rijdsdijk, McCrory, and Viding (2010) identified four groups of trajectories for CU traits between ages 7 and 12 in a sample of 9500 children: stable high, stable low, increasing, and decreasing. For the most part, group membership was driven largely by genetic contributions, but for girls in the stable high trajectory there was a strong contribution of shared environment. Moreover, Fontaine, McCrory, Boivin, Moffitt, and Viding (2011) reported that approximately 13% of the children demonstrated declines in CU traits. The authors also identified a very small group of children (0.2% of the sample) who demonstrated stable high CU traits but low levels of antisocial behavior. These findings suggest that not all children with CU traits become violent offenders, so understanding these youths' developmental trajectories may be critical to identifying potential protective factors and ultimately preventing the violence associated with psychopathy. Integrating the measurement of psychopathic traits into public health interventions may allow us to identify key protective factors that distinguish psychopathic youth who become violent from those who do not.

6. Risk and protective factors for psychopathy

To develop effective interventions for psychopathic traits that can prevent future violence, greater understanding is needed of what factors place youth at risk for perpetrating psychopathic violence. Farrington (2005) noted that “few researchers have tried to investigate early childhood risk factors that might predict, influence, or cause psychopathy” (p. 493). One consistent pattern that has arisen in the literature is that biological factors early

in life may play a critical role (albeit not at all the only role) in the development of the emotional deficit central to predispositions to this personality construct. Research with adults and adolescents has indicated a link between structural and functional anomalies in the amygdala and striatum and the affective and interpersonal features of psychopathy (e.g., Decety, Michalska, Akitsuki, & Lahey, 2009; Glenn, Raine, Yaralian, & Yang, 2010; Jones, Laurens, Herba, Barker, & Viding, 2009; Marsh et al., 2008; Yang, Raine, Narr, Colletti, & Toga, 2009; for more complete reviews of brain structure and function in psychopathy see Blair, 2006; Minzenberg & Siever, 2006; Kiehl, 2006; Raine & Yang, 2006). Nevertheless, because life experiences can sometimes influence later brain structure and function, the causal directionality of these intriguing differences require clarification. Still, such results have led to speculation that there is a neurodevelopmental basis for the underlying affective dysfunction of psychopathy and its ties to subsequent violent behavior (e.g., Gao, Raine, Venables, Dawson, & Mednick, 2010; White, Brislin, Sinclair, Fowler, & Blair, 2013). For example, Raine, Lee, Yang, and Colletti (2010) found evidence that fetal neural maldevelopment is associated not only with higher levels of psychopathic traits, but with heightened levels of aggression and violent behavior in a sample of adults. Specifically, these authors used magnetic resonance imaging to assess the presence of cavum septum pellucidum (CSP), a marker for fetal neural maldevelopment, and its relation to psychopathy and criminal offending in a sample of community participants. Analyses indicated that the group with presence of CSP were higher on psychopathy as measured by the PCL-R ($\eta^2 = .09$). However, after controlling for confounding psychopathologies the relationship between CSP and psychopathy was substantially stronger ($\eta^2 = .66$). These findings have further been replicated in a sample of adolescents (White et al., 2013).⁵

Several studies have pointed to a genetic influence on the expression of psychopathy traits and later antisocial behavior (Blonigen, Carlson, Krueger, & Patrick, 2003; Forsman et al., 2010; Larsson, Andershed, & Lichtenstein, 2006; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003). In particular, data from the Twins Early Development Study (TEDS: Trouton, Spinath, & Plomin, 2002) have been fruitful in identifying the genetic influences on CU traits and conduct disorder behaviors in a large sample of 7 year old children. Viding et al. (2005) reported that children with high levels of CU and antisocial behavior evinced an “extremely strong genetic influence and no influence of shared environment” (p. 592) and heritability statistically mediated the relationship between CU traits and antisocial behavior (Viding, Frick, & Plomin, 2007). In addition, data suggest that not only psychopathy itself, but also its longitudinal *stability*, is strongly genetically influenced (Blonigen et al., 2006; Forsman et al., 2008). Nevertheless, changes in psychopathic traits over time that do occur (e.g., Fontaine et al., 2010, 2011) may be due primarily to environmental factors (Forsman et al., 2008). In fact, genetic influences account for only about half of the variance in psychopathic traits (e.g., Larsson et al., 2006; Viding et al., 2005) suggesting an equally important role of still poorly understood environmental experiences.

