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# Public Health and Safety

## The Social Determinants of Health and Criminal Behavior

Gregg D. Caruso

# Public Health and Safety: The Social Determinants of Health and Criminal Behavior

Gregg D. Caruso
SUNY Corning
USA

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There are a number of important links and similarities between public health and safety. In this extended essay I will defend and expand my *public health-quarantine model* (see Caruso 2016, forthcoming-a, b; Pereboom and Caruso 2017), which is a non-retributive alternative for addressing criminal behavior that draws on the public health framework and prioritizes prevention and social justice. In developing my account, I will explore the relationship between public health and safety, focusing on how social inequalities and systemic injustices affect health outcomes and crime rates, how poverty affects brain development, how offenders often have pre-existing medical conditions (especially mental health issues), how involvement in the criminal justice system itself can lead to or worsen health and cognitive problems, how treatment and rehabilitation methods can best be employed to reduce recidivism and reintegrate offenders back into society, and how a public health approach could be successfully applied within the criminal justice system. My approach will draw on research from the health sciences, social sciences, public policy, law, psychiatry, medical ethics, neuroscience, and philosophy, and I will deliver a set of ethically defensible and practically workable proposals for implementing the public health-quarantine model.

I begin in §1 by discussing recent empirical findings in psychology, neuroscience, and the social sciences that provide us with an increased understanding of the social and neurological determinants of health and criminal behavior. I then turn in §2 to my *public health-quarantine model* and argue that it provides the most justified, humane, and effective approach for addressing criminal behavior. I conclude in §3 by proposing a *capability approach* to social justice grounded in six key features of human well-being. I argue that we cannot successfully address concerns over public health and safety without simultaneously addressing issues of social justice—including the *social determinants of health* (SDH) and the *social determinants of criminal behavior* (SDCB)—and I recommend eight general policy proposals consistent with my model.

## I. The Social Determinants of Health and Criminal Behavior

The *social determinants of health* are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life (World Health Organization 2017). These forces and systems include economic policies and systems, development agendas, social norms, social policies, and political systems. A core function of public health institutions is to identify and take action on the social determinants of health to address health inequities. One of the things I want to argue in this paper is that, just as it is important to identify and take action on the *social determinants of health* (SDH) if we want to improve health outcomes, it is equally important to identify and address the *social determinants of criminal behavior* (SDCB) if we want to reduce crime and improve public safety. Since the social determinants of health and criminal behavior are broadly similar, or so I will argue, I contend that we should adopt a broad public health approach focused on prevention and social justice for identifying and taking action on these shared social determinants.

### 1.1 **Poverty and Socioeconomic Status**

One of the most important determinants of health and criminal behavior is poverty and socioeconomic status. In 2015, 43.1 million people in the United States (13.5% of the population) lived below the official poverty line (United States Census Bureau 2016), and worldwide 9.6% of the world's population lived on $1.90 or less a day (The World Bank 2015). This is significant because we know that poverty or low socioeconomic status can have profound negative effects on health. Numerous studies have shown that individuals with lower *socioeconomic status* (or SES) have higher rates of mortality and

morbidity, including obesity, cardiovascular disease, and mental illness (see, e.g., Adler et al. 1994; Anderson and Armstead 1995; Chen et al. 2002; Chen 2004; Berkman and Epstein 2008; Akil and Ahmad 2011; Franks et al. 2011).[1] One study found that low SES had almost the same impact on health than smoking or a sedentary lifestyle, and was associated with a reduced life expectancy of 2.1 years (Stringhini et al. 2016). Interestingly, the relationship between SES and health holds true whether it is measured as the prevalence rate of illness, the severity of illness, or the likelihood of mortality, and it is true for most types of diseases, as well as for many risk factors for disease (Chen 2004: 112; Berkman and Epstein 2008). It also holds true across the life span, from childhood to older adulthood. And perhaps most intriguing, the relationship between SES and health exists as a gradient—i.e., it is not just that poor people have poorer health than rich people. Rather, "each step increase in SES is accompanied by incremental benefits in health" (Chen 2004: 112).

In addition to low SES, higher levels of income inequality have also been shown to have a negative effect on health, including higher rates of mortality and morbidity (see Kawachi et al. 1997; Kennedy et al. 1996; Pickett et al. 2005; Diez-Roux 2000; Pickett and Wilkinson 2010; Johnson et al. 2015). In a survey of data from 12 developed countries, Pickett and Wilkinson (2010) discovered that countries with higher income-inequality had three times as many individuals with mental illness than those with lower income-inequality. And Kahn et al. (2000) found that those living in states with higher income inequality had higher rates of depressive symptoms and poorer self-rated health in mothers at the bottom 20% of household income.

Unfortunately, these negative effects of socioeconomic status are not limited to poor health. A number of studies have also found that poverty and low SES during childhood is a distal risk factor for subsequent criminal and substance misuse behaviors (Carlen 1988; Wright et al. 1999; William and McShane 1998; Galloway and Shardhamar 2010; Sareen et al. 2011; Fergusson, Swain-Campbell, and Horwood 2004; Webster and Kingston 2014). A Norwegian total population study found that children of parents in the lowest income decile were twice as likely to be convicted of a violent or drug crime compared with their peers in the fifth decile (Sariaslan et al. 2014: 286; Galloway and Shardhamar 2010). Similarly, a number of longitudinal USA studies have linked low-income levels with substance use disorders (Sareen et al. 2011; McMillan et al. 2010). Additional studies have found that childhood socioeconomic disadvantage is associated with increases in rates of both self-reported crime and officially recorded convictions (Fergusson, Swain-Campbell, and Horwood 2004) and that poverty increases the likelihood that a person will commit crime, be apprehended, and be the victim of crime (Sampson and Laub 2003; Lewontin 2000). The relationship between poverty and violence also appears to hold across different sorts of violent crimes, including murder, assault, and domestic violence (Kelly 2000; Martinez 1996; Parker 1989; Pridemore 2011).

This does not mean, of course, that poverty *alone* is responsible for these anti-social behaviors since, as we'll see below, there are other important social determinants of drug misuse and violent behavior. We also know that poverty and low SES can cause depression in adolescents, and studies have found that an increase in depressive symptoms is associated with a significant elevated risk of subsequent violence (Yu et al. 2017). Behavioral genetic investigations also indicate that the likelihood for both violent offending and substance misuse are influenced by shared genetic and family environmental factors (Frisell et al. 2011; Kendler et al. 2012). The few studies, however, that have controlled for these genetic factors have found that there still remains an inverse association between parental income during childhood and development of behavioral problems (D'Onofrio et al. 2009; Hao and Matsueda 2006; Blau 1999; Jaffee et al. 2012; cf. Sariaslan et al. 2014). It would seem, then, that poverty or low SES remains a risk

[1] *Socioeconomic status* (or SES) is a multidimensional construct. It typically combines a number of objective factors such as an individual or parent's education, occupation, and income, as well as subjective perceptions of social status and social class (Brito and Noble 2014: 1; McLoyd 1998).

fact for substance misuse and criminal behavior.[2]

Determining exactly why this is the case is no doubt difficult to do, but we are beginning to understand some of the causal mechanisms at play. We know, for instance that: "Human development does not occur within a vacuum. The environmental contexts and social connections a person experiences throughout his or her lifetime significantly impact the development of both cognitive and social skills" (Brito and Noble 2014: 1). Numerous studies have shown that socioeconomic disparities profoundly affect physical health, mental wellbeing, and cognitive development (Anderson and Armstead 1995; Brooks-Gunn and Duncan 1997; McLoyd 1998; Evans 2006; Brito and Noble 2014; Nobel et al. 2015a). Studies indicate, for instance, that SES accounts for approximately 20% of the variance in childhood IQ (Gottfried et al. 2003) and it has been estimated that by age five, chronic poverty is associated with 6 to 13-point IQ reduction (Brooks-Gunn and Duncan 1997; Smith et al. 1997; as cited by Brito and Noble 2014). Evidence suggests multiple possible, and non-mutually exclusive, explanations for these findings (Brito and Nobel 2014: 2). Socioeconomically disadvantaged children, for instance, tend to experience less linguistic, social, and cognitive stimulation from their caregivers and home environments than children from higher SES homes (Brito and Nobel 2014: 2; Hart and Risley 1995; Bradley et al. 2001; Bradley and Corwyn 2002; Rowe and Goldin-Meadow 2009). Additionally, individuals from lower SES homes report more stressful events during their lifetime, and the biological response to stressors has been hypothesized as one of the underlying mechanisms for health and cognitive disparities in relation to SES (Brito and Nobel 2014: 2; Adler et al. 1994; Anderson and Armstead 1995; Cohen et al. 1999; Hackman and Farah 2009; Nobel et al. 2012a; Wilkson 1999).

These experiential differences are also "likely to have specific downstream effects on particular brain structures" (Brito and Noble 2014: 2). Disparities in the quantity and quality of linguistic stimulation in the home, for instance, have been associated with developmental differences in language-supporting cortical regions in the left hemisphere (Kuhl et al. 2003; Conboy and Kuhl 2007; Kuhl 2007; as cited by Brito and Noble 2014: 2). We also know that the experience of stress has important negative effects on the hippocampus (Buss et al. 2007; McEwen and Gianaros 2010; Tottenham and Sheridan 2010), the amygdala (McEwen and Gianaros 2010; Tottenham and Sheridan 2010), and areas of the prefrontal cortex (Liston et al. 2009; McEwen and Gianaros 2010)—structures which are linked together anatomically and functionally (Brito and Noble 2014: 2). Several recent studies, in fact, have directly studied the connection between socioeconomic parameters (e.g., family income and parental education) and cognitive and neurological development (see, e.g., Hackman and Farah 2009; Hackman et al. 2010; Piccolo et al. 2016; Noble 2015b; Lawson et al. 2013; Mackey et al. 2015). They found that lower SES is related to smaller overall cortical surface and thinner prefrontal cortex (Nobel et al. 2015b; Lawson et al. 2013), that both family income and parental education moderate non-linear age-related variations in cortical thickness (Piccolo et al. 2016), and that female adolescents in neighborhoods with high-inequality and low household income displayed a significant age-related decrease in cortical thickness compared to their peers (Parker et al. 2017).

We can conclude that while we may not yet fully understand all the causal mechanisms by which socioeconomic factors affect health and safety, poverty and socioeconomic status are important social determinants of both. Poverty and low SES can increase levels of stress, expose agents to more negative life events, limit educational opportunities, and profoundly affect the social, cognitive, and neurological development of agents. To reduce crime and increase health we need to adopt policies that directly address these socioeconomic factors.

### 1.2. Abuse and Domestic Violence

In addition to poverty and socioeconomic

[2]Studies also reveal that societies with greater inequality have higher rates of violent crime (see, e.g., Vives-cases et al. 2015; Enamorado and Rodrigiez-Castelan 2015; Ouimet 2010).

status, there are also a number of other social determinants of health and criminal behavior that a public health approach would need to address. These include education, housing, healthcare, childhood abuse, and domestic violence. Take exposure to violence, for example. While it transcends age and SES and affects all levels of income, education, and occupation, it overlaps with these other social determinants of health and crime since youth from lower SES backgrounds tend to have increased exposure and likelihood of suffering from detrimental future outcomes. We know that safe, stable, nurturing relationships and environments are essential to prevent child maltreatment and to assure that children reach their full potential (American Psychological Association Fact Sheet 2017; Centers for Disease Control and Prevention 2014). And child maltreatment takes a large economic toll on our society through child welfare costs, physical and mental health costs, special education costs, and legal system costs (Fang et al. 2012; APA 2017). Research shows that adverse childhood experiences are associated with risky health behaviors, crime, chronic health conditions, low life potential, and early death (Centers for Disease Control and Prevention 2016)—all of which have a profound negative impact on the health and opportunity of individuals.

Exposure to violence during adolescence, for instance, has been shown to correlate with reduced educational attainment, decreased odds of getting married, reduced income and net worth in adulthood, and increased instances of delinquency and violent behavior (Covey, Menhard, and Franzese 2013; Weaver, Borkowski, and Whitman 2008; Stouthamer-Loeber et al. 2002). A study conducted by Weaver, Borkowski, and Whitman (2008) found that witnessing violence and victimization prior to age ten predicted delinquency and violent behaviors even after controlling for prenatal maternal and early childhood externalizing problems. Violence victimization, in fact, has been found to be the single best predictor of juvenile violent behaviors for both boys and girls in a nationally representative sample of adolescents (Blum, Ireland, and Blum 2003). Among urban black adolescents, retrospective reports of witnessing violence and victimization were the strongest predictor of current use of violence, such as involvement in fights and carrying weapons (Durant et al. 1994; Weaver, Borkowski, and Whitman 2008: 96).[3] And Flannery et al. (1998) found that violent behavior among adolescents who were exposed to high levels of home violence were three times higher for girls and two times higher for boys when compared with adolescents from low-violence homes (see also Stouthamer-Loeber et al. 2002). Additional studies have found that exposure to violence at school is associated with concurrent violent behavior as well as psychological trauma (Flannery, Wester, and Singer 2004), that observing violence and family conflict is correlated with increased depressive symptoms during high school (Eisman et al. 2015; Lambert et al. 2010), that adolescents exposed to community violence have lower high school grade point averages and decreased enjoyment and interest in school (Borofsky et al. 2013; Strom et al. 2013), and that neighborhood violence has a negative impact on children's math and reading scores on standardized tests (Milam, Furr-Holden, and Leaf 2010) (see also American Psychological Association Fact Sheet 2017).

Domestic violence is another social determinant of health and safety and has been shown to have long-term negative effects on employment, mental health, and incarceration rates, especially for women. Studies have found that women in abusive relationships frequently lose their jobs, experience high job turnover, and are fired or forced to quit more frequently (Crowne et al. 2011; Adams et al. 2013). And the negative effects of abuse on the ability to remain employed is not just short-term, it also inhibits women's ability to maintain a job for some time after the abuse ends (Adams et al. 2013). Domestic violence has also been identified as the primary cause of family homelessness in seventeen percent of cities across the United States (United States Conference of Mayors 2015). Other studies have found that 85-90% of women in prison have a history of being

[3]It should be noted that the carrying of weapons is often done out of fear of victimization rather than violent or malicious intent (Jenkins and Bell 1994).

victims of violence prior to their incarceration, including domestic violence, sexual violence, and child abuse (ACLU 2011). One reasons for this is that women are often coerced into criminal activity by their abusers or forced to fight back to defend their lives or their children's lives (Gilfus 2002).

A study of women incarcerated in New York's Rikers Island found that most of the domestic violence survivors interviewed reported engaging in illegal activity in response to experience of abuse, the threat of violence, or coercion by a male partner (Richie 1996). Another study found that, of 525 abused women at a mental health center who had committed at least one crime, nearly half had been coerced into committing crimes by their batterers as "part of a structural sequence of actions in a climate of terror and diminished, violated sense of self" (Loring and Beaudoin 2000). Women, however, are more likely to be incarcerated for drug and property crimes compared to men, and less likely to be incarcerated for violent crime (Carson 2016). Furthermore, women of color and low-income women are disproportionately affected by mandatory arrest policies for domestic violence. A New York City study found, for example, that of women who had been arrested with their abusers (dual arrest cases) or arrested as a result of a complaint lodged by their abusers (retaliatory arrest cases), 66% were African American or Latina, 43% were living below the poverty line, and 19% were receiving public assistance at the time (Haviland et al. 2001).

Sadly the incarceration of women has additional negative consequences. Studies indicate that 70% of women in prison are mothers (Bloom 2004) and many of them are the primary caretakers of their children at home (Richie 2000). In fact, 1.3 million children are affected by female imprisonment, including the children left at home when the mother is imprisoned and the babies born and raised in prison (Poehlman 2003). The impact of this on children and families is profound and hard to fully calculate. The statistics are even more disturbing when one looks at the number of children who have *either* parent in prison or jail. Between 1991 and 2007, the number of children with a parent in state or federal prison grew 80 percent. Today, an estimated 2.7 million children in the U.S. have a parent in prison or jail—that is 1 in every 28 children (3.6% of all children) (Pew Charitable Trust 2010).

### 1.3 Housing, Mental Illness, and Healthcare

Housing, mental illness, and access to healthcare are also social determinants of health and criminal behavior and quite often overlap for vulnerable populations. For example, about a fifth of the 1.7 million homeless people in the United States suffer from untreated schizophrenia or manic-depressive illness. And not surprisingly, mental illness often prolongs homelessness. Approximately 26% of homeless adults staying in shelters live with serious mental illness and an estimated 66% live with severe mental illness and/or substance use disorders. Mental illness and homelessness also puts people at an increased risk of being the victim of a crime as well as being arrested for a crime, particularly disorderly conduct and property theft. In 2005, more than half of all people incarcerated in prisons and jails had a mental illness: 56% of state prisoners, 45% of federal prisoners, and 64% of jail inmates (James and Glaze 2006). Of those who had a mental illness, about three-quarters also had a co-occurring substance use disorder (James and Glaze 2006). Researchers have also found that of more than 20,000 adults entering five local jails, 14.5% of the men and 31% of the women had serious mental illnesses, which taken together, comprises 16.9% of those studied—rates in excess of three to six times those found in the general population (Steadman et al. 2009). And the numbers are even worse for juvenile offenders. Approximately 60-70% of youth in juvenile justice detention, correctional, or community-based facilities have a diagnosable mental illness and over 27% have a serious mental illness that impairs his or her ability to function (Skowyra and Cocozza 2006).