⁵Like Raine et al. (2010), White et al. (2013) found that the CSP was associated with increased risk for multiple forms of psychopathology including elevated levels of psychopathy traits. However, White and colleagues expanded upon these findings to show that ODD/CD youth with the presence of CSP did not differ on level of psychopathy traits or proactive aggression from ODD/CD youth without the presence of CSP. This finding is important because it indicates that CSP is not pathognomonic of psychopathy and violence. Rather, there are likely multiple developmental pathways to the manifestation of psychopathy traits and onset of associated violence.

The dearth of research on childhood risk and protective factors identified by Farrington (2005) appears to be even greater in reference to environmental influences. However, findings from the Cambridge study, a 40-year longitudinal study on development of antisocial behavior, suggested that the best predictors of psychopathy in this sample were having a convicted parent, physical neglect, low paternal involvement, low family income, and coming from a disrupted family (Farrington, 2006). In particular, physical neglect and disengaged fathers were the strongest predictors of deficient affect. This finding may suggest a significant environmental and experiential etiology to the core emotional deficits of psychopathy; although these familial factors may also themselves reflect genetic factors, along with gene–environment correlations or interactions.

Lynam et al. (2008) tested the moderating effect of a number of risk and protective factors on psychopathy traits from age 13 to age 24. These factors included demographic variables (race, family structure, family SES, and neighborhood SES), parenting factors (physical punishment, inconsistent discipline, lax supervision, and positive parenting), peer delinquency, own delinquency, and other individual differences (i.e., verbal IQ, behavioral impulsivity, and cognitive impulsivity), which overlap with some of the most common risk and protective factors for health and delinquency outcomes (Durlak, 1998). Tests of risk and protective factors indicated that physical punishment, peer delinquency, and family SES moderated the changes in psychopathy from age 13 to 24, but not as expected. The authors found that psychopathy traits at age 13 was most strongly related to psychopathy at age 24 for individuals with high SES, low physical punishment, and low peer delinquency. In other words, these typically protective factors did not reduce the stability of psychopathy from adolescence to adulthood. Similarly, Wootton, Frick, Shelton, and Silverthorn (1997) assessed the effects of parenting practices (e.g., level of supervision, type of discipline, use of praise) on conduct disorder in children. They found that the prevalence of conduct disorder was high for children high on CU traits, regardless of parenting practices. Thus protective factors that have been identified for other children (Durlak, 1998) may not be protective for children with CU traits. Nevertheless, the literature on protective factors in relation to psychopathy and violence is clearly in its nascent stages and requires further exploration. In particular, acquiring a better understanding of how environmental experiences may combine or interact statistically with genes to alter the manifestation of psychopathy traits that in turn predispose to violence will be a critical area for future research. More broadly, an essential step in the public health model to violence prevention is the identification of risk and protective factors (Mercy et al., 1993).

7. Neuro-developmental processes

When left to natural socialization processes without early intervention, individuals with predispositions for psychopathic traits may be intrinsically reinforced for their use of violent and aggressive behavior. Some theorists argue that the distinctive feature of psychopathy is a deep-seated emotional deficit stemming from dysfunction in the amygdala and associated areas (e.g., Blair, 2003; Herba et al., 2007; Kiehl, 2006). Specifically, they contend that persons who exhibit high levels of psychopathic traits do so, in part, because their underactive amygdalae fail to signal the full value of aversive stimuli. As a consequence, they do not respond to punishment cues in the same way as others (Birbaumer et al., 2005;

Bjork, Chen, & Hommer, 2012; Buckholtz et al., 2010; Flor, Birbaumer, Hermann, Ziegler, & Patrick, 2002). Therefore, attempts to dissuade aggressive and violent behavior during childhood through standard punishment do not work for these individuals. However, these individuals can often respond to rewards (i.e., positive reinforcement), and as a result, the instrumental gains from the aggressive acts reinforce and increase the propensity for such behavior. In fact, some authors have suggested that certain psychopathic traits, especially those tied to self-centered impulsive risk taking, may be associated with hyper-sensitivity to reward, including heightened responsivity in the “reward centers” of the brain when a behavior is reinforced (Bjork et al., 2012; Buckholtz et al., 2010). Notably, these findings are shown in healthy, nonforensic, nonclinical samples. Alternatively, other data suggest that psychopaths in general are not necessarily more sensitive to reward than nonpsychopathic persons, but that the ratio of their neurological reward sensitivity to punishment (in)sensitivity is greater (Pujara, Motzkin, Newman, Kiehl, & Koenigs, 2013). This is supported by laboratory paradigms that suggest children with CU traits assign greater focus and value to reward outcomes than punishment outcomes (Frick & White, 2008). Thus, not only do psychopathic persons appear to be largely immune to punishment cues; their sensitivity to reward typically remains intact, making the tangible gains from aggressive acts more gratifying (e.g., Pardini, Lochmann, & Frick, 2003). Consequently, their violent behavior has the potential to become intrinsically reinforcing via neurotransmitter systems involved in reward, such as the dopamine system (e.g., Couppis & Kennedy, 2008; Zellner & Ranaldi, 2010). This developmental process would suggest that those individuals, who are most psychopathic, possessing a diminished capacity for punishment and empathy but functional capacity for reward, would begin to evidence chronic, severe, and persistent violence from a young age. Indeed, this is a pattern identified in many youths exhibiting psychopathic traits (Frick, 2007; Frick & White, 2008). Moreover, this process would give rise to individuals prone to deriving intrinsic pleasure from inflicting violence (i.e., sadism). Indeed, studies have identified an association between psychopathy and sadistic traits in adolescents (Decety et al., 2009), college students (Buckels, Jones, & Paulhus, 2013), and adult murderers (Porter et al., 2003; Robertson & Knight, 2014).

8. Treatment and Opportunities for Prevention

The early genesis and developmental processes associated with violence among individuals with pronounced psychopathic traits would seem to paint a bleak picture with regard to prevention of violence. Our view is different. We believe that the findings we have reviewed point to the need for the proactive approach of the public health system (i.e., primary prevention) rather than relying solely on the more reactive and punitive approaches that have traditionally been implemented within the criminal justice system. In this way, addressing the problem of psychopathy associated violence in our society could parallel public health efforts for other conditions with known biological precursors that combine or interact with environmental risk factors. For example, the Centers for Disease Control and Prevention has initiated a number of programs that target people who are at high risk for diabetes, cancer, heart disease, and obesity (among others) and deliver lifestyle interventions designed to improve screening, treatment, nutrition, and physical activity to prevent or delay the onset of these diseases (www.cdc.gov/chronicdisease/). Thus, the biological and environmental risk

factors that have been identified for psychopathy could ultimately be leveraged in a similar way to (a) aid in early identification of individuals at high risk for violence and (b) develop interventions that prevent the onset or reduce the extent and consequences of violent behavior.

Furthermore, understanding the neurodevelopmental mechanisms that engender psychopathy and attendant violence can inform the development of effective strategies and target points for intervention. In particular, strategies employing positive reinforcement of prosocial behaviors beginning at an early age may prove most fruitful in preventing the violence associated with psychopathy. For example, Hawes and Dadds (2005) reported on the differential influence of psychopathic traits on rewarding versus punitive parenting strategies. They found that boys with elevated levels of psychopathic traits were less responsive to punishment methods and displayed less negative affect in response to punishment than did boys low in psychopathic traits. Yet, the groups did not differ in response to reward-based methods. Again, this pattern of results suggests that interventions employing principles of positive reinforcement for prosocial behaviors may be most promising for young individuals at risk for psychopathy. One of the key questions in addressing the role of psychopathic traits in prevention of violence is the extent to which these traits are responsive to existing treatments as this may proffer opportunities for adaptation and development of prevention strategies. Further, does the degree of malleability of these characteristics and subsequent violent behaviors vary across developmental stages? The answers to these questions provide clues about the opportunities to modify developmental processes that contribute to violent trajectories. In adopting a public health approach to prevention of psychopathic violence, a critical step involves developing, testing, and evaluating programs and interventions that can prevent or reduce the likelihood of future violent acts (Mercy et al., 1993). Although primary prevention strategies have yet to be developed for individuals with psychopathic traits, there has been preliminary research on treatments designed to reduce violent outcomes for psychopathic adults and adolescent offenders.