Studies have also found that homelessness significantly increases the risk of incarceration (Greenberg and Rosenheck 2008). One national survey of jail inmates found that prison inmates who had been homeless (that is, those who

reported an episode of homelessness anytime in the year before incarceration) made up 15.3% of the U.S. jail population, or 7.5 to 11.3 times the standardized estimate of 1.36% to 2.03% percent in the general U.S. adult population (Greenberg and Rosenheck 2008). For those with mental illnesses, the rates of homelessness are even higher—about 20% (Greenberg and Rosenheck 2008). And in comparison with other inmates, those who were homeless were more likely to be currently incarcerated for a property crime, but they were also more likely to have past criminal justice system involvement for both nonviolent and violent offenses, to have mental health and substance abuse problems, to be less educated, and to be unemployed (Greenberg and Rosenheck 2008). Others studies have estimated that 25-50% of people experiencing homelessness also have a history of incarceration (Doherty 2015). Additional studies have found that the relationship between homelessness and prison runs in the other directions as well—i.e., upon release from prison those who were previously homeless often return to homelessness while many others experience homelessness for the first time. There are a number of reasons for this including decreased employability, stigmatization, and exclusion from public housing in some states due to a felony conviction. These findings suggest that homelessness and incarceration increase the risk of each other, and these factors seem to be mediated by mental illness, substance abuse, education, and low SES. Adopting a public health approach to health and safety would require tackling the problem of homelessness and working to more effectively transition offenders back into society.

Access to healthcare is another social determinant of health and criminal behavior. For many vulnerable populations, including the homeless, poor, and mentally ill, not having access to affordable and consistent healthcare means forgoing treatment for mental illness, substance use, chronic health conditions, acute care, and injuries. Those without health insurance have less access to recommend care, receive poorer quality of care, and experience worse health outcomes than insured adults do (Institute of Medicine 2002; McWilliams 2009; National Immigration Law Center 2014). Uninsured adults are more than 25% more likely to die prematurely than adults with health insurance (Bailey 2012). The Institute of Medicine (2009) estimates that lack of health insurance led to the death of 18,000 adults in the year 2000, making it the sixth most frequent cause that year of death among people aged 18 or 64. Those without access to healthcare typically avoid seeking medical care unless they are faced with an emergency, or they delay care until their symptoms become intolerable (National Immigration Law Center 2014; Davis 2003). As a result, "the uninsured are less likely to receive a diagnosis in the early stages of a disease and are more likely to suffer complications from aggravated medical conditions" (National Immigration Law Center 2014). They are more likely to receive, say, an initial diagnosis of cancer at a later stage of the disease and die within less time after diagnosis (Davis 2003). And with acute or sudden conditions, such as injuries, the uninsured tend to experience poorer medical outcomes, are less likely to fully recover, and more likely to die as a result of the injury (McWilliams 2009). The uninsured (and underinsured) are also more likely to be crushed by the healthcare costs associated with these treatments, forcing many to go bankrupt. According to Health Affairs, nearly 2 million Americans filed for medical bankruptcy in 2001 due to unexpected health problems (Himmelstein et al. 2005).

Studies have also found that people in the criminal justice system experience chronic health conditions, infectious diseases, substance use disorders, and mental illnesses at much higher rates than the general population (see, e.g., National Commission on Correctional Health Care 2002; Cloud 2014; Rich et al. 2014). And since more than 95% of prisoners eventually return to the general population, bringing their health conditions with them, and 80% are without health insurance upon reentry into the community (Rich et al. 2014), treatment initiated during incarceration frequently stops when an individual returns to society—including even HIV care, which often receives priority treatment in the incarcerated setting (Montague et al. 2012; Rich et al. 2011).

This has, as one would predict, profound negative health consequences. Numerous studies have found that risk of emergency care, hospitalization, and death is exceptionally high after release from jail or prison (Rich et al. 2014; Binswanger et al. 2007; Spaulding et al. 2011; Binswanger et al. 2013; Frank et al. 2013; Wang, Wang, and Krumholz 2013). If we want to improve public health and safety, we should heed the advice of Rich et al. (2014) and view incarceration as a public health issue and draw those who are incarcerated into the healthcare system. This is "critical for the nation" and "is especially relevant for poor communities, communities of color, and other socially marginalized groups that are both disproportionately imprisoned and often disenfranchised from medical care" (2014: 463).

### 1.4 **Education, Environment, and Nutrition**

We also know that education, environmental health, and poor nutrition are important social determinants and have a profound negative affect on public health and safety. Beginning with education, studies indicate that only about half of incarcerated adults have a high school degree or its equivalent (Harlow 2003) and youth in the juvenile system are significantly more likely than other youth to have academic skills well below their grade level, possess a learning or developmental disability, and drop out of school (Katsiyannis et al. 2008). According to the Urban Institute, employment rates and earning histories of people in prison and jail are often low before incarceration as a result of limited education, low job skill levels, and the prevalence of physical and mental health problems—and incarceration only exacerbates these challenges (Holzer, Raphael, and Stoll 2003). A three-state recidivism study conducted from 2001 to 2006 found that less than half of people released from prison had secured a job upon their return to the community (Visher, Debus, and Yahner 2008). Almost all experts agree that education is important for preventing the occurrence of crime before it occurs and can help lower recidivism rates, especially if educational opportunities (including job training) are extended into prison. In fact, numerous studies show that enrollment in school and academic achievement is associated with lower levels of criminal behavior, reoffending, and better outcomes into adulthood (see, e.g., Katsiyannis et al. 2008). And a 2013 RAND Corporation study showed that participation in prison education, including academic and vocational programming, was associated with an over 40% reduction in recidivism—while also saving $4 to $5 for each dollar spent (Davis et al. 2013).

Environmental health and nutrition are also important determinants of public health and safety. As Georges Benjamin, the Executive Director of the American Public Health Association (APHA), writes: "Many communities lack access to nutritious, affordable food; are denied safe places to walk and exercise; or live near polluting factories." And as a result, the "health risks for these families are greater" (APHA 2017). The World Health Organization (WHO) defines *environment*, as it relates to health, as "all the physical, chemical, and biological factors external to a person, and all the related behaviors" (WHO 2006). And *environmental health* consists of preventing or controlling disease, injury, and disability related to the interaction between people and their environment. As APHA puts it:

> Environmental health is the branch of public health that: focuses on the relationships between people and their environment; promotes human health and well-being; and fosters healthy and safe communities. Environmental health is a key part of any comprehensive public health system. The field works to advance policies and programs to reduce chemical and other environmental exposures in air, water, soil and food to protect people and provide communities with healthier environments. (2017)

A comprehensive public health approach should therefore incorporate a focus on, and concern for, air quality, surface and ground water quality, toxic substances and hazardous wastes, climate change, exposure to lead in homes and schools, epidemiology, and other environmental factors, since we know that these can (and do) have

profound effects on public health and safety.

Given limited space, I can only briefly mention a few of these determinants of health here—for a more comprehensive understanding of these issues see World Health Organization (2002, 2006a). Let me begin with air quality. We know that poor air quality is linked to premature death, cancer, and long-terms damage to respiratory and cardiovascular systems (WHO 2005, 2006a, 2013, 2016a). And while we have made some progress reducing harmful air emissions, the EPA estimates that in 2008 approximately 127 million people lived in U.S. counties that exceeded national air quality standards (U.S. Environmental Protection Agency 2010). The World Health Organization (WHO) further estimates that in 2014, 92% of the world population was living in places where WHO air quality guidelines levels were not met (WHO 2016a). These are troubling statistics since outdoor air pollution was estimated to cause 3 million premature deaths worldwide in 2012 (WHO 2016a).

Surface and ground water quality is another major determinant of environmental health. Worldwide, water-related disease remains one of the major health concerns. Diarrhoeal diseases, which are largely derived from poor water and sanitation, accounted for 1.8 million deaths in 2002 and contributed around 62 million Disability Adjusted Life Years per annum (WHO 2004a). According to the World Health Organization, "this places diarrhoeal diseases as the sixth highest cause of mortality and third in the list of morbidity and it is estimated that 3.7 per cent of the global disease burden is derived from poor water, sanitation and hygiene (Pruss-Ustun et al. 2004)" (WHO 2006b: 3). It was estimated that in 2002, roughly one-sixth of humanity (1.1 billion people) lacked access to any form of improved water supply within 1 kilometer of their home, and approximately 40 per cent of humanity (2.6 billion people) lack access to some form of improved excreta disposal (WHO and UNICEF 2004). This is clearly a public health crisis and needs to be given urgent attention. To properly address it, though, a number of other social inequities will need to be addressed as well, since these negative health consequences are primarily borne by populations in developing counties and by children.

Exposure to lead is another major determinant of health. It can be caused (as we know from the tragic events in Detroit) by contamination from lead pipes, or by inhalation of lead particles, ingestion of lead-contaminated dust or paint chips, or eating food from lead-glazed containers. Lead is a cumulative toxicant that affects multiple body systems and is particularly harmful to young children. When it enters the body it is distributed to the brain, liver, kidney, and bones—and no known level of lead exposure is considered safe. According to the World Health Organization, young children are particularly vulnerable to the toxic effects of lead and can suffer profound and permanent adverse health effects, particularly affecting the development of the brain and nervous system (WHO 2010, 2016b). Lead also causes long-term harm in adults, including increased risk of high blood pleasure and kidney damage. And exposure to pregnant women to high levels can cause miscarriage, stillbirth, premature birth, and low birth weight, as well as malformations (WHO 2010, 2016b). Children who survive lead poisoning may be left with mental retardation and behavioral disorders. As the WHO describes, "lead affects children's brain development resulting in reduced intelligence quotient (IQ), behavioral changes such as reduced attention span and increased antisocial behavior, and reduced educational attainment" (WHO 2016b; see also 2010). In fact, numerous studies have found that the brain damage caused by exposure to lead and the neurobehavioral changes associated with it are irreversible and untreatable (Needleman et al. 1990; Bellinger, Stiles, and Needleman 1992; Burns et al. 1999; Rogan et al. 2001; Wright et al. 2008).

Given the focus of this paper, a few additional facts are worth mentioning. First, exposure to lead is often a byproduct of other social injustices and is completely preventable. As the WHO describes:

> Although lead can affect children from every socioeconomic stratum, socially and economically deprived children in low-

> income countries carry the greatest burden of disease due to lead. Poor people are more likely to be exposed to lead and to be at risk of exposure to multiple sources. They are more likely to dwell on marginal land (near landfills and polluted sites), to live in substandard housing with ageing and deteriorating lead-based paint, and to live near industry sites where waste is burned… (2010: 35).

The WHO report goes on to say:

> Communities that lack political influence, communities that are disenfranchised, and ethnic minority groups have repeatedly been shown to be at greater risk of exposure to lead than other populations. Such communities typically lack the power to force companies, such as lead recyclers or smelters, to stop polluting their environment. (WHO 2010: 35; see also American Pediatrics Committee on Environmental Health 2003).

I will address the issue of social justice in the final section of this paper, but it may already be clear to some readers that a comprehensive approach to public health and safety will require our institutions—especially our health and criminal justice institutions—to become de facto social justice institutions.

The second thing I want to note is that since lead exposure at young ages leaves children with problems like learning disabilities, ADHD, and impulse control, it has also been proposed that it can lead to increases in criminal behavior (Feigenbaum and Muller 2016; Aizer and Currie 2017; Billings and Schnepel 2015). Three different research teams have recently studied the effects of lead exposure on juvenile delinquency and crime rates, and each found some support for the claim. Feigenbaum and Muller (2016) used homicide rates between 1921 and 1936 and compared them to cities with municipal water systems that used either lead or iron service pipes. They found support for the hypothesis that lead service pipes considerably increased city-level homicide rates. Aizer and Currie (2017), on the other hand, used data linking preschool blood lead levels with data on school detention and suspension for 120,000 children born between 1990-2004 in Rhode Island. They found that a one-unit increase in lead increased the probability of suspension from school by 6.4-9.3% and the potential of detention by 27-74%, though the latter applied only to boys. Billings and Schnepel (2015) took a different approach and studied the effect of CDC-recommended interventions for kids with elevated blood lead levels. Since kids are required to test positive for lead twice to get services, they hypothesized that the random noise in the test could be used to study the effects of treatment—that is, they presumed that a lot of kids who test over the threshold once but not a second time do so for reasons other than their actual lead exposure. Using data on kids born between 1990 and 1997 in Charlotte, N.C., and comparing blood lead level tests with school records and adult arrests, they found that kids who received the intervention exhibited substantially less antisocial behavior, including suspensions, absences, school crimes, and violent crime arrests. While much more work in this area needs to be done, these findings suggest that lead exposure is potentially a public health *and* safety issue (see also Drum 2016).

Climate change is another determinant and is likely to have profound negative effects on public health and safety. The Intergovernmental Panel on Climate Change (IPCC) projects, for example, that climate change will impact sea level, patterns of infectious diseases, air quality, and the severity of natural disasters such as floods, droughts, and storms (IPCC 2014a, b, c; see also Patz et al. 2005; Kinney 2008). And while many are beginning to understand that we need to combat climate change for the sake of society and its environmental health (although, perhaps, not enough), very few realize that climate change is also a "threat multiplier" and will likely increase the incidents of war, conflict, and violence (NATO Science and Technology Committee 2017; Weaver et al. 2017; U.S. Defense Department 2015). A new NATO special report concludes that climate change is the ultimate "threat multiplier"—meaning that it can

exacerbate political instability in the world's most unstable regions. By intensifying extreme weather events like droughts, climate change stresses food and water supplies. In poor, arid countries already facing food and water shortages, this increased stress can lead to disputes and violent conflict over scarce resources. Rising sea levels can also cause refugee crises as large numbers of people are forced to relocate, and this too can cause conflict as resources get stretched and cultures clash.

The U.S. Department of Defense (DoD) has also concluded that climate change is a threat multiplier and that "climate change is an urgent and growing threat to national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources such as food and water" (DoD Report 2015: 3). Former Defense Secretary Chuck Hagel said, for example: "Rising global temperatures, changing precipitation patterns, climbing sea levels and more extreme weather events will intensify the challenges of global instability, hunger, poverty, and conflict." He went on to say that, "They will likely lead to food and water shortages, pandemic disease, disputes over refugees and resources, and destruction by natural disasters in regions across the globe" (DoD News 2014). The U.N. Secretary-General Antonio Guterres has also made similar statements (U.N. Press Release 2017). And in 2016, a coalition of twenty-five military and national security experts, including former advisers to Ronald Reagan and George W. Bush, warned that climate change poses a "significant risk to U.S. national security and international security" and requires immediate attention from the U.S. federal government (Center for Climate and Security 2016). It would seem, then, that climate change is not only an environmental issue, it is a major public safety concern.

One last social determinant worth mentioning here is diet and nutrition. We know that access to food, diet, and good nutrition are a critical pathway in influencing chronic conditions such as hypertension, diabetes, cardiovascular disease, obesity, cancer, osteoporosis, and dental disease (Viswanath and Bond 2007; WHO 2002, 2003). A joint report put out by the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) (2003) found, for example, that many of the deaths and disabilities caused by the major nutrition-related chronic diseases are due to risk factors that could easily be prevented. The report goes on to make a number of recommendations to help prevent death and disability from major nutrient-related chronic diseases. Unfortunately, many poor, disadvantaged, and marginalized people find it difficult (or even impossible) to follow these guidelines due to larger systemic social inequities. This is why concern for public health and safety cannot be separated from issues of social justice—i.e., we will need to address these larger social issues if we want to promote public health and safety. With regard to diet and nutrition, these include addressing household food security (e.g., access to affordable and appropriate food), national and regional food security (e.g., the ability to provide adequate nutrition within a country without relying heavily on imported products), and cold-chain reliability (the safety of transporting products that deteriorate microbiologically in the heat).

It should also be noted that like many of the other social determinants discussed thus far, there is good reason to think that poor nutrition and diet can also negatively impact public safety, not just health. For instance, several studies now suggest that nutrient-poor diets can contribute to violent criminal acts and psychopathology (see, e.g., Gesch, et al. 2002; Zaalberg et al. 2010; Deans 2011; Hibbeln 2001). In one study conducted by Bernard Gesch and colleagues (2002), 231 adult male prisoners received a daily vitamin, mineral, and essential fatty acid supplementation or a placebo. After 142 days, Gesch et al. found that the disciplinary incidents per 1000 person-days dropped from 16 to 10.4 in the active group, which is a 35% reduction, whereas the placebo group only dropped 6.7%—and for especially violent incidents, the active group dropped by 37%. Zaalberg and colleagues (2010) were able to replicate these findings—the only difference was that in their study the supplements used included increased doses of omega 3 fatty acids compared to Gesch. These results, especially with regard to omega-3s, are interesting since there is growing

evidence that low levels of omega-3 alongside other micronutrient deficits may be linked to antisocial and aggressive behavior (Gesch, et al. 2002; Corrigan et al. 1994; Schoenthaler 1983a, 1983b; Schoenthaler and Bier 2000).

Two randomized clinical trials, for instance, have found that anger scores were reduced among substance abusers and participants with borderline personality disorder when administered omega-3's (Buydens-Branchey, Branchey, and Hibbeln 2008; Zanarini and Frankenburg 2003). And a study by Gow and colleagues (2013) conducted in children and adolescents with ADHD and symptoms of conduct-disorder found that low blood levels of omega-3 were negatively associated with high scores on callous and unemotional (CU) traits. This is particularly interesting since callous and unemotional traits are a sizeable risk factor for the later development of psychopathy and antisocial behaviors. These and other findings lead Adrian Raine to suggest that omega-3s might be a place to intervene given everything we know about the neuroanatomy of violent criminals (Raine et al. 2016)—since it has been shown that omega-3 supplementation increases the function of the dorsolateral prefrontal cortex, a region Raine found to have higher rates of damage or dysfunction in criminal offender (Raine 2014; Raine et al. 2000).