The majority of treatment outcome studies of violence have examined psychopathy as a moderator of violent outcomes in convicted offender populations (Reidy, Kearn, & DeGue, 2013). These studies depict a generally consistent pattern, suggesting that psychopathy moderates treatment outcomes predicting treatment dropout and violent recidivism with sexual and/or general violence; and at faster rates. In contrast, a study of community based psychiatric patients found that psychopathy did not moderate treatment outcomes. However, the data also suggested that reductions on violence for the high treatment group had dissipated by the one year follow-up (Skeem, Monahan, & Mulvey, 2002). Additionally, this study was marked by large attrition rates among the highest risk patients, so replication of these findings is necessary. Notably, a number of methodological limitations complicate interpretation of the treatment outcome literature for psychopathy and violence in adults (D'Silva, Duggan, & McCarthy, 2004; Reidy et al., 2013), so clear-cut conclusions are premature. Yet, taken as a whole, this literature suggests that *adult* psychopathic persons may be more difficult to treat, or at least require both more resources to treat and larger treatment doses to achieve sufficient changes in violent behavior.

Although continued research on this topic within this adult population with increased methodological rigor is needed, the literature suggests that the violence of adult psychopaths is challenging to address. These findings underscore the need for primary prevention approaches that start at an early stage of life. Indeed, meta-analyses suggest that the earlier in life we can intervene the greater the efficacy of the intervention will be (e.g., Dekovic et al., 2011; Weisz, Weiss, Alicke, & Klotz, 1987). Notably, Dekovic and colleagues found that effect sizes for prevention of criminal offending in adulthood were modest at best in the 9 studies they analyzed. Nevertheless, their findings provided supporting evidence for a public health model of violence prevention. Indicated prevention programs, namely, those that target individuals who are already demonstrating risk factors for the condition (rather than universal programs), prevention programs that worked with youth most at risk, and prevention programs that started in infancy or preschool versus grade school were significantly more effective in the prevention of adult criminal offending. Moreover, the authors reported that tailored programs targeting key putative etiological risk factors (e.g., socio-emotional development) rather than general skills (e.g., academic and intellectual development) were more likely to demonstrate preventative effects.

Indeed, for adolescents showing signs of psychopathy, there is reason to believe that an intervention specifically tailored to the unique socio-emotional developmental constraints of psychopathic characteristics may be effective in reducing violence. The Mendota Juvenile Treatment Center (MJTC) was not developed specifically for psychopathic youth, but it was developed for severely violent adjudicated youth and possesses a number of characteristics that align well with the developmental processes of children with CU traits and violent behavior. Moreover, this program has been evaluated and replicated with adolescents with psychopathy traits and thus far is one of the only interventions to demonstrate sustained efficacy with this population. The main philosophical principles of MJTC are the reduction of sanctions for negative behavior and the implementation of behavioral strategies that appear to approximate a type of token economy. In other treatment models, the use of punitive sanctions for violent and disruptive behavior often results in expulsion or temporary removal from treatment programs due to segregation, which may paradoxically reinforce the undesired behavior. At MJTC, when increased security measures are required, a concomitant increase in individualized treatment contact occurs, which precludes negative reinforcement of disruptive behavior. Thus, MJTC appears to shift reinforcement from negative behaviors to the desired prosocial behaviors: the program relies on a system of rapidly increasing incentives for positive interpersonal functioning, behavioral control, and participation in treatment (for more details, see Caldwell & Van Rybroek, 2005).

Using propensity score analysis to control for nonrandom assignment, Caldwell, Skeem, Salekin, and Van Rybroek (2006) compared 56 adolescents mandated to MJTC to 85 adolescents in a “treatment as usual” (TAU) comparison group. Results indicated that compared to a group of high psychopathy adolescents from traditional correctional institutions, high psychopathy adolescents incarcerated and treated at MJTC were significantly less likely to violently recidivate at two year follow-up. These findings were replicated again using a TAU comparison group with a larger sample ($n = 248$) and follow-up period ranging from 24 to 79 months (Caldwell, 2011). In a third study, Caldwell, McCormick, Umstead, and Van Rybroek (2007) found that the association between

psychopathy and violence dissipated among adolescent offenders treated at MJTC. Specifically, there was no relationship between psychopathy and violent or general recidivism at 4 year follow-up. Although this study did not utilize a TAU comparison group, it contributes to the evidence demonstrating the efficacy of MJTC to reduce the violence associated with psychopathy.

Caldwell, McCormick, Wolfe, and Umstead (2012) expanded upon the previous findings to examine psychopathy traits themselves as an outcome above and beyond violent behavior. Changes in psychopathy scores were evaluated at 3 time points over 180 days. The decline in CU traits from time 1 to time 2 was approximately half of that observed from time 2 to time 3, indicating that the rate of decline in CU traits increased over time. In turn, these changes in psychopathy traits predicted improved institutional behavior and treatment compliance. As the authors noted, these results suggest that a sufficient dosage of treatment may be effective at reducing both psychopathic traits and the violence they may engender.

Several other studies have indicated the possibility of reducing psychopathic traits in child and adolescent populations, with sustained effects as long as three years (Kolko et al., 2009; McDonald, Dodson, Rosenfield, & Jouriles, 2011). Although these studies offer promising strategies for youth with psychopathy traits, they did not evaluate violence outcomes. Thus, replication and extension of these findings is necessary to demonstrate that the reductions in psychopathy translate into reductions in violence. Both of these interventions employed multi-pronged treatment that included elements of parent training to reinforce prosocial behavior strategies and alternatives to coercive or aggressive tactics (Kolko et al., 2009; McDonald et al., 2011). These results at first glance appear to contradict the findings of Lynam et al. (2008) who reported that parenting practices did not protect against psychopathy traits over an 11 year period. Yet, we would argue that these findings are actually consistent. As Hawes and Dadds (2005) found, negative or punitive parenting practices are ineffective for youth with CU traits. In contrast, reward strategies are often effective, which is consistent with the research on neural conditioning reviewed above (e.g., Birbaumer et al., 2005; Bjork et al., 2012; Buckholtz et al., 2010; Flor et al., 2002; Pujara et al., 2013). Thus we posit that like the MJTC, these interventions incorporated strategies that focus on positively reinforcing prosocial behaviors and decreasing the use of punishment.

Although these studies may not reflect the evaluation of primary prevention strategies, we believe they offer crucial information for this purpose. These promising treatment strategies may proffer valuable information that could be adapted for the development of both primary and secondary prevention programs designed to prevent the violence associated with psychopathy.

9. Integrating Psychopathy and the Public Health Approach

A number of scientific disciplines have proffered great knowledge and advanced our understanding of violence. Yet, public health is unique in its multidisciplinary scientific approach aimed explicitly at identifying effective strategies to prevent violence, injury, and death (Mercy et al., 1993). This approach is a multistage process that includes 1) defining the problem, conducting surveillance and data collection; 2) identifying risk and protective

factors; 3) developing and testing interventions; and 4) disseminating and implementing efficacious prevention interventions with continued measurement to evaluate effectiveness and cost-effectiveness (Mercy et al., 1993). While it may appear that these steps would occur in a linear order, they in fact, are ongoing and thus often operate in tandem: surveillance systems maybe used to identify risk and protective factors or to evaluate the effectiveness of prevention strategies; pertinent risk and protective factors may moderate the efficacy of prevention strategies; dissemination and implementation of efficacious strategies to different populations may require translation based on unique risk and protective factors; the development and evaluation of prevention interventions may involve identification and assessment of new risk and protective factors (Mercy et al., 1993). In the sections that follow we highlight how addressing psychopathy can advance violence prevention efforts in public health and how the public health approach can advance our knowledge of psychopathy.