In one study, Raine and colleagues (2014) conducted a longitudinal study of children in the small island of Mauritius, and found that omega-3 may have long-term neurodevelopmental effects that ultimately reduce antisocial and aggressive behavior in children. The study tracked the development of children who had participated in an enrichment program as three-years-olds, as well as the development of children who did not participate. The enrichment program had additional cognitive stimulation, physical exercise, and nutritional enrichment—including an extra two and a half portions of fish a week. They found that at 11 years old, participants in the enrichment program showed a marked improvement in brain function as measured by EEG, as compared to those who did not participate. And at age 23, they showed a 34% reduction in criminal behavior. In a more recent study, Raine et al. (2016) found that nutritional supplementation of omega-3, multivitamins, and minerals over 3 months, combined with cognitive behavior therapy, reduced childhood aggression in 11 to 12-year-olds.

These findings not only highlight the importance of diet and nutrition with regard to public health and safety, they also suggest that supplements, including omega-3's, can potentially be used (along with more traditional therapies) to help reduce aggression, violence, and crime.

### 1.5 **The Neuroscience of Psychopathy**

Let me conclude this section with a brief discussion of psychopathy since it is, perhaps, the best-known personality disorder associated violent antisocial behavior. Psychopathy is a "personality construct characterized by deficits in interpersonal relations and affect processes (e.g., fearlessness, callousness, failure to form close emotional bonds, dishonesty, deficits in passive avoidance learning, and deficient empathic responses) as well as antisocial and impulsive behavior" (Leutgeb et al. 2015: 195; Hare and Neumann 2008). Psychopathy is strongly associated with violence and criminal recidivism (Hare 1991, 2003; Kiehl and Hoffman 2011)—and the conning, manipulative, interpersonal style of psychopaths typically has a broad, destructive impact on the individuals' life, work, and relationships (Anderson and Kiehl 2014: 103). The Psychopathy Checklist-Revised is widely used as the measure to identify psychopathic traits and it comprises two factors reflecting emotional and interpersonal detachment (Factor 1) as well as antisocial behavior and parasitic lifestyle (Factor 2) (Hare 2003). Given its connection with violence and criminal behavior, psychopathy is clearly relevant to our discussion of public health and safety.

Measures of psychopathy have proven to be valuable for risk assessment in violent criminals. As Anderson and Kiehl summarizes the findings:

> While only about 1% of the adult general population would be classified as such by Hare's Psychopathy Checklist-Revised,

> psychopaths make up around 20% of the prison population in North America (Hare 2003). Above and beyond criminal activity, psychopaths are particularly prone to violence, demonstrating increased aggressive behavior and committing a greater number of violent attacks than non-psychopaths (Salekin et al. 1996)… Psychopathy is also a strong predictor of how likely one is to re-offend after release from prison (Hart et al. 1988; Porter et al. 2001), and it is a particularly strong predictor of violent recidivism (Cornell et al. 1996; Harris et al. 1991; Port et al. 2009). Within one year of release psychopaths are about three times more likely to recidivate than non-psychopaths, and four times more likely to violently recidivate (Hemphill et al. 1998). Indeed, after 10 years, 77% of psychopaths had committed a violent offense compared to 40% of the sample in a large follow-up assessment (Harris et al 1991). Non-psychopathic offenders' violent recidivism rates appear to plateau at about 40%; however after 20 years, it was reported that 90% of psychopaths had committed another violent crime (Rice and Harris 1997). Furthermore, these trends remain consistent outside North American, generalizing across a variety of cultures (Hare et al. 2000). (Anderson and Kiehl 2014: 107-8)

Since the core features of psychopathy appear to be developmental in nature, with relatively persistent traits becoming apparent before the age of 10, the better we understand how "neurocognitive peculiarities can hijack the development of our moral sensibility" (Anderson and Kiehl 2014: 103) the more successful we will be in developing new strategies for managing the specific deficits responsible for this altered developmental trajectory.

Over the last few decades, neuroscientists have begun to study the neuronal basis of psychopathy (see e.g., Raine et al. 2000; Glenn et al. 2010; Glenn, Yang, and Raine 2012; Viving, McCory, and Seara-Cardoso 2014; Leutgeb et al. 2015). Leutgeb et al. (2015), for example, compared structural imaging data from 40 male high-risk violent offenders and 37 non-delinquent healthy controls via voxel-based morphometry. They then correlated psychopathic traits and risk for violence recidivism with grey matter volume of regions of interest previously shown relevant for criminal behavior. They found that (a) relative to controls, criminals showed less gray matter volume in the prefrontal cortex and more gray matter volume in cerebellar regions and basal ganglia structures; (b) within criminals, there was a negative correlation between prefrontal gray matter volume and psychopathy; (c) there was a positive correlation between cerebellar gray matter volume and psychopathy as well as risk of recidivism for violence; (d) gray matter volumes of the basal ganglia and supplementary motor area were positively correlated with anti-sociality, and (e) that gray matter volume of the amygdala was negatively correlated with dynamic risk for violence recidivism (Leutgeb et al. 2015). They concluded that in violent offenders, deviations in gray matter volume of the prefrontal cortex as well as areas involved in the motor component of impulse control (cerebellum, basal ganglia, supplementary motor area) are differentially related to psychopathic traits and the risk of violence recidivism. Other neuroimaging investigations have found reductions in orbitofrontal gray matter in psychopaths (e.g., Boccardi et al 2011; Tiihonen et al 2008; de Oliveira-Souza 2008) as well as volume reduction in the most anterior frontopolar regions of the prefrontal cortex (Tiihonen et al. 2008; de Oliveira-Souza2 008).

The amygdala also features prominently in theories of psychopathy due to its role in forming stimulus-reinforcement association, conditioned fear responses, and the initiation of affective states (David 1997; Davis and Whalen 2001; Anderson and Kiehl 2014: 111). And recent neuroimaging data has strongly implicated the involvement of the amygdala in psychopathy-related deficits (Anderson and Kiehl 2014: 111). In one large-scale investigation involving nearly 300 incarcerated subjects, Ermer and colleagues (2011) found that psychopathy was associated with decreased regional gray matter in several paralimbic and

limbic areas, including the amygdala. Yang et al. (2010) also found that volume reductions in both the prefrontal cortex and the amygdala were more pronounced in psychopaths with criminal convictions compared to both controls and "successful" psychopaths. And in their overview of the neuroscientific literature on psychopathy, Anderson and Kiehl describe a number of other findings related to the amygdala and prefrontal cortex:

> Kiehl and colleagues (2001) were the first to report amygdala dysfunction in criminal psychopaths using fMRI, demonstrating reduced activity there when comparing emotional and non-emotional words. Amygdala deficits in psychopathy have also been demonstrated during aversive conditioning (Birbaumer et al. 2005; Rilling et al. 2007; Veit et al. 2002), when viewing pictures depicting moral violations (Harenski et al. 2010), viewing pictures of facial affect (Gordon et al. 2004), when viewing pictures depicting moral violations (Harenski et al. 2010), and when viewing fearful faces (Dolan and Fullam 2009). Many of these reports are the same as those indicating lower prefrontal activity in psychopaths, and this likely speaks to the extensive connections between the amygdala and prefrontal cortex. Building on the pattern noted above, youth with callous/unemotional traits and conduct disorder also show lower amygdala activity when engaged in passive avoidance learning (Finger et al. 2011) and viewing fearful faces (Jones et al. 2009). This result suggests that disruption in affective processing evident in adults is a deficit which begins early in life, having persistent effects into adulthood. (2014: 112).

Additional studies have found reduced gray matter volumes in psychopaths' cingulate cortex and other paralimbic structures (Boccardi et al. 2011), tissue reduction in the temporal pole (Muller et al 2008) and insula (de Oliveira-Souza et al. 2008), and tissue reduction in the posterior cingulate (Ermer et al. 2011).

Given these new insights into the neurological correlates of psychopathy, neuroscientific methods may have the potential to improve existing tools for prediction of violence recidivism (Leutgeb et al. 2015: 194; see also Meixner 2014). But unlike the social determinants of health and criminal behavior discussed earlier, I want to flag a few potential ethical concerns about the use of neuroscience in predicting future violent behavior. The use of neuroscience in criminal law has recently become a topic of much debate and has even given birth to a new area of study called *neurolaw* (see, e.g., Shen 2010; Jones 2013; Jones et al. 2013a, b; Meixner 2014). John Meixner identifies three major areas of interest regarding the application and use of neuroscience within the law: (1) neuroscience-based credibility assessments, which seeks to detect lies or knowledge associated with a crime; (2) application of neuroscience to aid in assessment of brain capacity for culpability, especially among adolescents; and (3) neuroscience-based prediction of future recidivism (Meixner 2014). I am only concerned here with the last of these—the potential use of neuroscience to predict violent and criminal behavior before it occurs. While a public health approach to criminal behavior should welcome any and all improvements in our current risk assessment instruments, including those provided by neuroscience, I fear that these measures can potentially be used to justify preemptive incapacitation for those who are deemed a risk to society. There is also the very real potential for stigmatization—identifying children who exhibit early psychopathic traits, for example, may be helpful in providing early interventions, but it can also stigmatize them by labeling them as potential future criminals.

While these issues are important and demand more attention than I can give them here, I would like to make a few broad suggestions. First, I have elsewhere argued that preemptive incapacitation should be prohibited in all but the most extreme circumstances (Caruso forthcoming-c; see also Pereboom and Caruso 2017). Given that we are unable to assess with certainty the likelihood of future violent behavior, and given the potential for false positives, I maintain that significant weight

should be given to protecting individual liberty. Just as we adopt the *presumption of innocence* in the criminal justice system, we should likewise adopt the *presumption of harmlessness* since the social and neurological determinants of crime outlined above are like individual dials on a vast combination lock—even if four out of five numbers (say) are in place, the lock will not open until the last number (e.g., the last environmental or neurological trigger) is put in place. Since we are in a poor epistemic position to judge when (if ever) all the numbers/conditions will trigger a violent episode, and since this will likely remain true for some time, I propose that we put a bright line in the sand in favor of protecting individual liberty and against preemptive incapacitation, especially with regard to risk assessed by brain scans or other demographic risk factors.

Second, since the potential for stigmatization in youth who exhibit callous-unemotional traits (an early indicator of psychopathy) is a serious one, I recommend that we favor interventions that (a) maximize the autonomy of agents, (b) acknowledge the potential for change, and (c) focus on current antisocial behavior rather than future risk of offending. In fact, studies have found that not all children that exhibit callous-unemotional traits grow up to be adult psychopaths, which is important. This challenges us to find the right interventions—and there are some promising treatment approaches out there for young people. As Anderson and Kiehl point out:

> [The] patterns of delinquency [in psychopaths] are persistent from a young age, and are a conspicuous cause for concern that the developmental nature of psychopaths may place even the very young on a trajectory for incorrigible antisocial deviance. Evidence suggests, however, that such a bleak outlook may only apply when traditional intervention strategies are implemented…In fact, alternative strategies which incorporate knowledge of psychopaths' impaired forms of social reasoning have proven to be more effective, particularly, when applied to younger offenders. (2014: 113)

Anderson and Kiehl go on to outline a number of these alternative strategies, including targeted treatments tailored for specific groups of offenders (see also Andrews et al. 1990). They acknowledge that therapeutic interventions and rehabilitation strategies with adult psychopaths have traditionally proven ineffective and even occasionally counterproductive, but they also note that "successful interventions might be more likely at an earlier stage when the focused reinforcement of socially adaptive behaviors is likely to have a more robust impact on the developing personality and behavioral habits of the fledgling psychopath" (2014: 115). The Mendota Juvenile Treatment Center (MJTC) in Madison, Wisconsin, for example, has designed and implemented an ambitious treatment program that employs intensive one-on-one therapeutic attention, several hours a day, for a minimum of six moths (Caldewll and Van Rybroek 2001). Studies indicate that this intensive treatment protocol may cut violent recidivism rates in half, compared to juveniles receiving standard group therapy sessions (Caldewll and Van Rybroek 2001, 2005).

It is also worth noting that recent research has found that psychopaths—especially those with antisocial personality disorder and psychopathy—*do not learn well with punishment* (Gregor et al. 2015). A recent study by Gregor et al. (2015) found that people with antisocial personality disorder and psychopathy appear to have reinforcement-learning systems that don't operate in the "normal" way. In particular, the behavior of men with antisocial personality disorder "seems to be driven more by potential rewards than potential punishments (reward dominance)" (2015: 153). This suggests that punitive approaches to criminal behavior, like those currently favored in the United States, are not likely to be effective in altering the antisocial behavior of psychopaths. When it comes to adult criminal psychopaths, "the best strategy might be to focus on minimizing the harm they cause others by reinforcing specific behavioral patters and self-control" and the most effective means of doing this "might be to promote such behavior with measured rewards" (Anderson and Kiehl 2014: 114).

## II. The Public Health-Quarantine Model

Everything we know about the social determinants of health and criminal behavior indicates that we need to adopt a public health approach that focuses on addressing poverty and socioeconomic issues, education, abuse, domestic violence, unemployment, housing, healthcare, mental health, environmental health, and nutrition. This conclusion is in line with the recommendations of the World Health Organization Commission on Social Determinants of Health, the Vera Institute of Justice (Cloud 2014), the Acheson Report in Britain (1998), and the National Criminal Justice and Public Health Alliance (Heller 2016) (see also Lee 2005; Irwin et al. 2006). I contend that if we really want to improve public health and safety it is imperative that we use the power of the public health framework to re-envision and change our criminal justice system and all its component parts (see also Heller 2016). I concur with Jonathan Heller that we need to start thinking about criminal justice as a public health issue by: "changing behaviors related to violence; addressing the traumas that victims face and how those perpetuate crime; reducing adverse childhood experiences; ensuring those leaving prison [have access to healthcare]; and working to reinvest savings from criminal justice reform back into our hardest hit communities" (2006).

My own *public health-quarantine model* goes further, however, by also recommending that we reject the notions of free will and basic desert moral responsibility, and with them individual blame and retributive punishment (Caruso 2016, forthcoming-a, b, c; Pereboom and Caruso 2017). My reasons for rejecting the concept of free will are *hard incompatibilist* and have been spelled out at length elsewhere (Caruso 2012; Pereboom and Caruso 2017; see also Pereboom 2001, 2014). I have also argued that life without free will and basic desert moral responsibility is not only possible but also preferable. Belief in free will can stifle personal development, encourage punitive excess in criminal justice, and perpetuate social and economic inequalities (Caruso 2017, forthcoming-d; see also Waller 2011, 2014; Pereboom 2001, 2014). Once we abandon these antiquated notions, we can, as Bruce Waller notes, "look more clearly at the causes and more deeply into the systems that shape individuals and their behavior" (Waller 2011: 287), and this will allow us to adopt more humane and effective approaches to education, criminal justice, and social policy. While my *free will skepticism* is not a necessary condition for adopting a public health approach to criminal behavior, I maintain that (a) it is the *most justified* position given our best philosophical and scientific theories about the world (see, e.g., Caruso 2012, 2013, 2015, 2017; Pereboom 2001, 2014; Levy 2011; Waller 2011), (b) it provides distinct advantages over the retributive justification for criminal punishment; and (c) it best captures the intuition that the lottery of life is not always fair (we do not all have equal starting points in life) and that *luck* profoundly affects our life outcomes—an intuition that should be reinforced by our discussion of the social determinants of health and criminal behavior.

Free will skepticism maintains that what we do and the way we are is ultimately the result of factors beyond our control, and because of this agents are never morally responsible in the *basic desert* sense—the sense that would make us *truly deserving* of praise and blame, punishment and reward, in a non-consequentialist, backward-looking sense (see Pereboom 2001, 2014; Caruso 2012, 2017; Caruso and Morris 2017). A number of contemporary philosophers have argued for and defended free will skepticism, but I will not rehearse these arguments here (see, e.g., Pereboom 2001, 2014; Strawson 1986, 1994; Levy 2011; Waller 2011; Caruso 2012). The important thing for this discussion is that free will skepticism is inconsistent with one of the leading justifications for punishment in the criminal justice system—*retributivism*. The retributive justification of punishment maintains that the punishment of a wrongdoer is justified for the reason that she *deserves* something bad to happen to her just because she has knowingly done wrong—this could include pain, deprivation, or even death. As the retributivist Mitchell Berman puts it, "A person who unjustifiably and inexcusably causes or risks harm to others or to significant social interests

deserves to suffer for that choice, and he deserves to suffer in proportion to the extent to which his regard or concern for others falls short of what is properly demanded of him" (2008: 269). For the retributivist, it is the *basic desert* attached to the criminal's immoral action alone that provides the justification for punishment. The desert the retributivist invokes is *basic* in the sense that justifications for punishment that appeal to it are not reducible to consequentialist considerations nor to goods such as the safety of society or the moral improvement of the criminal.

Free will skepticism undermines this justification for punishment because it does away with the idea of *basic desert* (see Pereboom 2001, 2014; Caruso 2012, 2016). If agents do not deserve blame just because they have knowingly done wrong, neither do they deserve punishment just because they have knowingly done wrong. The challenge facing free will skepticism, then, is to explain how they can adequately deal with criminal behavior without the justification provided by retributivism and basic desert moral responsibility. I contend that this challenge can be met and that the *public health-quarantine model* is the best and most comprehensive approach to criminal behavior—one that is ethically defensible, practically workable, and more humane than retributivism (see Caruso 2016, forthcoming-a, b, c).