9.1. Masking Effects in Evaluation Research

Measuring psychopathy traits in public health research has the potential to increase precision in identifying the effects of violence prevention programs. Considering the disproportionate influence of this small subset of the population on overall levels of violence (e.g., Beaver, 2013; Wolfgang et al., 1972), it is reasonable to suspect that this small subset may exert similar influence on the outcomes of evaluation research. When psychopathy traits are unmeasured and uncontrolled, potentially effective interventions and prevention strategies may appear ineffective. For example, Olver, Lewis, and Wong (2013) found that their Aggressive Behavior Control treatment program was related to therapeutic change, as reflected by reductions in risk for violence and violent recidivism, only when controlling for psychopathy. Moreover, interventions shown to be efficacious and effective for youth (e.g., Fagan & Catalano, 2013; Matjasko et al., 2012) may yield attenuated effect sizes (e.g., Dekovic et al., 2011) because of disproportional weighting of psychopathic traits in the intervention group. Highly psychopathic persons are more likely to be recruited or mandated to participation in violence intervention strategies because they are at greater risk for violence. Thus, in studies that lack random assignment, measuring psychopathy can provide more accurate estimates of intervention effects by means of such statistical methods as covariance adjustment or propensity score analysis. Alternatively, some of these interventions may be effective with psychopathic youth and may be the best method of intervention for these adolescents. Nevertheless, if we do not measure psychopathy traits, we may be unable to identify interventions that may be more effective for high risk youth. Additionally, psychopathic persons appear to require greater resources and are more likely to drop out from interventions compared with non-psychopathic persons (Reidy et al., 2013). This knowledge may be informative for researchers developing programs, as it will offer implications for how interventions should be implemented. For example, adolescents treated at MJTC could not withdraw from the program and there was a high ratio of staff to offenders necessary to implement the intervention. These components may not be feasible in alternative settings such as those in which school-based interventions are administered.

9.2. Surveillance

In the realm of public health, extensive surveillance systems are often employed to collect data regarding the prevalence of various types of injuries or diseases in a particular

population, as well as behaviors and risk factors that give rise to them (Mercy et al., 1993). Public health surveillance is the ongoing systematic collection, analysis, and interpretation of health related data, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling disease and injury for the planning, implementation, and evaluation of public health practice (Thacker & Berkelman, 1988). Surveillance within the field of public health is carried out for the purpose of serving as an early warning system for impending public health emergencies, documenting the impact of intervention strategies, or monitoring the epidemiology of health problems, and to inform public health policy and strategies (WHO, 2014).

From a public health perspective, surveillance is essential for primary prevention. Nevertheless, surveillance of psychopathy and CU traits across the lifespan is lacking, limiting conclusions regarding the impact of violence perpetrated by psychopathic individuals. Violence prevention work within public health would benefit from increased surveillance of psychopathy and its relation to violence and other health outcomes. To track the impact of the violence associated with psychopathy, a reliable and valid means of assessing this construct across developmental stages is necessary. A proliferation of research in recent decades has spawned multiple interrelated measurement methods (e.g., Edens et al., 2001; Hare & Neumann, 2008; Lilienfeld & Fowler, 2006; Sharp & Kine, 2008). Nevertheless, the measurement of psychopathy in real-world settings typically occurs only reactively by the criminal justice system. Moreover, the measures of psychopathy typically used in these settings, such as the PCL-R, are time and resource-intensive. Consequently, the use of these forensic measures is rarely logistically feasible, because effective surveillance requires administration of measures to diverse populations. This pragmatic limitation has precluded psychopathy surveillance in nationally representative samples, particularly with youth. Fortunately, a growing literature supports the use of self-report measures for the detection of psychopathy traits and prediction of aggressive behavior (Lilienfeld & Fowler, 2006) potentially even at clinically diagnostic levels (Kimonis et al., in press). Moreover, researchers have implemented resource-efficient methods of surveying psychopathy traits in large samples and longitudinally (e.g., Fontaine et al., 2010; Kimonis et al., in press; Trouton et al., 2002). Considering the existence of established youth surveillance systems (e.g., University of Michigan's Monitoring the Future survey, National Health and Nutrition Examination Survey, National Survey of Children's Exposure to Violence, National Survey on Drug Use and Health), surveillance of psychopathy traits could be implemented by means of incorporation into existing efforts or development of similar systems.

9.3. Protective Factors

Perhaps one of the most glaring gaps in the psychopathy literature is the lack of knowledge regarding protective factors. Identification of risk and protective factors is a critical step in the public health approach to violence prevention (Mercy et al., 1993). Although several biological and environmental risk factors have been identified, we are unaware of any factors that have been shown to reduce risk for psychopathy or the violence it presumably engenders. In particular, we have yet to identify *modifiable* protective factors. Nevertheless, we know that at least a small group of youth with psychopathic traits does not become violent (Fontaine et al., 2011). From a public health perspective, these youth may represent a

critical subgroup of the population that possesses at least partial immunity (i.e., protective factors) against the deleterious impact of psychopathic traits. Expanding measurement and research on psychopathic traits at early ages may identify those individual experiences, personal characteristics, and/or environmental factors that inoculate youth possessing marked psychopathy traits against violence. Considering the relation between psychopathy and violence-related outcomes, it is imperative that violence prevention researchers identify both modifiable risk and protective factors for psychopathy and consequent violence.