The public health-quarantine model is based on an analogy with quarantine and draws on a comparison between treatment of dangerous criminals and treatment of carriers of dangerous diseases. It takes as its starting point Derk Pereboom's famous account (2001, 2013, 2014). In its simplest form, it can be stated as follows: (1) Free will skepticism maintains that criminals are not morally responsible for their actions in the basic desert sense; (2) plainly, many carriers of dangerous diseases are not responsible in this or in any other sense for having contracted these diseases; (3) yet, we generally agree that it is sometimes permissible to quarantine them, and the justification for doing so is the right to self-protection and the prevention of harm to others; (4) for similar reasons, even if a dangerous criminal is not morally responsible for his crimes in the basic desert sense (perhaps because no one is ever in this way morally responsible) it could be *as* legitimate to preventatively detain him as to quarantine the non-responsible carrier of a serious communicable disease.

The first thing to note about the theory is that although one might justify quarantine (in the case of disease) and incapacitation (in the case of dangerous criminals) on purely utilitarian or consequentialist grounds, Pereboom and I want to resist this strategy (see Pereboom and Caruso 2017). Instead, on our view incapacitation of the dangerous is justified on the ground of the right to harm in self defense and defense of others. That we have this right has broad appeal, much broader than utilitarianism or consequentialism has. In addition, this makes the view more resilient to a number of objections (see Pereboom and Caruso 2017; Caruso, forthcoming-c; Pereboom 2016).

Second, the quarantine model places several constraints on the treatment of criminals (see Pereboom 2001, 2014; Pereboom and Caruso 2017). First, as less dangerous diseases justify only preventative measures less restrictive than quarantine, so less dangerous criminal tendencies justify only more moderate restraints. In fact, for certain minor crimes perhaps only some degree of monitoring could be defended. Secondly, the incapacitation account that results from this analogy demands a degree of concern for the rehabilitation and wellbeing of the criminal that would alter much of current practice. Just as fairness recommends that we seek to cure the diseased we quarantine, so fairness would counsel that we attempt to rehabilitate the criminals we detain. If a criminal cannot be rehabilitated, and our safety requires his indefinite confinement, this account provides no justification for making his life more miserable than would be required to guard against the danger he poses.

Third, this account provides a more resilient proposal for justifying criminal sanctions than other non-retributive options. One advantage it has over consequentialist deterrence theories, for example, is that it has more restrictions placed on it with regard to using people merely as a means.

For instance, as it is illegitimate to treat carriers of a disease more harmfully than is necessary to neutralize the danger they pose, treating those with violent criminal tendencies more harshly than is required to protect society will be illegitimate as well. In fact, in all our writings on the subject, Pereboom and I have always maintained the *principle of least infringement*, which holds that the least restrictive measures should be taken to protect public health and safety (Caruso 2016; Pereboom and Caruso 2017). This ensures that criminal sanctions will be proportionate to the danger posed by an individual, and any sanctions that exceed this upper bound will be unjustified.

In addition to these restrictions on harsh and unnecessary treatment, the model also advocates for a broader approach to criminal behavior that moves beyond the narrow focus on sanctions. On the model I have developed, the quarantine analogy is placed within the broad justificatory framework of *public health ethics* (Caruso 2016). Public health ethics not only justifies quarantining carriers of infectious diseases on the grounds that it is necessary to protect public health, it also requires that we take active steps to *prevent* such outbreaks from occurring in the first place. Quarantine is only needed when the public health system fails in its primary function. Since no system is perfect, quarantine will likely be needed for the foreseeable future, but it should *not* be the primary means of dealing with public health. The analogous claim holds for incapacitation. Taking a public health approach to criminal behavior would allow us to justify the incapacitation of dangerous criminals when needed, but it would also make prevention a *primary function* of the criminal justice system. If we care about public health and safety, the focus should always be on preventing crime from occurring in the first place by addressing the systemic causes of crime. Put simply, prevention is always preferable to incapacitation.

Furthermore, public health ethics sees *social justice* as a foundational cornerstone to public health and safety (Caruso 2016). In public health ethics, a failure on the part of public health institutions to ensure the social conditions necessary to achieve a sufficient level of health is considered a grave injustice. An important task of public health ethics, then, is to identify which inequalities in health are the most egregious and thus which should be given the highest priority in public health policy and practice. The public health approach to criminal behavior likewise maintains that a core moral function of the criminal justice system is to identify and remedy social and economic inequalities responsible for crime. Just as public health is negatively affected by poverty, racism, and systematic inequality, so too is public safety. This broader approach to criminal justice therefore places issues of social justice at the forefront. It sees racism, sexism, poverty, and systemic disadvantage as serious threats to public safety and it prioritizes the reduction of such inequalities.

## III. Social Justice and Public Policy

While there are different ways of understanding *social justice* and different philosophical accounts of what a theory of justice aims to achieve, I favor a *capability approach* according to which the development of capabilities—what each individual is able to do or be—is essential to human well-being (e.g., Sen 1985, 1999; Nussbaum 2011; Power and Faden 2006). For capability theorists, human well-being is the proper end of a theory of justice. And on the particular capability approach I favor, social justice is grounded in six key features of human well-being: *health*, *reasoning*, *self-determination*, *attachment*, *personal security*, and *respect* (see Caruso, forthcoming-c; Powers and Faden 2006).[4] Following Powers and Faden (2006), I maintain that each of these six dimensions is an essential feature of well-being such that "a life substantially lacking in any one is a life seriously deficient in what it is reasonable for anyone to want, whatever else they want" (Powers and Faden 2006: 8). The job of justice is therefore to achieve a sufficiency of these six essential dimensions of human well-being, since each is a separate indicator of a decent life.

[4]Note that this is a pared down list from the ones offered by Martha Nussbaum and other capability theorists (see Nussbaum 2011).

The key idea of capability approaches is that social arrangements should aim to expand people's capabilities—their freedom to promote or achieve *functionings* that are important to them. *Functionings* are defined as the valuable activities and states that make up human well-being, such as having a healthy body, being safe, or having a job. While they are related to goods and income, they are instead described in terms of what a person is able to do or be as a result. For example, when a person's need for food (a commodity) is met, they enjoy the functioning of being well-nourished. Examples of functionings include being mobile, being healthy, being adequately nourished, and being educated. The genuine opportunity to achieve a particular functioning is called a *capability*. *Capabilities* are "the alternative combination of functionings that are feasible for [a person] to achieve"—they are "the substantive freedom" a person has "to lead the kind of life he or she has reason to value" (Sen 1999: 87).

As Tabandeh, Gardoni, and Murphy describe (2017):

> Genuine opportunities and actual achievements are influenced by what individuals have and what they can do with what they have. What they can do with what they have is a function of the structure of social, legal, economic, and political institutions and of the characteristics of the built-environment (i.e., infrastructure). For example, consider the functioning of being mobile. The number of times an individual travels per week can be an indicator of mobility achievement. When explaining a given individual's achievement or lack of achievement, a capability approach takes into consideration the conditions that must be in place for an individual to be mobile. For instance, the possession of certain resources, like a bike, may influence mobility. However, possessing a bike may not be sufficient to guarantee mobility. If the individual has physical disabilities, then the bike will be of no help to travel. Similarly, if there are no paved roads or if societal culture imposes a norm that women are not allowed to ride a bike, then it will become difficult or even impossible to travel by means of a bike. As this example makes clear, different factors will influence the number of times the individual travels. (Tabandeh, Gardoni, and Murphy describe 2017)

Thinking in terms of capabilities raises a wider range of issues than simply looking at the amount of resources or commodities people have, because people have different needs. In the example given above, just providing bicycles to people will not be enough to increase the functioning of being mobile if you are disabled or prohibited from riding because of sexist social norms. A capabilities approach to social justice therefore requires that we consider and address a larger set of social issues.

Bringing everything together, my public health-quarantine model characterizes the moral foundation of public health as social justice, not just the advancement of good health outcomes. That is, while promoting social goods (like health) is one area of concern, public health ethics as I conceive it is embedded within a broader commitment to secure a sufficient level of health and safety for all and to narrow unjust inequalities (see Powers and Faden 2006). More specifically, I see the capability approach to social justice as the proper moral foundation of public health ethics. This means that the broader commitment of public health should be the achievement of those capabilities needed to secure a sufficient level of human well-being—including, but not limited to, health, reasoning, self-determination, attachment, personal security, and respect. By placing social justice at the foundation of the public health approach, the realms of criminal justice and social justice are brought closer together. I see this as a virtue of the theory since it is hard to see how we can adequately deal with criminal justice without simultaneously addressing issues of social justice. Retributivists tend to disagree since they approach criminal justice as an issue of individual responsibility and desert, not as an issue of collective responsibility. I believe it is a mistake to hold that the criteria of individual accountability

can be settled apart from considerations of social justice and the social determinants of criminal behavior. Making social justice foundational, as my public health-quarantine model does, places on us a collective responsibility—which is forward-looking and perfectly consistent with free will skepticism—to redress unjust inequalities and to advance collective aims and priorities such as public health and safety. The capability approach and the public health approach therefore fit nicely together. Both maintain that poor health and safety are often the byproducts of social inequities, and both attempt to identify and address these social inequities in order to achieve a sufficient level of health and safety.

To conclude, I would like to offer the following eight general policy proposals. I maintain that each is consistent with my public health-quarantine model as well as everything we know about the social and neurological determinants of health and criminal behavior. My intent is for each to serve as a general guiding principle by which more specific policy proposals can be generated. While wide reaching and ambitious, I maintain that any approach to public health and safety that hopes to be effective should adopt practices and policies consistent with these eight proposals.

**(1) Invest in programs and policies aimed at reducing poverty, homelessness, abuse, and domestic violence.** As we saw in §1, poverty, low socioeconomic status, homelessness, abuse, and domestic violence, are important social determinants of health (SDH) and criminal behavior (SDCB). They also severely diminish human well-being by limiting an individual's ability to secure a sufficient level of health, personal security, meaningful attachment, and self-determination. Under the capability approach, poverty is a capability deprivation rather than a mere lack of money. It severally limits what each individual is able to do or be, and in some cases makes certain essential functions impossible. For example, decent and stable housing is essential for human survival and dignity, a principle affirmed both by U.S. policy and international human rights law. Without access to housing or the ability to secure housing, this essential function for human well-being cannot be met. The capability approach and the public health approach work well together here since both maintain that we need to take into consideration the conditions that must be in place for an individual to be capable of achieving a sufficient level of health and safety. Adequate housing and freedom from abuse are often essential for this. Hence, our health, safety, and justice institutions should work together to reduce the instances of abuse and domestic violence and address the social inequities responsible for poverty and homelessness.

**(2) Increase funding for mental health services with a focus on the early and active treatment of mental illness.** Mental illness can severally impact an individual's life-potential and negatively affect his/her health and well-being. It can also impact public safety. As we saw earlier, more than half of all people incarcerated in prisons and jails in 2005 had a mental illness: 56% of state prisoners, 45% of federal prisoners, and 64% of jail inmates (James and Glaze 2006)—and of those who had a mental illness, about three-quarters also had a co-occurring substance use disorder (James and Glaze 2006). Consider depression as just one example. A recent longitudinal study by Yu et al. (2017) examined the association between depression and subsequent violence from three representational samples in the Netherlands, United Kingdom, and Finland. They found a consistent pattern of increased relative risk for violence in adolescents with depressive symptoms. In the Finnish sample, for example, the odds of violence in individuals with a diagnosis of depression were increased two-fold, compared to those without depression. We also know that higher rates of depression have been reported among adolescents in juvenile detention and correctional facilities (e.g., 11% in boys and 29% in girls). These findings highlight the need for active and early treatment of mental illness, especially in adolescents and young people.

**(3) Secure universal access to affordable and consistent healthcare for all.** Access to affordable and consistent healthcare is essential for human well-being. It is also key from the perspective of public health and safety. As we saw earlier,

for many vulnerable populations, including the homeless, poor, and mentally ill, not having access to affordable and consistent healthcare means forgoing treatment for mental illness, substance use, chronic health conditions, acute care, and injuries. This in turn has profound negative effects on public health and safety. To prevent these deleterious effects we should adopt policies that strive to make healthcare accessible and affordable for all. We should also extend the public health framework to those in the criminal justice system and do everything we can to improve the health of offenders and link them up with programs and services that will provide continued access to healthcare. As Rich et al. (2014) argue:

> Incarceration can cause harm to individual and community health, but prisons and jails also hold enormous potential to play an active and beneficial role in the health care system and, ultimately, to improve health. Traditionally, incarcerated populations have been incorrectly viewed as isolated and self-contained communities with only peripheral importance to the public health at large. This misconception has resulted in missed opportunities to positively affect the health of both the individuals and the imprisoned community as a whole and potentially to mitigate risk behaviors that may contribute to incarceration. Both community and correctional health care professionals can capitalize on these opportunities by working together to advocate for the health of the criminal justice-involved population and their communities. (2014: 462)

Public health and safety affects all of us and it should be the goal of everyone to provide affordable and consistent healthcare to all members of society. Doing so would not only help improve public health and safety, it would also help address a number of other social inequities. As Rich et al. argue, "Given the racial disparities of incarceration, if criminal justice involvement were to lead to increased access to health care upon release, this could cause a decrease in the racial disparities regarding health and health care in the community" (2014: 464).

**(4) Reject retributivism and purely punitive approaches to criminal justice and shift the focus to *prevention*, *rehabilitation,* and *reintegration*.** While retributivism is one of the (if not the) main sources of justification for punishment within the U.S. criminal justice system, I contend that there are at least two good reasons for rejecting it. The first is that retributive punishment is inconsistent with free will skepticism and the rejection of *just desert*—hence, if free will skepticism is correct (as I believe it is) then retributive punishment is unjustified. The second maintains that independent of free will, there are good practical grounds for rejecting retributivism since it often leads to ineffective, excessively punitive, and inhumane practices and policies. Several studies now show that retributivism often leads to excessively punitive forms of punishment and that such punitiveness is often counterproductive from the perspective of public safety. Of course, there are many reasonable retributivists who acknowledge that we imprison far too many people, in far too harsh conditions, but the problem is that retributivism remains committed to the core belief that criminals deserve to be punished and suffer for the harms they have caused. This retributive impulse in *actual practice*—despite theoretical appeals to proportionality by its proponents—often leads to practices and policies that try to make life in prison as unpleasant as possible. It was this retributive impulse, for instance, that lay behind 2014 changes to the incentives and earned privileges (IEP) scheme in England and Wales and which resulted in an effective blanket ban on sending books to prisoners. Luckily, the high court declared the ban unlawful, reasoning that books are often essential to the rehabilitation of people in prison. It is also this retributive impulse that has led, at least in part, to the mass incarceration crisis in the U.S.

By now most people know the numbers. With only 5% of the world's population, the U.S. imprisons 25% of the world's prisoners—far more than any other nation in the world. The U.S. has more than 700 prisoners for every 100,000 people, whereas Scandinavian countries such as Sweden, Finland

and Norway hover around 70 per 100,000. And not only does the U.S. imprison at a much higher rate, it also imprisons in notoriously harsh conditions. American prisons are often cruel places, using a number of harsh forms of punishment, including extended solitary confinement. The watchdog organization Solitary Watch (2012) estimates that up to 80,000 people in the U.S. are currently in some form of solitary confinement. These prisoners are isolated in windowless, soundproof cubicles for 23 to 24 hours each day, sometimes for decades. Under such conditions, prisoners experience sever suffering, often resulting in serious psychological problems. Supreme Court Justice Anthony Kennedy, for instance, recently stated that, "solitary confinement literally drives men mad."[5]

Such excessively punitive punishment not only causes severe suffering and serious psychological problems, it does nothing to rehabilitate prisoners, nor does it reduce the rate of recidivism. In fact, the U.S. has one of the highest rates of recidivism in the world, with 76.6% of prisoners being rearrested within five years of release. Norway, by contrast, averages around 20%. One of the reasons for this wide divergence in recidivism rates is that the Norwegian system prioritizes rehabilitation and reintegration (providing prisoners with educational programs, work training, etc.) while the U.S. system is focused more on giving offenders their just deserts. Looked at empirically, it's nigh impossible to defend the claim that commitment to just deserts and retributivism *ensures* proportional and humane punishment. In fact, the opposite seems to be the case—the problem of disproportionate punishment seems to grow more out of a desire for retribution and the belief that people justly deserve what they get.

Once we reject retributivism and purely punitive approaches to criminal behavior, we can move away from the myopic focus on punishment and embrace instead a holistic approach to criminal behavior that prioritizes prevention and social justice. Prevention should always be the mission of our health and justice institutions and one way to try to achieve this aim is to systematically address the social determinants of criminal behavior. The public health-quarantine model, however, also realizes that not all crimes can be prevented and occasionally dangerous criminals will need to be incapacitated for the safety of society. The model provides the justification needed for incapacitation in such cases, but even here the goal should always be rehabilitation and reintegration. Unfortunately, the current U.S. prison system is not well suited for the task of rehabilitation—e.g., within many prisons offenders are typically housed in inhumane conditions, deprived of mental health services, drug treatment, and educational opportunities. We cage offenders like animals, dehumanize them from the moment they arrive, segregate and isolate them, and give them minimal autonomy, then we release them and expect they will somehow be model citizens. This is clearly not working.

I recommend adopting policies aimed specifically at the rehabilitation and reintegration of offenders. To focus on just one example, we need to address the physical design of prisons. With few exceptions, U.S., U.K., and Australian prisons are harsh, restrictive institutions, designed to enable maximum control over inmates' behavior at any time. As Lutham and Klippan write: "Their scale and appearance instill mistrust and anonymity... The ability to personalise space, have ownership and have personal control over one's situation is intentionally absent. Mostly, these are overtly punitive environments, unlike any other" (2016). These "cold" prison environments have an effect on the people inside them and they are typically not good. Just consider the rates of suicide and self-harm in U.S. prisons. According to the federal Bureau of Justice Statistics, suicides account for more deaths in state and federal prisons than drug and alcohol intoxication deaths, homicide, and accidents combined. And things are even worse in county jails where the suicide rate was 46 per 100,000 in 2013. Incidents of self-harm in England and Wales are also at an all-time high (Ministry of Justice 2016). Furthermore, U.S. and U.K. prisons are also breeding grounds for violence (Bowker 1980; Irwin 1980; Johnson

[5]He made this statement before the House Appropriations Subcommittee on Financial Services and Federal Government, as reported on in the Huffington Post on 3/24/2015: http://www.huffingtonpost.com/2015/03/24/anthony-kennedy-solitary-confinement_n_6934550.html

1987; Ministry of Justice 2016), which is not surprising given that they typically confine large numbers of people in overcrowded quarters and in conditions characterized by material and social deprivation (Bowker 1980; Toch 1985; Wolfgang and Ferracuti 1976; Wortley 2005).

In his book *Situational Prison Control* (2005), former prison psychologist Richard Wortley articulates strategies to reduce negative behavior in prison contexts, including through physical design. He suggests (a) setting positive expectations through domestic furnishings that confer trust; (b) reducing anonymity through small prison size; (c) personalizing victims through humane conditions; (d) enabling a positive sense of community through ownership and personalization of the space; and (e) reducing provocation and stress by designing in the capacity for inmates to enact control over environmental conditions and personal space. The current model of U.S. correctional facilities is the antithesis of each of these strategies. Lutham and Klippan correctly note, "When we create environments that fuel the negative behaviors we naturally associate with criminals, we are caught in a vicious cycle: harsh community and political attitudes toward prisons and prisoners are perpetuated, and overtly punitive prisons continue to be built" (2016).

Some good examples of innovating prison design exist in Scandinavian counties—including Halden Prison in Norway, Leoben in Australia, Enner Mark in Denmark, and the Norwegian prison island of Bastoy. These prisons are purposely designed to reduce crime. Lutham and Klippan explain:

> They do this by providing positive opportunities for inmates and building a greater sense of optimism for their future…These spaces are designed to more closely reflect environments in the outside community. The design treats these people not solely as "prisoners" but also as community members—with all the social, vocational and emotional responsibility that this entails. (Lutham and Klippan 2016)

Halden Prison in Norway, for example, has trees intentionally scattered across its 75-acre site, whereas U.S. prisons are usually devoid of vegetation to maximize visibility. In addition, to help inmates develop routines and to reduce the monotony of confinement, designers spread Halden's living quarters, work areas, and activity centers across the prison grounds. This provides offenders with some degree of autonomy and encourages interpersonal interactions—mirroring the kinds of conditions they will return to upon release. In fact, the Norwegian Correctional Services has officially adopted something called the *normality principle*—a principle I strongly endorse. The principle maintains that during the serving of a sentence "life inside [prisons] will resemble life outside as much as possible."[6] It further states that, "No one shall serve their sentence under stricter circumstances than necessary for the security of the community. Therefore offenders shall be placed in the lowest possible security regime." Lastly, it states that prison should be a restriction of liberty but nothing more, that is, "no other rights have been removed by the sentencing court." According to the normality principle, an offender should have all the same rights as other people living in Norway and life inside should resemble life outside as much as possible. All Norwegian prisoners, for example, have the right to study and they are all allowed to vote. Sentences are also kept short. On average they are no more than eight months long, and nearly 90% of sentences are for less than a year. Additionally, the longest sentence permitted by law is 21 years, but that can be extended in five-year increments if a prisoner is not rehabilitated and is considered a continued risk to society. Since most prisoners will eventually return to society, Norwegian prisons prepare inmates for reintegration by mimicking the outside world as much as possible.

Adopting the goal of rehabilitation and reintegration will force us to reexamine not only the physical design of prisons but all aspects of the carceral experience. We should aim for the rehabilitation and reintegration of offenders back into society

[6]For more details, see the Norwegian Correctional Service's full document: http://www.kriminalomsorgen.no/information-in-english.265199.no.html

and we should adopt practices and policies that best achieve this goal. The *normality principle* is just one example of a policy specifically designed with this goal in mind, but other policies will be needed as well. Unfortunately, retributivism and purely punitive approaches to criminal behavior remain a stumbling block in the way of progress. It is imperative that we reject these and consider anew the aims and ends of criminal justice.

**(5) End all policies that disenfranchise ex-offenders, making it more difficult for them to reintegrate back into society.** In 2016, an estimated 6.1 million people were prohibited from voting due to laws restricting voting rights for those convicted of felony-level crimes (Uggen, Larson, and Shannon 2016). The African American community has been disproportionately impacted by these felony disenfranchisement policies, with a recent report from the Sentencing Project estimating that 1 in every 13 black Americans has lost their voting rights (Chung 2016). Voter disenfranchisement, however, is not the only barrier ex-prisoners face. Under the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), 13 states fully prohibit anyone with a drug-related conviction from receiving public assistance under the Temporary Assistance to Needy Families (TANF) program—and 23 other states maintain a partial ban. Additionally, people with a felony criminal record are restricted from jury service in 47 states (Love 2016), and the American Bar Association has documented 27,254 state occupational licensing restrictions nationwide for people with a criminal record (Love, Roberts, and Klingele 2013). Public housing is also restricted for many ex-offenders. In fact, under current housing policies, everyone convicted of a felony is automatically ineligible for a minimum of five years—condemning people with criminal records to homelessness or transient living at precisely the moment when reintegration is most important. Policies like these make it more difficult for ex-offenders to reintegrate back into society and end up increasing the chances of recidivism. They are counterproductive from the perspective of public health and safety. Rather than making us safer, these policies are a hangover from an antiquated and largely discredited approach to criminal justice—one grounded in the retributive impulse for payback and the desire to give offenders their *just deserts*. If we wish to adopt effective, data-driven policies aimed at promoting public health and safety, as I believe we should, these disenfranchisement policies need to be abandoned.

**(6) Prioritize and properly fund education, especially in low-income areas, and support educational programs in prison.** Research has shown that education is an important SDH and SDCB. Not only can it have a profound impact on an individual's life-potential, receiving an adequate education is an important (and perhaps essential) functioning for human well-being. Yet despite its obvious importance, there still remains enormous educational inequity within the United States. We need to adopt programs and policies aimed at leveling the playing field. In particular, we need to make it a public health priority to provide low-income communities with adequate educational opportunities. We also need to support and fund educational programs in prison. We know that correctional education improves inmates' chances of not returning to prison. A major 2013 study by the RAND Corporation found, for example, that inmates who participate in correctional education programs have 43% lower odds of recidivating than those who do not (Davis et al. 2013). This translates to a reduction in the risk of recidivating of 13 percentage points. These programs also improve the chances of offenders obtaining employment after release. The odds of obtaining employment post-release among inmates who participated in correctional education was 13% higher than the odds for those who did not (Davis et al. 2013). Furthermore, providing correctional education is cost-effective when it comes to reducing recidivism—saving $4 to $5 for each dollar spent.

**(7) Adopt policies that protect the environmental health of our communities by combating climate change, protecting air and water, and reducing/eliminating harmful toxins.** As we saw in §1.4, public health and safety can be negatively affected by environmental factors such as poor air and water quality, exposure to lead and toxins, and climate change. Exposure to lead, for instance, can cause

long-term harm in adults, including increased risk of high blood pressure, kidney failure, and, in pregnant women, miscarriage, stillbirth, premature birth, and minor malformations (WHO 2016b). Young children are particularly vulnerable to the toxic effects of lead and "can suffer profound and permanent adverse health effects, particularly affecting the development of the brain and nervous system" (WHO 2016b). Furthermore, lead exposure is also a potential threat to public safety since studies have found that it can lead to increases in criminal behavior (Feigenbaum and Muller 2016; Aizer and Currie 2017; Billings and Schnepel 2015). This is just one example since there are many other toxins and environmental factors that affect health and safety. Climate change, for example, is a threat to public health and safety since it is likely to cause more variable weather, heat waves, heavy precipitation events, flooding, droughts, more intense storms, sea level rise, and air pollution (IPCC 2014a, b, c)—each of which has the potential to negatively affect public health as well as be a threat multiplier, increasing conflict and military involvement around the world.

If we wish to adopt a broad, holistic approach to public health and safety—one grounding in social justice and aimed at promoting health and preventing criminal behavior—we need to adopt practices and policies that address these environmental threats. Robert Bullard (2010), for example, proposes a number of helpful solutions in his discussion of overcoming racism in environmental decision-making. He begins by noting that:

> Despite the recent attempts by federal agencies to reduce environmental and health threats in the United, States, inequities persist. If a community is poor or inhabited largely by people of color, there is a good chance that it receives less protection than a community that is affluent or white. This situation is a result of the country's environmental policies, most of which distribute the costs in a regressive pattern while providing disproportionate benefits for the educated and wealthy. (2010: 644)

Bullard provides numerous examples of environmental discrimination and argues that unequal environmental protection undermines three basic types of equity: procedural, geographic, and social (2010; see also Bullard 1983, 1987, 1990). Some examples of environmental discrimination include: how the U.S. government cleans up toxic waste sites and punishes polluters (e.g., white communities see faster action, better results, and stiffer penalties than communities where black, Hispanic and other minorities live [see, e.g., Lavelle and Coyle 1992]); the geographical placement of landfills, incinerators, sewage treatment plants, lead smelters, refineries, and other noxious facilities, which are more often put in poor and minority communities (see, e.g., Costner and Thornton 1990); and the role of sociological factors, such as race, ethnicity, class, culture, lifestyle, and political power, in environmental decision-making (Bullard 1983, 1987, 1990, 2010).

To correct for these inequities and to end unequal environmental protection, Bullard proposes the following five principles of environmental justice (abstracted from 2010: 647-55):

**(a) The Right to Protection:** Every individual has a right to be protected from environmental degradation. Protecting this right will require enacting a federal "fair environmental act." The act could be modeled after the various federal civil rights acts that have promoted nondiscrimination—with the ultimate goal of achieving 'zero tolerance'—in such areas as housing, education, and employment. The act ought to address both the intended and unintended effects of public policies and industrial practices on ethnic minorities and other vulnerable groups.

**(b) Prevention of Harm:** Preventing, the elimination of the threat before harm occurs, should be the preferred strategy of government. For example, to solve the lead problem, the primary focus should

be shifted from treating children who have been poisoned to eliminating the threat by removing lead from houses, replacing lead pipes, etc.

**(c) Shift the Burden of Proof:** Under the current system, individuals who challenge polluters must prove that they have been harmed, discriminated against, or disproportionately affected. Few poor or minority communities have the resources to hire the lawyers, expert witnesses, and doctors needed to sustain such a challenge. Thus, the burden of proof must be shifted to the polluters who do harm, discriminate, or do not give equal protection to minorities and other overburdened classes. Environmental justice would require the entities that are applying for operating permits for landfills, incinerators, smelters, refineries, and chemical plants, for example, to prove that their operations are not harmful to human health, will not disproportionately affect minorities or the poor, and are nondiscriminatory.

**(d) Obviate Proof of Intent:** Laws must allow disparate impact and statistical weight—as opposed to "intent"—to infer discrimination because proving intentional and purposeful discrimination in a court of law is next to impossible.

**(e) Redress Inequity:** Disproportionate impact must be redressed by targeting action and resources. Resources should be spent where environmental and health problems are greatest, as determined by some ranking scheme—but one not limited to risk assessment. Such targeting should channel resources to the hot spots, communities that are burdened with more than their fair share of environmental problems.

Each of these proposals would, I believe, be an improvement over existing practices since they go a long way in correcting for the procedural, geographic, and social inequities that currently exist. I present them here, however, only as an example of what a more specific set of proposals might look like. Of course, one or more of Bullard's principles might be debated and additional proposals will still need to be added—e.g., ones that directly address climate change, global environmental justice, and the allocation of scarce resources. But whatever more specific set of proposals we adopt, if they are to be consistent with the general public health framework I have outlined, they will need to identify and address social inequities in environmental health and aim to promote human well-being by seeking to achieve a sufficient level of health and personal security for all members of society.

**(8) Research more effective interventions and rehabilitation strategies for psychopathy.** The success of the Mendota Juvenile Treatment Center (MJTC) program indicates that certain interventions and treatment protocols can in fact work in cutting violent recidivism rates in juveniles who exhibit callous-unemotional traits (Caldewll and Van Rybroek 2001, 2005). While genetic factors and neurobiological deficits are widely believed to be involved in the development of psychopathy, early identification of the personality traits associated with psychopathy, as well improvement in the social conditions identified above, can help mitigate the development of psychopathy. Furthermore, as we come to better understand psychopathy and its neurological correlates, we can potentially develop better "intervention strategies that are informed by an understanding of the neuropsychological obstacles to healthy development" (Anderson and Kiehl 2014: 116). The MJTC program is one intervention strategy that needs to be studied further—and, as Anderson and Kiehl point out, "it will be necessary to carry out rigorous investigations of changes in functional circuitry over the course of reasonably successful intervention efforts" (2014: 116).

The use of neurofeedback in correctional settings has also been suggested as "an innovative approach that may ultimately lessen criminal behavior, prevent violence, and lower recidivism" (Gkotsi and Benaroyo 2012: 3; see also Evans 2006; Quirk 1995; Smith and Sams 2005). As Gkotsi and Benaroyo describe:

> Neurofeedback or neurotherapy is a relatively new, noninvasive method which is based on the possibility of training and adjusting the speed of brainwaves, which normally occur at various frequencies (Hammond, 2011). An overabundance, or deficiency in one of these frequencies, often correlates with conditions such as depression, and emotional disturbances and learning disabilities, such as Attention Deficit Hyperactivity Disorder (ADHD) (Greteman, 2009)…Therapists attach electrodes to the patients' head and a device records electrical impulses in the brain. These impulses are sorted into different types of brain waves. Using a program similar to a computer game, patients learn to control the video display by achieving the mental state that produces increases in the desired brain wave activity. Neurofeedback has gained recognition for its potential benefits for children with ADHD, alcoholics and drug addicts. It can also enhance athlete and musician performance as well as improve elderly people's cognitive function (Greteman, 2009). (2012: 3)

Douglas Quirk, a Canadian researcher, tested the effects of a neurofeedback treatment program on 77 dangerous offenders in an Ontario correctional institute who suffered from deep-brain Epileptic activity. The results demonstrated reduction in the subjects' criminal recidivism and suggested that, "a subgroup of dangerous offenders can be identified, understood and successfully treated using this kind of biofeedback conditioning program" (Quirk 1995; as quoted by Gkotsi and Benaroyo 2012: 3). Additional studies by Smith and Sams (2005) on juvenile offenders with significant psychopathology and electroencephalographic abnormalities, and by Martin and Johnson (2005) on male adolescents diagnosed with ADHD also demonstrated reduced recidivism, improved cognitive performance, improved emotional and behavioral reactions, and inhibition of inappropriate responses. Findings like these are promising and moving forward we will need to further investigate whether neurofeedback can produce similar results with psychopathy.

## Conclusion

In this essay I have attempted to do five main things: (a) argue that the social determinants of health (SDH) are broadly similar to the social determinants of criminal behavior (SDCB); (b) identify poverty, socioeconomic status, abuse, violence, housing, mental health, access to healthcare, education, environmental health, and nutrition as key social determinants; (c) argue that we should adopt a broad public health approach, focused on prevention and social justice, for identifying and taking action on these shared social determinants; (d) introduce and sketch my own non-retributive alternative for addressing criminal behavior, the *public health-quarantine model*; and (e) recommend eight broad public policy proposals for moving forward. If what I have argued is correct, we cannot successfully address concerns over public health and safety without simultaneously addressing issues of social justice—including the social determinants of health and criminal behavior. Criminal justice and social justice are intimately connected and as a result retributive and purely punitive approaches to criminal behavior end up missing the mark, since they see the problem as generally a matter of personal responsibility and desert. The best and most comprehensive way to address criminal behavior is to adopt the public health-quarantine model and the eight proposals outlined above.

## References


Acheson, D., D. Barkers, J. Chambers, H. Graham, M. Marmot, and M. Whitehead. 1998. *Independent Inquiry into Inequalities in Health Report*. London. Stationary Office.

ACLU. 2011. Prison Rape Elimination Act of 2002 (PREA). https://www.aclu.org/other/prison-rape-elimination-act-2003-prea

Adams, A.E., R.M. Tolman, D. Bybee, C.M. Sullican, and A.C. Kennedy. 2013. The impact of intimate partner violence on low-income women's economic well-being: The mediating role of job stability. *Violence Against Women* 18: 1345-1367.

Adler, N.E., T. Boyce, M.A. Cheney, S. Cohen, S. *Folk*,am, R.L. Kahn, and S.I. Syme. 1994. Socioeconomic status and health: The challenge of the gradient. *American Psychologist* 49: 15-24.

Adler, N.E., E.S. Epel, G. Castellazzo, and J.R. Ickovics. 2000. Relationship of subjective and objective social status with psychological functioning: Preliminary data in healthy white women. *Health Psychology* 19: 586-92.

Aizer, A., and J. Currie. 2017. Lead and Juvenile Delinquency: New Evidence for Linked Birth, School and Juvenile Detention Records. *National Bureau of Economic Research*, May 2017, no. 23392.

Akil, Luma, and H.A. Ahmad. 2011. Effects of socioeconomic factors on obesity rates in four southern states and Colorado. *Ethnicity and Disease* 21 (1): 58-62.