9.4. Primary Prevention

We are hardly the first to suggest that psychopathy is a major public health issue; nor are we the first to argue for a prevention strategy that harnesses early identification to target this small group of high-risk persons (Coid & Yang, 2011; Lynam, 1996; Vaughn & DeLisi, 2008). Lynam (1996) made the case nearly two decades ago for the early identification of chronic offenders by measuring psychopathy traits. He noted that tertiary prevention strategies (i.e., incarceration) have largely been ineffective and argued instead for the development of primary or secondary prevention strategies. We echo his contentions, with the caveat that further work will be needed to determine to extent to which such identification efforts will result in false-positive errors. The aggregate of psychopathy research examining genetic factors, neurodevelopmental correlates, life-course persistence, and treatment response points to a need for primary prevention of psychopathy and its attendant violence. Personality and its associated behaviors often become thoroughly entrenched and may be increasingly resistant to change as they are rehearsed and reinforced (Buss, 1995; Roberts & DeVecheio, 2000). Consequently, far greater time and resources may be required to achieve smaller gains from treatment efforts. Thus, applying primary prevention approaches to psychopathic violence is an additional essential avenue for the public health field. Moreover, the proactive approach of preventing the onset of violence would bear substantial implications at the individual and societal levels when considering the cost of psychopathy across the lifetime. The violence attributable to psychopathy constitutes a substantial portion of the societal burden to the public and thus necessitates significant attention by prevention experts. Psychopathy costs the criminal justice system hundreds of billions of dollars annually (Kiehl & Hoffman, 2011). This figure does not even consider the significant annual costs to the public health system, let alone the incalculable physical and psychological suffering incurred by the victims of violence. Moreover, these costs reflect only a single year in the life-course of psychopaths' violence. The cumulative lifetime cost of the violence associated with psychopathy is substantially greater as is the unquantifiable suffering experienced by victims. Indeed, the increased resources required to implement primary prevention strategies may be recouped in the reductions of societal costs (e.g., to the criminal justice and public health systems) achieved by these prevention efforts. For example, Fagan and Catalano (2013) reported on a number of prevention programs that required varying degrees of resource investment. According to their analysis, resource-intensive strategies, such as Multisystemic Therapy and Multidimensional Foster Care with Therapy, offered returns between four and five dollars for every dollar invested (Fagan & Catalano, 2013). Every \$10,000 spent on a youth in the MJTC proffered a savings of approximately \$70,000 due to lowered recidivism, particularly violent recidivism (Caldwell, Vitacco, & Van Rybroek, 2006). This analysis is probably a conservative estimate, as the

authors included only costs paid through state taxes and did not include costs to the victim (e.g., lost productivity and medical and mental health expenses resulting from violence-related injuries and deaths). Similarly, the cost-benefit ratios of Fagan and Catalano may be conservative, as many of them do not account for lifetime offending. Caldwell, Skeem, et al. (2006), Caldwell, Vitacco, et al. (2006) noted that the youth in their sample presented with “substantial psychopathic personality features” and “extensive histories of violence” (p. 163), suggesting that the societal costs of these youth's violence would be substantial. Indeed, estimates from Pennsylvania suggest that juvenile violent crime may account for nearly 50% of the cost to victims of all violent crime (Miller, Fisher, & Cohen, 2001). Intervening with youth before they become violent would markedly increase these returns. Cohen and Piquero (2009) estimated that intervening at birth with high-risk youth would save between \$2.6 and \$4.4 million per individual by the time they reached adolescence. These economic data, as well as the lack of data indicating effective treatments for adult populations, point to need to intervene at an early age. The promise of a program like the MJTC suggests that the benefits could be magnified if found to be effective as a primary prevention approach.

9.5. Tailoring and Implementing Prevention Strategies for Selected & Indicated (High-Risk) Populations

Considering psychopaths' largely distinctive pattern of neural and behavioral conditioning, it may be important to design intervention strategies that focus on positively reinforcing prosocial behaviors early in life, before antisocial and violent behaviors are reinforced by peers and others. Children demonstrating precursors for psychopathy traits may benefit from structured interventions that employ positive reinforcement strategies, much like those MJTC has implemented (Caldwell & Van Rybroek, 2005). Nevertheless, if callous-unemotional youth could be identified before they violently offend, they could be targeted for prevention strategies adapted from validated interventions such as MJTC, rather than waiting to implement interventions through the criminal justice system. MJTC applies basic principles of behavioral conditioning and token economies to gradually shift reinforcement from antisocial to prosocial behaviors. Thus, by reducing the focus on punitive sanctions and increasing the focus on positive reinforcement, they have tailored an intervention to the reinforcement processes associated with psychopathy. This strategy may ultimately prove promising if adapted into a primary prevention approach.

Of course, even if we know when and how to intervene, that does not tell us *for whom* to intervene. Several identified biomarkers such as presence of the CSP, electrodermal reactivity, or low heart rate might one day suggest methods for identifying high-risk populations (e.g., Choy et al., 2015; Gao et al., 2010; Glenn, Raine, Venables, & Mednick, 2007; Raine et al., 2010; White et al., 2013). Likewise, considering our knowledge regarding the genetic contribution to psychopathy and violence (Fontaine et al., 2010, 2011; Viding et al., 2005, 2007) as well as the familial transmission of chronic violent offending (e.g., Beaver, 2013), it may make sense to identify individuals who come from families with criminal parents or siblings (e.g., Farrington, 2006) so that they can receive preventive resources as needed. Additionally, a number of prenatal and perinatal complications have been linked to increased risk for the emotional deficits of psychopathy in adolescence and

It is our hope that if a primary prevention strategy employing methods of positively reinforcing prosocial behavior while downplaying the role of punishing negative behaviors is implemented, the risk of iatrogenic outcomes would be minimal, although this strategy will require empirical validation to ensure that there are no unintended side effects. For example, there may be certain prosocial benefits to at least mild levels of callous and unemotional characteristics, especially when these characteristics can be regulated by individuals over time. For example, physicians' ability to temporarily suppress their empathic responding (e.g., Decety, Yang, & Cheng, 2010) may allow them to succeed in high-stress situations. Likewise, these attributes in mild form may assist individuals to function effectively in certain professions, such as law enforcement, fire-fighting, front-line military combat, bomb-disposal, and the like (see Skeem et al., 2011, for a broader discussion). As a consequence, any method of early identification must be undertaken with great care for the ethical implications for both the individual and society. Such ethical concerns about the potential consequences of identifying you that risk for violence must guide our research and prevention efforts, but should not preclude them.

11. Conclusions

We have tried to make the case that psychopathy is a serious public health problem that requires public health solutions. The role of psychopathy, especially its core affective traits and associated antisocial behaviors, as a risk factor for violent behavior is well-established. Nevertheless, our knowledge of how to address the broader societal problem of psychopathy is limited by the fact that our approach to psychopathy has been largely reactive rather than proactive. Although some have concluded pessimistically that psychopathic persons are not amenable to treatment, there is preliminary but promising evidence that certain interventions implemented before adulthood may be effective. Nevertheless, the crucial question of whether violence perpetrated by psychopaths can be *prevented* before it emerges remains largely unanswered.

To address this question, we argue (see also Coid & Yang, 2011; Lynam, 1996), that adopting a public health perspective on the relation between psychopathy and violence could be of substantial value to the field and to society as a whole. Within the public health model, greater research and surveillance (monitoring) of psychopathic traits across the lifespan, although not without important pragmatic and ethical challenges that require thoughtful analysis, can alert researchers to potentially modifiable protective factors, the developmental trajectories that predispose to violence, and the developmental periods most appropriate for intervention. Because many and perhaps even most individuals with core emotional deficits (i.e., CU traits) related to psychopathy do not become violent, research on the protective variables that buffer these at-risk individuals from violence could be fruitful for prevention efforts. From this information, as well as information from successful programs such as MJTC, novel interventions may eventually be developed and evaluated as primary prevention strategies for psychopathy and the violence associated with it. Greater attention to pioneering work on psychopathy and violence would enhance our base of knowledge and ensure maximum benefits, not only for individuals targeted by violence prevention efforts, but also for the communities in which they live.

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