American Academy of Pediatrics Committee on Environmental Health. 2003. *Pediatric Environmental Health*, 2n ed. Elk Grove Village, IL: American Academy of Pediatrics.

American Psychological Association. 2017. Violence and socioeconomic status fact sheet. Available online: http://www.apa.org/pi/ses/resources/publications/factsheet-violence.pdf

American Public Health Association. 2017. Environmental health. Accessed on September 2, 2017: https://www.apha.org/topics-and-issues/environmental-health

Anderson, N.E., and C.A. Armstead. 1995. Toward understanding the association of socioeconomic status and health: A new challenge for the biopsychosocial approach. *Psychosom. Med.* 57: 213-25.

Anderson, N.E., and K.A. Kiehl. 2014. Psychopathy: Developmental perspectives and their implications for treatment. *Restor Naurol Neuroscience* 32 (1): 103-117.

Andrews, D.A., J. Bonta, and I. Hoge. 1990. Classification for effective rehabilitation: Rediscovering psychology. *Criminal Justice and Behavior* 17 (1): 19-52.

Bailey, K. 2012. *Dying for Coverage: The Consequences of Being Uninsured*. Families USA. http://familiesusa.org/product/dying-coverage-deadly-consequences-being-uninsured

Bellinger, D.C., K.M. Stiles, and H.L. Needleman. 1992. Low-level lead exposure, intelligence, and academic achievement: A long-term follow-up study. *Pediatrics* 90 (6): 855-61.

Bengtsson, M. 2017. Depression in adolescents raises risk for violence. *Reliawire*, August 7, 2017. Available online: http://reliawire.com/depression-adolescents-violence/

Berkman. L., and A.M. Epstein. 2008. Beyond health care: Socioeconomic status and health. *New England Journal of Medicine* 358 (23): 2509-10.

Berman, Mitchell. 2008. Punishment and justification. *Ethics* 18: 258-290.

Billings, S.B., and K.T. Schnepel. 2015. *Life after Lead: Effects of Early Interventions for Children Exposed to Lead*. ARC Centre of Excellence for Children and Families over the Life Course. No. 2015-18.

Binswanger, I.A., P.J. Blatchford, S.R. Mueller, and M.F. Stern. 2013. Mortality after prison release: Opioid overdose and other causes of death, risk factors, and time trends from 1999 to 2009. *Annuals of Internal medicine* 159 (9): 592-600.

Binswanger, I.A., M.F. Stern, R.A. Deyo, P.J. Heagerty, A. Cheadle, J.G. Elmore, et al. 2007. Release from prison—a high risk of death for former inmates. *New England Journal of Medicine* 256 (2): 157-65.

Birbaumer, N., R. Veit, M. Lotze, M. Erb, C. Hermann, W. Grodd, H. Flor. 2005. Deficient fear conditioning in psychopathy: A functional magnetic resonance imaging study. *Archives of General Psychiatry* 62 (7): 799-805.

Blau, D.M. 1999. The effect of income on child development. *Review of Economic Statistics* 81: 261-76.

Bloom, B. 2004. The impact of California's parole policies on women. Testimony before the Little Hoover Commission, April 22, 2004. https://www.prisonlegalnews.org/news/publications/ca-women-on-parole-report/

Blum, J., M. Ireland, and R.W. Blum. 2003. Gender differences in juvenile violence: A report from Add Health. *Journal of Adolescent Health* 32: 234-40.

Boccardi, M., G.B. Frisoni, R.D. Hare, E. Cavedo, P. Najt, and J. Tiihonen. 2011. Cortex and amygdala morphology in psychopaths. *Psychiat. Res. Neuroim.* 193 (2): 85-92.

Borofsky, L.A., I. Kellerman, B. Baucom, P.H. Oliver, and G. Margolin. 2013. Community violence exposure and adolescents' school engagement and academic achievement over time. *Psychology of Violence* 3: 1-15.

Bradley, R.H., and R.F. Corwyn. 2002. Socioeconomic status and child development. *Ann. Rev. Psychol.* 53: 371-99.

Bradley, R.H., R.F. Corwyn, M. Burchinal, H.P. McAdoo, and C. Garcia Coll. 2001. The home environments of children in the United States Part II: Relations and behavioral development through age thirteen. *Child Development* 72: 1868-86.

Brito, N.H., K.G. Noble. 2014. Socioeconomic status and structural brain development. *Frontiers in Neuroscience* 8: 276.

Brooks-Gunn, J., and G.J. Duncan. 1997. The effects of poverty on children. *Future Child* 7: 55-71.

Bullard, R. 1983. Solid waste sites and the black Houston community. *Sociological Inquiry* 53 (2-3): 273-88.

Bullard, R. 1987. *Invisible Houston: The Black Experience in Boom and Bust*. College Station, Tex.: Texas A&M University Press.

Bullard, R. 1990. *Dumping in Dixie: Race, Class, and Environmental Quality*. Boulder, Co.: Westview Press.

Bullard, R. 2010. Overcoming racism in environmental decision making. *Environment: Science and Policy for Sustainable Development* 36 (4): 10-44. Reprinted in *Environmental Ethics: Readings in Theory and Application 5th Edition*, eds. L.P. Pojman and P. Pojman, pp.644-659. Wadsworth, Cengage Learning.

Burns, J.M., et al. 1999. Lifetime low-level exposure to environmental lead and children's emotional and behavioral development at ages 11-13 years. The Port Pirie Cohort study. *American Journal of Epidemiology* 149: 740-49.

Buss, C., C. Lord, M. Wadiwalla, D.H. Hellhammer, S.J. Lupiens, M. Meaney, et al. 2007. Maternal care modulates the relationship between prenatal risk and hippocampal volume in women but not in men. *Journal of Neuroscience* 27: 2592-85.

Buydens-Branchey, L., M. Branchey, and J.R. Hibbeln. 2008. Associations between increases in plasma n-3 polyunsaturated fatty acids following supplementation and decreases in anger and anxiety in substance abusers. *Prog Neuropsychopharmacol Biol Psychiatry* 32 (2): 568-75.

Caldwell, M.F., and G.J. Van Rybroek. 2001. Efficacy of a decompression treatment model in the clinical management of violent juvenile offenders. *International Journal of Offender Therapy* 45 (4): 469-77.
Caldwell, M.F., and G.J. Van Rybroek. 2005. Reducing violence in serious and violent juvenile offenders using intensive treatment. *International Journal Law. Psychiat.* 28 (6): 622-36.

Carlen, P. 1988. *Women, Crime, and Poverty*. Open University Press.

Carson, E.A. 2016. *Prisoners in 2015.* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics.

Caruso, G.D. 2012 *Free Will and Consciousness: A Determinist Account of the Illusion of Free Will*. Lanham, MD: Lexington Books.

Caruso, G.D. (ed.) 2013. *Exploring the Illusion of Free Will and Moral Responsibility*. Lanham, MD: Lexington Books.

Caruso, G.D. 2015. Free Will Eliminativism: Reference, Error, and Phenomenology. *Philosophical Studies* 172 (10): 2823-2833.

Caruso, G.D. 2016. Free Will Skepticism and Criminal Behavior: A Public Health-Quarantine Model. *Southwest Philosophy Review* 32 (1): 25-48.

Caruso, G.D. 2017. Skepticism about moral responsibility. *Stanford Encyclopedia of Philosophy*.

Caruso. G.D. forthcoming-a. The public health quarantine model. In *The Oxford Handbooks of Moral Responsibility*, eds. D. Nelkin and D. Pereboom. New York: Oxford University Press.

Caruso, G.D. forthcoming-b. Justice without retribution. *Neuroethics*.

Caruso, G.D. forthcoming-c. *Unjust Deserts: Free Will, Moral Responsibility, and Criminal Punishment.* Book manuscript. Preview chapters available online: http://nebula.wsimg.com

Caruso, G.D. forthcoming-d. Free will skepticism and its implications: An argument for optimism. In *Free Will Skepticism in Law and Society*, ed. Elizabeth Shaw and Derk Pereboom. Cambridge University Press.

Caruso, G.D., and S.G. Morris. 2017. Compatibilism and Retributive Desert Moral Responsibility: On What is of Central Philosophical and Practical Importance. *Erkenntnis* 82: 837-55.

Center for Climate and Security. 2016. *The Climate and Security Advisory Group: Briefing Book for New Administration*. https://climateandsecurity.files.wordpress.com/2016/09/climate-and-security-advisory-group_briefing-book-for-a-new-administration_2016_11.pdf

Centers for Disease Control and Prevention. 2014. *Essentials for Childhood: Steps to Create Safe, Stable, Nurturing Relationships and Environments.* Retrieved from https://www.cdc.gov/violenceprevention/pdf/essentials_for_childhood_framework.pdf

Centers for Disease Control and Prevention. 2016. Adverse childhood experiences (ACEs). Retrieved from https://www.cdc.gov/violenceprevention/acestudy/index.html

Chen, E. 2004. Why socioeconomic status affects the health of children. *Current Directions in Psychological Science* 13 (3): 112-15.

Chen, E., K.A. Matthews, and W.T. Boyce. 2002. Socioeconomic differences in children's health: How and why do these relationships change with age? *Psychological*

*Bulletin* 126: 295-329.

Chung, J. 2016. *Felony Disenfranchisement: A Primer*. The Sentencing Project. http://www.sentencingproject.org/publications/felony-disenfranchisement-a-primer/

Cloud, D. 2014. *On Life Support: Public Health in the Age of Mass Incarceration*. New York: Vera Institute of Justice. Available online: https://www.vera.org/publications/on-life-support-public-health-in-the-age-of-mass-incarceration

Cohen, S., G.A. Kaplan, and J.T. Salonen. 1999. The role of psychological characteristics in the relation between socioeconomic status and perceived health. *Journal of Applied Social Psychology* 29: 445-68.

Conboy, B.T., and P.K. Kuhl. 2007. Early speech perception: Developing a culturally specific way of listening through social interaction. In *On Being Moved: From Mirror Neurons to Empathy*, ed. S. Braten, pp.175-99. AmsterdamL John Benjamins.

Cornell, D.G., J. Warren, G. Hawk, E. Staffoed, G. Oram, and D. Pine. 1996. Psychopathy in instrumental and reactive violent offenders. *J. Consult. Clin. Psych.* 64 (4): 783-90.

Corrigan, F., R. Gray, A. Strathdee, R. Skinner, A, Van Rhijn, and D. Horrobin. 1994. Fatty acid analysis of blood from violent offenders. *Journal of Forensic Psychiatry* 5 (1): 83-92.

Costner, P., and J. Thornton. 1990. *Playing with Fire*. Washington, D.C.: Greenpeace.

Covey, H.C., S. Menard, R.J. Franzese. 2013. Effects of adolescent physical abuse, exposure to neighborhood violence, and witnessing parental violence on adult socioeconomic status. *Child Maltreatment* 18: 85-97.

Crowne, S.S., H.S. Juon, M. Ensminger, L. Burrell, E. McFarlane, and A. Duggan. 2011. Concurrent and long-term impact of intimate partner violence on employment stability. *Journal of Interpersonal Violence* 26: 1282-1304.

Davis, K. *The Costs and Consequences of Being Uninsured*. The Commonwealth Fund.

Davis, M. 1997. Neurobiology of fear responses: The role of the amygdala. *Journal Neuropsych. Clin. N.* 9 (3): 382-402.

Davis, M., and P.J. Whalen. 2001. The amygdala: Vigilance and emotion. *Mol. Psychiatry* 6 (1): 13-34.

Davis, L.M., R. Bozick, J.L. Steele, J. Saunders, and J.N.V. Miles. 2013. *Evaluating the Effectiveness of Correctional Education: A Meta-Analysis of Programs that Provide Education to Incarcerated Adults*. Santa Monica, CA: RAND Corporation.

Deans, E. 2011. Diet and violence: Does diet affect our criminal behavior? *Psychology Today*, May 2, 2011: https://www.psychologytoday.com/blog/evolutionary-psychiatry/201105/diet-and-violence

De Oliveira-Souza, R., et al. 2008. Psychopathy as a disorder of the moral brain: Fronto temporo-limbic grey matter reductions demonstrated by vox-based morphometry. *NeuroImage* 40 (3): 1202-1213.

Department of Defense News. 2014. Hagel to address 'threat multiplier' of climate change. DoD website: https://www.defense.gov/News/Article/Article/603440/

Department of Defense, U.S. 2015. *National Security Implications on Climate-Related Risks and Changing Climate*. http://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery

Diez-Roux, A.V., B.G. Link, and M.E. Northbridge. 2000. A multilevel analysis of income inequality and cardiovascular disease risk factors. *Social Science Medicine* 50: 673-87.

Dodge, K.A., J.E. Bates, and G.S. Pettit. 1990. Mechanisms in the cycle of violence. *Science* 250: 1678-83.

Dolan, M.C., and R.S. Fullam. 2009. Psychopathy and functional magnetic resonance imaging blood oxygenation level-depend responses to emotional faces in violent patients with schizophrenia. *Biological Psychiatry* 66 (6): 570-77.

D'Onofrio, B.M., J.A., Goodnight, C.A. Van Hulle, J.L. Rodgers, P.J. Rathouz, I.D. Waldman, et al. 2009. A quasi-experimental analysis of the association between family income and offspring conduct problems. *Journal of Abnormal Child Psychology* 37: 415-29.

D'Onofrio, B.M., B.B. Lahey, E. Turkheimer, P. Lichtenstein. 2013. Critical need for family-based, quasi-experimental designs in integrating genetic and social science research. *American Journal of Public Health* 103: 546-55.

Doherty, M. 2015. Incarceration and Homelessness: Breaking the Cycle. E-*newsletter of the COPS Office* 8 (12): https://cops.usdoj.gov/html/dispatch/12-2015/incarceration_and_homelessness.asp

Drum, K. 2016. Lead: American's real criminal element. *Mother Jones*, Feb. 11, 2016: http://www.motherjones.com/environment/2016/02/lead-exposure-gasoline-crime-increase-children-health/

Duncan, G. J. Brooks-Gunn, J. Yeung, and J. Smith. 1998. How much does childhood poverty affect the life chances of children? *American Sociological Review* 63: 406-23.

Durant, R.H., C. Cadenhead, R.A. Pendergrast, G. Slavens, and C.W. Linder. 1994. Factors associated with the use of violence among urban black adolescents. *American Journal*

*of Public Health* 84: 612-17.

Eisman, A.B., S.A. Stoddard, J. Heinze. C.H. Caldwell, and M.A. Zimmerman. 2015. Depressive symptoms, social support, and violence exposure among urban youth: A longitudinal study of resilience. *Developmental Psychology* 51: 1307-16.

Enamorado, T., and C. Rodriguez-Castelan. 2015. Income inequality and violent crime: Evidence from Mexico's drug war. *Journal of Dev. Econ.* 120: 128-43.

Ermer, E., L.M. Cope, P.K. Nyalakanti, V.D. Calhoun, and K.A. Kiehl. 2011. Aberrant paralimbic gray matter in criminal psychopathy. *Journal of Abnormal Psychology.*

Evans, G.W. 2006. Children development and the physical environment. *Annual review of Psychology* 57: 423-51.

Evans, J.R. 2006. *Forensic applications of QEEG and neurotheraphy*. Informa Healthcare.

Fang, X., D.S. Brown, C.S. Florence, and J.A. Mercy. 2012. The economic burden of child maltreatment in the United States and implications for prevention. *Child Abuse and Neglect* 36: 156-165.

Feigenbaum, J.J., and C. Muller. 2016. Lead exposure and violent crime in the early twentieth century. *Explorations in Economic History* 62: 51-86.

Fergusson, D., N. Swain-Campbell, and J. Horwood. 2004. How does childhood economic disadvantage lead to crime? *Journal of Child Psychology and Psychiatry* 45 (5): 956-66.

Finger, E.C., A.A. March, K.S. Blair, M.E. Reid, C. Sims, P. Ng, and J.R. Blair. 2011. Disruption reinforcement signaling in the orbitofrontal cortex and caudate in youth with conduct disorder or oppositional defiant disorder and high level of psychopathic traits. *American Journal of Psychiatry* 168 (2): 152-62.

Flanagan, D.J., M. Singer, and K. Wester. 2001. Violence exposure, psychological trauma, and suicide risk in a community sample of dangerously violent adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 40: 435-42.

Flanagan, D.J., M. Singer, L. Williams, and P. Castro. 1998. Adolescent violence exposure and victimization at home: Coping and psychological trauma symptoms. *International Review of Victimology* 6: 63-82.

Frank, J.W., C.M. Andrews, T.C. Green, A.M. Samuels, T.T. Trinh, and P.D. Friedmann. 2013. Emergency department utilization among recently released prisoners: A retrospective cohort study. *BMC Emergency Medicine* 13 (1): 16.

Franks, P., P.C. Winters, D.J. Tancredi, and K.A. Fiscella. 2011. Do changes in traditional coronary heart disease risk factors over time explain the association between socio-economic status and coronary heart disease? *BMC Cardiovascular Disorders* 11: 28.

Frisell, T. P. Lichtenstein, N. Langstrom. 2011. Violent crime runs in families: A total population study of 12.5 million individuals. *Psychological Medicine* 41: 97-105.

Galloway, T.A, and T. Skardhamar. Does parental income matter for onset of offending? *European Journal of Criminology* 7: 424-41.

Gesch, C.B., S.H. Hammond, S.E. Hampson, A. Eves, and M.J. Crowder. 2002. Influence of supplementary vitamins, minerals and essential fatty acids on the antisocial behavior of young adult prisoners. *The British Journal of Psychiatry* 181 (1): 22-28.

Gilfus, M. 2002. Women's experiences of abuse as a risk factor for incarceration. *VAWnet Applied Research Forum, National Resource Center on Domestic Violence/ Pennsylvania Coalition against Domestic Violence.*

Gkotsi, G-M., and L. Benaroyo. 2012. Neuroscience and the treatment of mentally ill criminal offenders: Some ethics issues. *Journal of Ethics and Mental Health* 6: 1-7.

Glenn, A.L., A. Raine, P.S. Yaralian, and Y. Yang. 2010. Increased volume of the striatum in psychopathic individuals. *Biological Psychiatry* 67: 52-58.

Glenn, A.L., Y. Yang, and A. Raine. 2012. Neuroimaging in psychopathy and antisocial personality disorder: Functional significance and neurodevelopmental hypothesis. In *Neuroimaging in Forensic Psychiatry: From the Clinic to the Courtroom*, ed. J.R. Simpson, pp.81-98. Oxford: Wiley-Blackwell.

Gordon, H.L., A. Baird, and A. End. 2004. Functional differences among those high and low on a trait measure of psychopathy. *Biological Psychiatry* 56 (7): 516-21.

Gottfried, A.W., A.E. Gottfried, K. Bathrust, D.W. Guerin, and M.M. Parramore. 2003. Socioeconomic status in children's development and family environment: Infancy through adolescence. In *Socioeconomic Status, Parenting and Child Development*, eds. M.H. Bornstein and R.H. Bradley, pp.189-207. Mahwah, NJ: Lawrence Erlbaum.

Gow, R.V., F/Vallee-Tourangeau, M.A. Crawford, E. Taylor, K. Ghebremeskl, A.A. Bueno, et al. 2013. Omega-3 fatty acids are inversely related to callous and unemotional traits in adolescent boys with attention deficit hyperactivity disorder. *Prostaglandins Leukot Essent Fatty Acids* 88 (6): 411-8.

Greenberg, G.A., and R.A. Rosenheck. 2008. Jail

incarceration, homelessness, and mental health: A national study. *Psychiatry Service* 59 (2): 170-7.

Gregory, S., R.J. Blair, D. ffytche, A. Simmons, and V. Kumari, S. Hodgins, and N. Blackwood. 2015. Punishment and psychopathy: A case-control functional MRI investigation of reinforcement learning in violent antisocial personality disorder men. *The Lancet* 2 (2): 153-60.

Gregory, S., D. ffytche, A. Simmons, V. Kumari, M. Howard, S. Hodgins, et al. 2012. The antisocial brain: Psychopathy matters. *Archives of General Psychiatry* 69: 962-72.

Gretemann, B. 2009. Improve mental health and neurofeedback. *Odewire Magazine*. March 1.

Hackman, D.A., and M.J. Farah. 2009. Socioeconomic status and the developing brain. *Tends in Cognitive Science* 13: 65-73.

Hackman, D.A., M.J. Farah, and M.J. Meaney. 2010. Socioeconomic status and the brain: Mechanistic insights from human and animal research. *National Review of Neuroscience* 11: 651-9.

Hammond, C.D. 2011. What is neurofeedback; an update. *Journal of Neurotherapy* 15: 305-336.

Hao, L., and R.L. Matsueda. 2006. Family dynamics through childhood: A sibling model of behavior problems. *Social Science Research* 35: 500-24.

Hare, R.D. 1991. *The Hare Psychopathy Checklist-Revised*. Tornoto, ON: Multi-Health Systems.

Hare, R.D. 2003. *The Hare Psychopathy Checklist-Revised, 2nd Ed.*. Tornoto, ON: Multi-Health Systems.

Hare, R.D., D. Clark, and M. Grann. 2000. Psychopathy and the predictive validity of the PCL-R: An international perspective. *Behavioral Science and Law* 18: 623-45.

Hare, R.D., and C.S. Neumann. 2008. Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology* 4: 217-46.

Harenski, C.L., S.H. Kim, and S. Hamann. 2009. Neuroticism and psychopathy predict brain activation during moral and nonmoral emotion regulation. *Cogn. Affect. Behav. Neurosci*. 9 (1): 1-15.

Harlow, C.W. 2003. *Education and Correctional Populations*. Washington, DC: Department of Justice, Bureau of Justice Statistics. Available online: bjs.ojp.usdoj.gov/content/pub/pdf/ecp.pdf

Hariss, G.T., M.E. Rice, and C.A. Cormier. 1991. Psychopathy and violent recidivism. *Law and Human Behavior* 15 (6): 625-37.

Hart, B. and T.R. Risley. 1995. *Meaningful Differences in the Everyday Experience of Young American Children*. Baltimore, MD: Paul H. Brookes Publishing.

Hart, S.D., P.R. Kripp, and R.D. Hare. 1988. Performance of male psychopaths following conditional release from prison. *J. Consult. Clin. Psych.* 56 (2): 227-32.

Haviland, M., V. Frye, V. Rajah, J. Thukral, and M. Trinity. 2001. The family protection and domestic violence intervention act of 1995. Examining the Effects of Mandatory Arrest in New York City. *Family Violence Project, Urban Justice Center.*

Heller, J., 2016. A framework connecting criminal justice and public health. Human Impact Partners and the National Criminal Justice and Public Health Alliance. http://www.humanimpact.org/from-the-hip-blog/a-framework-connecting-criminal-justice-and-public-health/

Heller, S., A. H.A. Pollack, R. Ander, and J. Ludwig. 2013. Preventing youth violence and dropout: A randomized field experiment. Working Paper 19014. National Bureau of Economic Research, Cambridge, MA.

Hemphill, J.F., R.D. Hare, and S. Wong. 1988. Psychopathy and recidivism: A review. *Legal Criminology and Psychology* 3 (1): 139-70.

Human Rights Watch. 2004. *No Second Chance: People With Criminal Records Denied Access to Public Housing*. https://www.hrw.org/report/2004/11/17/no-second-chance/people-criminal-records-denied-access-public-housing

Hummelstein, D.U., E. Warren, D. Thome, and S. Woolhandler. 2005. Market Watch: Illness and injury as contributors to bankruptcy. *Health Affairs*. Available online: http://content.healthaffairs.org/content/suppl/2005/01/28/hlthaff.w5.63.DC1

Holzer, H.J., S. Raphael, and M.A. Stoll. 2003. *Employment Barriers Facing Ex-Offenders*. Washing, DC: The Urban Institute.

Institute of Medicine. 2002. *Care without Coverage: Too Little, Too Late*. Washington, DC: National Academy Press.

Institute of Medicine. 2009. *American's Uninsured Crisis: Consequences for Health and Health Care*. Washington, DC: National Academy Press

Intergovernmental Panel on Climate Change (IPCC). 2014a. *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar5/syr/

Intergovernmental Panel on Climate Change (IPCC). 2014b.

*Climate Change 2014: Impacts, Adaptions, and Vulnerability*. http://www.ipcc.ch/report/ar5/wg2/

Intergovernmental Panel on Climate Change (IPCC). 2014c. *Climate Change 2014: Mitigation of Climate Change*. http://www.ipcc.ch/report/ar5/wg3/

Irwin, A., N. Valentine, C. Brown, et al. 2006. The commission on social determinants of health: Tackling the social roots of health inequalities. *PLos Med* 3 (6): e106.

Jaffee, S.R., L.B. Strait, and C.L. Odgers. 2012. From correlates to causes: Can quasi-experimental studies and statistical innovation bring us closer to identifying the causes of antisocial behavior? *Psychological Bulletin* 138: 272-95.

James, D.J., and L.E. Glaze. 2006. *Mental Health Problems of Prison and Jail Inmates*. Washington, DC: Bureau of Justice Statistics. Available online: bjs.gov/content/pub/pdf/mhppji.pdf

Jenkins, E.J., and C.C. Bell. 1994. Adolescent violence: Can it be curbed? *Adolescent Medicine* 1: 71-86.

Johnson, S.L., E. Wibbels, and R. Wilkinson. 2015. Economic inequality is related to cross-national prevalence of psychotic symptoms. *Social Psychiatry Psychiatric Epidemiology* 50: 1799-1807.

Jones, A.P., K.R. Laurens, C.M. Herba, G.J. Barker, and E. Viding. 2009. Amygdala hypoactivity to fearful faces in boys with conduct problems and callous unemotional traits. *American Journal of Psychiatry* 166 (1): 95-102.

Jones, O.D. 2013. Seven ways neuroscience aids law. In A. Battro, S. Deheane, and W. Singer, eds. *Neuroscience and the Human Person: New Perspectives on Human Activities*.

Jones, O.D., R. Marois, M.J. Farah, and H.T. Greely. 2013. Law and neuroscience. *Journal of Neuroscience* 33 (45): 17624-30.

Jones, O.D., A.D. Wagner, D.L. Faigman, and M.E. Raichle. 2013. Neuroscientists in court. *National Review of Neuroscience* 14 (10): 730-6.

Katsiyannis, A., J.B. Ryan, D. Zhang, and A. Spann. 2008. Juvenile delinquency and recidivism: The impact of academic achievement. *Reading and Writing Quarterly* 24 (2): 177-196.

Kawachi, I., B.P. Kennedy, K. Lochner, and D. Prothrow-Stith. 1997. Social capital, income inequality, and mortality. *American Journal of Public Health* 87: 1491-98.

Kelly, M. 2000. Inequality and crime. *Review of Economics and Statistics* 82 (4): 530-39.

Kendler, K.S., K. Sunquist, H. Ohisson, K. Palmer, H. Maes. M.A. Winkleby, et al. 2012. Genetic and family environmental influences on the risk for drug abuse: A national Swedish adoption study. *Archives of General Psychiatry* 69: 690-97.

Kennedy, B.O., I. Kawachi, and D. Prothrow-Stith. 1996. Income distribution and mortality: Cross sectional ecological study of the Robin Hood index in the Unites States. *BMJ* 312: 1004-7.

Kearney, M.S., B.H. Harris, E. Jacome, and L. Parker. 2014. Ten economic facts about crime and incarceration in the United States. Policy memo for The Hamilton Project. Available online: https://www.brookings.edu/research/ten-economic-facts-about-crime-and-incarceration-in-the-united-states/

Kiehl, K.A., and M.B. Hoffman. 2011. The criminal psychopath: History, neuroscience, treatment, and economics. *Jurimetrics* 51 (4): 355-97.

Keihl, K.A., A.M. Smoth, R.D. Hare, A. Mendrek, B.B. Forster, J. Brink, and P.F. Liddle. 2001. Limbic abnormalities in affective processing by criminal psychopaths as revealed by functional magnetic resonance imaging. *Biological Psychiatry* 50 (9): 677-84.

Kinney, P.L. 2008. Climate change, air quality, and human health. *American Journal of Preventive Medicine* 35 (5): 459-67.

Kuhl, P.K. 2007. Is speech learning "gated" by the social brain? *Developmental Science* 10: 110-20.

Kuhl, P.K., F.-M. Tsao, and H.-M. Liu. 2003. Foreign-language experience in infancy: Effects of short-term exposure and social interaction of phonetic learning. *Proceedings of the National Academy of Science, U.S.A.* 100: 9096-9101.

Lambert, S.F., K. Nylund-Gibson, N. Copeland-Linder, and N.S. Lalongo. 2010. Patterns of community violence exposure during adolescence. *American Journal of Community Psychology* 46 (3-4): 289-302.

Lavelle, M., and M. Coyle. 1992. Unequal protection. *National Law Review* 21: 1-2.

Lawson, G.M., J.T. Duda, B.B. Avants. J. Wu, and M.J. Farah. 2013. Associations between children's socioeconomic status and prefrontal cortical thickness. *Developmental Science* 16: 641-52.

Lee, J.W. 2005. Public health is a social issue. *Lancet* 365: 1005-6.

Leutgeb, V., M. Leitner, A. Wabnegger, D. Klug, W. Scharmuller, T. Zussner, and A. Schienie. 2015. Brain abnormalities in high-risk violent offenders and their association with psychopathic traits and criminal recidivism.

*Neuroscience* 12 (308): 194-201.

Leventhal, T., and J. Brooks-Gunn. 2000. The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin* 126: 309-37.

Levy, N. 2011, *Hard Luck: How Luck Undermines Free Will and Moral Responsibility*, New York: Oxford University Press.

Lewontin, R. 2000. *The Triple Helix: Gene, organism and environment*. Cambridge: Harvard University Press.

Liston, C. B.S. McEwen, and B.J. Casey. 2009. Psychosocial stress reversibly disrupts prefrontal processing and attentional control. *Proceedings of the National Academy of Science, U.S.A.* 106: 912-17.

Loring, M.T., and P. Beaudoin. 2000. Battered women as coerced victim-perpetrators. *Emotional Abuse* 3: 13.

Love, M. 2016. *50-State Comparison Loss and Restoration of Civil Rights and Firearms Privileges*. National Association of Criminal Defense Lawyers.

Love, M., J. Roberts, and C. Klingele. 2013. *Collateral Consequences of Criminal Convictions: Law, Policy and Practice*. New York: Thomson West.

Lutham, R., and L. Klippan. 2016. From expected reoffender to trusted neighbor: Why we should rethink prisons. *The Conversation*, August 14. http://theconversation.com/from-expected-reoffender-to-trusted-neighbour-why-we-should-rethink-our-prisons-60114

Mackey, A.P., et al. 2015. Neuroanatomical correlates of the income-achievement gap. *Psychological Science* 26: 925-33.

Martin, G., and C.L. Johnson. 2005. The boys totem town neurofeedback project: A pilot study of EEG biofeedback with incarcerated juvenile felons. *Journal of Neurotherapy* 9 (3): 71-86.

Martinez, R. 1996. Latinos and lethal violence: The impact of poverty and inequality. *Social Problems* 43 (2): 131-46.

McEwen, B.S., and P.J. Gianaros. 2010. Central role of the brain in stress and adaption: Links to socioeconomic status, health, and disease. *Ann. N.Y. Academy of Science* 1186: 190-222.

McLoyd, V.C. 1998. Socioeconomic disadvantage and child development. *American Psychology* 53: 185.

McMillan, K.A., M.W. Enns, G.J. Asmundson, J. Sareen. 2010. The association between income and distress, mental disorders, and suicide ideation and attempts: Findings from the collaborative psychiatric epidemiology surveys. *Journal of Clinical Psychiatry* 71: 1168-75.

McWilliams, J.M. 2009. Health consequences of uninsurance among adults in the United States: Recent evidence and implications. *Milbank Quarterly* 87 (2): 443-94.

Meixner, J.B. 2014. Applications of neuroscience in criminal law: Legal and methodological issues. *Current Neurol Neuroscience Rep* 15: 513.

Milam, A.J., C.D.M. Furr-Holden, and P.J. Leaf. 2010. Perceived school and neighborhood safety, neighborhood violence and academic achievement in urban school children. *The Urban Review* 42: 458-67.

Ministry of Justice. 2016. Safety in custody statistics bulletin: England and Wales. https://www.gov.uk/government/statistics/safety-in-custody-quarterly-update-to-june-2016

Montague, B.T., D.L. Rosen, L. Solomon, A. Nunn, T. Green, M. Costa, et al. 2012. Tracking linkage to HIV care for former prisoners: A public health priority. *Virulence* 3 (3): 319-24.

Muller, J.L., M. Sommers, K. Dohnel, T. Weber. M.D. Schmidt-Wilcke, and G. Hajak. 2008. Disturbed prefrontal and temporal brain function during emotion and cognitive interaction in criminal psychopathy. *Behavioral Science and Law* 2008: 26 (1): 131-50.

National Coalition for the Homeless. 2009. Why are people homeless? Available online: http://www.nationalhomeless.org/factsheets/why.html

National Commission on Correctional Health Care. 2002. *The Health Status of Soon-To-Be-Released Prisoners: A Report to Congress*. Chicago: National Commission on Correctional Health.

National Immigration Law Center. 2014. Issue brief: The consequences of being uninsured. Available online: https://www.nilc.org/wp-content/uploads/2015/11/consequences-of-being-uninsured-2014-08.pdf

Needleman, H.L., et al. 1990. The long-term effects of exposure to low doses of lead in childhood: An 11-year follow-up report. *New England Journal of Medicine* 322 (2): 83-88.

Noble, K.G., L.E. Engelhardt, N.H. Brito, L. Mack, E. Nail, R.F. Barr, W.P. Fifer, and A. Elliot. 2015a. Socioeconomic disparities in Neurocognitive Development in the first two years of life. *Developmental Psycholobiology* DOI: 10.1002/dev.21303

Noble, K.G., S.M. Grieve, M.S. Korgaonkar, L.E. Engelhardt, E. Griffith, L.M. Williams, et al. 2012b. Hippocampal volume varies with educational attainment across the life-span. *Frontiers in Human Neuroscience* 6: 307.

Noble, K.G., S.H. Houston, N.H. Brito, H. Bartsch, E. Kan, J.M. Kuperman, N. Akshoomoff, et al. 2015b. Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience* 18: 773-78.

Nobel, K.G. S.M. Houston, E. Kan, and E.R. Sowell. 2012a. Neural correlates of socioeconomic status in the development human brain. *Developmental Science* 15: 516-27.

NATO Science and Technology Committee. 2017. *Food and Water Security in the Middle East and North Africa*. March 2017: http://www.nato-pa.int/Default.asp?SHORTCUT=4518

Nussbaum, Martha. 2011. *Creating Capabilities: The Human Development Approach*. Harvard University Press.

Ouimet, M.A. 2010. A world of homicides: The effect of economic development. Income inequality, and excess infant mortality on the homicide rate for 165 countries in 2010. *Homicide Studies* 16: 238-58.

Parker, R.N. 1989. Poverty subculture of violence, and type of homicide. *Social Forces* 67 (4): 983-1007.

Parker, N., A. Pui-Yee Wong, G. Leonard, M. Perron, B. Pike, L. Richer, S. Veillette, et al. 2017. Income inequality, gene expression, and brain maturation during adolescence. *Scientific Reports* 7: doi:10.1038/s41598-017-07735-2.

Patz, J., D. Campbell-Lendrum, T. Holloway, et al. 2005. Impact of regional climate change on human health. *Nature* 438 (7066): 310-17.

Pereboom, D. 2001. *Living without free will*. New York: Cambridge University Press.

Pereboom, D. 2013. Free will skepticism and criminal punishment. In *The Future of Punishment*, edited by Thomas Nadelhoffer. New York: Oxford University Press: 49-78.

Pereboom, D. 2014. *Free will, agency, and meaning in life*. Oxford: Oxford University Press.

Pereboom, D. 2016. Replies to Victor Tadros, Saul Smilansky, Michael McKenna, and
Al Mele. *Criminal Law and Philosophy*.

Pereboom, D., and G.D. Caruso. 2017. Hard-Incompatibilism Existentialism: Neuroscience, Punishment, and Meaning in life, in *Neuroexistentilism: Meaning, Morals, and Purpose in the Age of Neuroscience*, ends. Gregg D. Caruso and Owen Flanagan. New York: Oxford University Press.

Pew Charitable Trust. 2010. *Collateral Costs: Incarceration's Effect on Economic Mobility*. Washington, DC: Pew Charitable Trust.

Piccolo, L.R., E.C. Merz, X. He, E.R. Sowell, and K.G. Noble. Age-related differences in cortical thickness vary by socioeconomic status. *PLos One* 11: 1-18.

Pickett, K., S. Kelly, E. Brunner, T. Lobstein, and R. Wilkinson. 2005. Wider income gaps, wider waistbands? An ecological study of obesity and income inequality. *Journal of Epidemiological Community Health* 59: 670-74.

Pickett, K.E., and R.G. Wilkinson. 2010. Inequality: An underacknowledged source of mental illness and distress. *British Journal of Psychiatry* 197: 426-28.

Poehlmann, J. 2003. New study shows children of incarcerated mothers experience multiple challenges. *Family Matters: A Family impact Seminar Newsletter for Wisconsin Policymakers* 3 (2).

Porter, S., A. Birt, and D.P. Boer. 2001. Investigation of the criminal and conditional release profiles of Canadian federal offenders as a function of psychopathy and age. *Law and Human Behavior* 25 (6): 647-661.

Porter, S., L. Brinke, and K. Wilson. 2009. Profiles and conditional release performance of psychopathic and non-psychopathic sexual offenders. *Legal Criminology and Psychology* 14 (1): 109-11.

Powers, M., and R. Faden. 2006. *Social Justice: The Moral Foundations of Public Health and Health Policy.* New York: Oxford University Press.

Pridemore, W.A. 2011. Poverty matters: A reassessment of the inequality-homicide relationship in cross-national studies. *British Journal of Criminology* 51 (5): 739-72.

Pruss-Ustun, A., D. Kay, L. Fewtell, and J. Bartram. 2004. Unsafe water, sanitation and hygiene. In *Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attributable to Selected Major Risk Factors*, eds. M. Ezzati, A.D. Lopez, A. Rodgers, and C.J.L. Murray, pp.1321-52. World Health Organization, Geneva.

Quirk, D.A. 1995. Composite biofeedback conditioning and dangerous offenders: III. *Journal of Neurotherapy* 1 (2): 44-54.

Raine, A. 2014. *The Anatomy of Violence: The Biological Roots of Crime*. New York: Vintage.

Raine, A., T. Lencz, S. Bihrle, L. LaCasse, and P. Colletti. 2000. Reduced prefrontal gray matter volume and reduced autonomic activity in antisocial personality disorder. *Archives of General Psychiatry* 57: 119-27.

Raine, A., R.A. Cheney, R. Ho, J. Portnoy, J. Liu, L. Soyfer, J. Hibbeln, and T.S. Richmond. 2016. Nutritional supplementation to reduce children aggression: A

randomized stratified, single-blind, factorial trial. *The Journal of Child Psychology and Psychiatry* 57 (9): 1038-46.

Raine, A., J. Portnoy, J. Liu, T. Mahoomed, and J. Hibbeln. 2014. Reduction in behavior problems with omega-3 supplementation in children aged 8-16 years: A randomized, double-blind, placebo-controlled, stratified, parallel-group trial. *The Journal of Child Psychology and Psychiatry* 56 (6): 509-520.

Rich, J.D., R. Chandler, B.A. Williams, D. Dumont, E.A. Wang, F.S. Taxman, et al. 2014. How heal care reform can transform the health of criminal justice-involved individuals. *Health Affairs* 33 (3): 462-67.

Rich, J.D., D.A. Wohl, C.G. Beckwith, A.C. Spaulding, N.E. Lepp, J. Baillargeon, et al. 2011. HIV-related research in correctional populations: Now is the time. *Curr HIV/AIDS Rep.* 8 (4): 288-96.

Richie, B. 2000. Issues incarcerated women face when they return to their communities. Paper prepared for the Reentry Roundtable. Washington, D.C.

Rilling, J.K., A.L. Glenn, M.R. Jairam, G. Pagnoni, D.R. Goldsmith, et al. 2007. Neural correlates of social cooperation and non-cooperation as function of psychopathy. *Biological Psychiatry* 67 (6): 1260-71.

Rise, M.E., and G.T. Harris. 1997. Cross-validation and extension of the violent risk-appraisal guide for child molesters and rapists. *Law and Human Behavior* 21 (2): 231-38.

Rogan, W.J., et al. 2001. The effect of chelation therapy with succimer on neuropsychological development in children exposed to lead. *New England Journal of Medicine* 344 (19): 1421-26.

Rowe, M.L., and S. Goldin-Meadow. 2009. Early gesture selectively predicts later language learning. *Developmental Science* 12: 182-87.

Salekin, R.T., R. Rogers, and K.W. Sewell. 1996. A review and meta-analysis of the psychopathy checklist and psychopathy checklist-revised: Predictive validity of dangerousness. *Clinical Psychological Sceince* 3 (3): 203-215.

Sampson, R.J., and J.H. Laub. 2003. Life-course disasters? Trajectories of crime among delinquent boys followed to age 70. *Criminology* 40: 319-339.

Sareen, J., T.O. Afifi, K.A. McMillian, G.J. Asmundson. 2011. Relationship between household income and mental disorders: Findings from a population-based longitudinal study. *Archives of General Psychiatry* 68: 419.

Sariasian, A., N. Langstrom, B. D'Onofrio, J. Hallqvist, J. Franck, P. Lichtenstein. 2013. The impact of neighborhood deprivation on adolescent violent criminality and substance misuse: A longitudinal quasi-experimental study of the total Swedish population. *International Journal of Epidemiology* 42: 1057-66.

Sariasian, A., H. Larsson, B. D'Onofrio, N. Langstrom, and P. Lichtenstein. 2014. Childhood family income, adolescent violent criminality and substance misuse: Quasi-experimental total population study. *British Journal of Psychiatry* 205: 286-90.

Sen, Amartya. 1985. *Commodities and Capabilities.* North-Holland.

Sen, Amartya. 1999. *Development as Freedom*. New York: Oxford University Press.

Schoenthaler, S.J. 1983a. The Alabama diet-behavior program: An evaluation at the Coosa Valley Regional Detention Center. *International Journal of Biosocial Research* 5 (2): 79-87.

Schoenthaler, S.J. 1983b. Diet and crime: An empirical examination of the value of nutrition in the control and treatment of incarcerated juvenile offenders. *International Journal of Biosocial Research* 12 (4): 25-39.

Schoenthaler, S.J., and I.D. Bier. 2000. The effect of vitamin-mineral supplementation on juvenile delinquency among American schoolchildren: A randomized, double-blind placebo-controlled trial. *Journal of Alternative and Complementary Medicine* 6 (1): 7-17.

Shen, F.X. 2010. The law and neuroscience bibliography: Navigating the emerging field of neurolaw. *Internal Journal of Legal Inf.* 38: 352-99.

Skowyra, K.R., and J.J. Cocozza. 2006. *Blueprint for Change: A Comprehensive Model for the Identification and Treatment of Youth with Mental Health Needs in Contact with the Juvenile Justice System*. Washington, DC: National Center for Mental Health and Juvenile Justice, PRA Associates, Inc. Available online: ncmhjj.com/wp-content/uploads/2013/12/Blueprint.pdf

Smith, J.R., J. Brooks-Gunn, and P. Klebanov. 1997. The consequences of living in poverty for young children's cognitive and verbal ability and early school achievement. In *Consequences of Growing up Poor*, eds. G.J. Duncan and J. Brooks-Gunn, pp.132-89. New York: Russell Sage Foundation.

Smith, P.N., and M.W. Sams. 2005. Neurofeedback with juvenile offenders: A pilot study in the use of QEEG-based and analog-based remedial neurofeedback training. *Journal of Neurotherapy* 9(3): 87-99.

Solitary Watch. 2012. How many prisoners are in solitary confinement in the United States? http://solitarywatch.

com/2012/02/01/how-many-prisoners-are-in-solitary-confinement-in-the-united-states/

Spaulding, A.C., R.M. Seals, V.A. McCallum, S.D. Perez, A.K. Brzozowski, and N.K. Steenland. 2011. Prisoner survival inside and outside of the institution: Implications for health-care planning. *American Journal of Epidemiology* 173 (5): 479-87.

Steadman, H.J., F. Osher, P.C. Robbins, B. Case, and S. Samuels. 2009. Prevalence of serious mental illness among jail inmates. *Psychiatric Services* 60: 761-65.

Storm, I.F., S. Thoresen, T. Wentzel-Larsen, and G. Dyb. 2013. Violence, bullying, and academic achievement: A study of 15-year-old adolescents and their school environment. *Child Abuse and Neglect* 37: 243-51.

Stouthamer-Loeber, M., E.H. Wei, D.L. Homish, and R. Loeber. 2002. Which family and demographic factors are related to both maltreatment and persistent serious juvenile delinquency? *Children's Services: Social Policy, Research, and Practice* 5: 261-72.

Tiihonen, J., R.Rossi, M. Laakso, S. Hidgins, C. Testa, and G.B. Frisoni. 2008. Brain anatomy of persistent violent offenders: More rather than less. *Psychiat. Res. Neuroimaging* 163 (3): 201-12.

Tottenham, N., and M. Sheridan. 2010. A review of adversity, the amygdala, and the hippocampus: A consideration of developmental timing. *Frontier of Human Neuroscience* 3: 68.

United States Census Bureau. 2016. Income and Poverty in the United States: 2015. Available online: https://www.census.gov/library/publications/2016/demo/p60-256.html

United States Conference of Mayors. 2015. *Hunger and homelessness survey: A status report on hunger and homelessness in American cities*. http://mazon.org/assets/Uploads/Hunger-and-Homelessness-Survey.pdf

United States Environmental Protection Agency. 2010. *Our Nation's Air: Status and Trend Through 2008*. Washington, DC: EPA.

Strawson, G. 1986. *Freedom and Belief*. Oxford: Oxford University Press.

Strawson, G. 1994. The impossibility of moral responsibility. *Philosophical Studies* 75 (1): 5-24.

Stringhini, S., C. Carmeli, M. Jokela, M. Avendano, P. Muenning, F. Guida, F. Ricceri, et al. 2016. Socioeconomic status and the 25 x 25 risk factors as determinants of premature mortality: A multicohort study and meta-analysis of 1.7 million men and women. *Lancet* 389 (10075): 1229-37.

Uggen, C., R. Larson, and S. Shannon. 2016. *6 Million Lost Voters: State-Level Estimates of Felony Disenfranchisement*. Washington, DC: The Sentencing Profect.

United Nations Press Release. 2017. Calling climate change direct threat, multiplier of many others at General Assembly Event, Secretary-General stresses need for urgent, decisive action. https://www.un.org/press/en/2017/sgsm18470.doc.htm

Veit, R., H. Flor, M. Erb, C. Hermann, M. Lotze, W. Grodd, N. Birbaumer. 2002. Brain circuits involved in emotional learning in antisocial behavior and social phobia in humans. *Neuroscience Letters* 328 (3): 233-36.

Viding, E., E. McCroy, and A. Seara-Cardoso. 2014. Psychopathy. *Current Biology* 24 (18): R871-74.

Visher, C., S. Debus, and J. Yahner. 2008. *Employment After Prison: A Longitudinal Study of Releases in Three States*. Washing, DC: Urban Institute.

Viswanath, K., and K. Bond. 2007. Social determinants and nutrition: Reflections on the role of communication. *Journal of Nutr Educ Behav.* 2: 20-24.

Vives-cases, C., L. Otero-Garcia, and J. Torrubiano. 2015. Intimate partner violence among women in Spain: The impact of regional-level male employment and income inequality. *European Journal of Public Health* 25: 1-7.

Waller, B. 2011. *Against Moral Responsibility*. Cambridge, MA: MIT Press.

Waller, B. 2014. *The Stubborn System of Moral Responsibility*. Cambridge, MA: MIT Press.

Wang, E.A., Y. Wang, and H.M. Krumholz. 2013. A high risk of hospitalization following release from correctional facilities in Medicare beneficiaries: A retrospective matched cohort study, 2002 to 2010. *JAMA Internal Medicine* 173 (17): 1621-28.

Weaver, C.M., J.G. Borkowski, and T.L. Whitman. 2008. Violence breeds violence: Childhood exposure and adolescent conduct problems. *Journal of Community Psychology* 36 (1): 96-112.

Weaver, C.P., R.H. Moss, K.L Ebi, P.H. Gleicj, P.C. Stern, C. Telbaldi, et al. 2017. Reframing climate change assessments around risk: Recommendations for the US National Climate Assessment. *Environmental Research Letters* 12: http://iopscience.iop.org/article/10.1088/1748-9326/aa7494/pdf

Webster, C., and S. Kingston. 2014. Anti-poverty strategies for the U.K.: Poverty and crime review. Project report. Joseph Rowntree Foundation. Available online: http://eprints.lancs.ac.uk/71188/1/JRF_Final_Poverty_and_Crime_Review_

May_2014.pdf

Wilkinson, R.G. 1999. Health, hierarchy, and social anxiety. *Ann. N.Y. Acad. Sci.* 896: 48-63.

Williams, F.P., and M.D. McShane. 1998. *Criminological Theory: Selected classic readings*. Anderson Publishing.

The World Bank. 2015. *Global Monitoring Report*. Available online: http://pubdocs.worldbank.org/en/503001444058224597/Global-Monitoring-Report-2015.pdf

World Health Organization. 2002. *World Health Report 2002*. WHO, Geneva.

World Health Organization. 2004. *World Health Report 2004*. WHO, Geneva.

World Health Organization. 2005. *Air Quality Guidelines: Global Update 2005*. http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg/en/

World Health Organization. 2006a. *Preventing Disease Through Healthy Environments*. Geneva, Switzerland: WHO.

World Health Organization. 2006b. *Protecting Groundwater for Health: Managing the Quality of Drinking-water Sources*. London: IWA. http://www.who.int/water_sanitation_health/publications/PGWsection1.pdf

World Health Organization. 2010. *Childhood Lead Poisoning*. Geneva: WHO.

World Health Organization. 2013. IARC: Outdoor air pollution a leading environmental cause of cancer deaths. International Agency for Research on Cancer, WHO. http://www.iarc.fr/en/media-centre/iarcnews/pdf/pr221_E.pdf

World Health Organization. 2016a. Ambient (outdoor) air quality and health: Fact sheet. http://www.who.int/mediacentre/factsheets/fs313/en/

World Health Organization. 2016b. Lead poising and health: Fact sheet. http://www.who.int/mediacentre/factsheets/fs379/en/

World Health Organization (WHO) and Food and Agriculture Organization (FAO). 2003. *Joint WHO/FAO Expert Report on Diet, Nutrition and the Prevention of Chronic Disease*. WHO, Geneva.

World Health Organization and UNICEF. 2000. *Global Water Supply and Sanitation Assessment 2000 Report*. Geneva and New York: WHO and UNICEF.

Wortley, R. 2005. *Situational Prison Control*. Cambridge University Press.

Wright, B.R.E, A. Caspi, T.E. Moffitt, R.A. Miech, P.A Silva. 1999. Reconsidering the relationship between SES and delinquency: Causation but not correlation. *Criminology* 37: 175-94.

Wright, J.P., et al. 2008. Association of prenatal and childhood blood lead concentrations with criminal arrests in early adulthood. *PLoS Medicine* 5 (5): e101.

Yang, Y., A. Raine, P. Colletti, A.W. Toga, K.L. Narr. 2010. Morphological alterations in prefrontal cortex and amygdala in unsuccessful psychopaths. *Journal of Abnormal Psychology* 119 (3): 546-554.

Yu, R., M. Aaltonen, S. Branje, T. Ristikari, W. Meeus, K. Salmela-Aro, et al. 2017. Depression and violence in adolescence and young adults: Findings from three longitudinal cohorts. *Journal of American Academy of Adolescent Psychiatry* 56 (8): 652-58.

Zaalberg, A., H. Nijman, E. Bulten, L. Stoosma, and C. Van der Staak. 2010. Effects of nutritional supplements on aggression, rule-breaking, and psychopathology among young adult prisoners. *Aggressive Behavior* 36 (2): 117-26.

Zanarini, M.C. and F.R. Frankenburg. 2003. Omega-3 fatty acid treatment of women with borderline personality disorder: A double-blind, placebo-controlled pilot study. *American Journal of Psychiatry* 160 (1): 167-9.