

# How Much Does That Cost? Examining the Economic Costs of Crime in North America Attributable to People With Psychopathic Personality Disorder

Dylan T. Gatner<sup>1, 2</sup>, Kevin S. Douglas<sup>1, 3, 4</sup>, Madison F. E. Almond<sup>1</sup>, Stephen D. Hart<sup>1, 5</sup>,  
and P. Randall Kropp<sup>1, 2</sup>

<sup>1</sup> Department of Psychology, Simon Fraser University

<sup>2</sup> British Columbia Mental Health and Substance Use Services, Forensic Psychiatric Services, Vancouver, Canada

<sup>3</sup> Helse Bergen Sikkerhet Kompetansesenter, Bergen, Norway

<sup>4</sup> Regional Centre for Research and Education in Forensic Psychiatry, Oslo University Hospital, Oslo, Norway

<sup>5</sup> Faculty of Psychology, University of Bergen

Cost of illness research has established that mental disorders lead to significant social burden and massive financial costs. A significant gap exists for the economic burden of many personality disorders, including psychopathic personality disorder (PPD). In the current study, we used a top-down prevalence-based cost of illness approach to estimate bounded crime cost estimates of PPD in the United States and Canada. Three key model parameters (PPD prevalence, relative offending rate of individuals with PPD, and national costs of crime for each country) were informed by existing literature. Sensitivity analyses and Monte Carlo simulations were conducted to provide bounded and central tendency estimates of crime costs, respectively. The estimated PPD-related costs of crime ranged from \$245.50 billion to \$1,591.57 billion (simulated means = \$512.83 to \$964.23 billion) in the United States and \$12.14 billion to \$53.00 billion (simulated means = \$25.33 to \$32.10 billion) in Canada. These results suggest that PPD may be associated with a substantial economic burden as a result of crime in North America. Recommendations are discussed regarding the burden–treatment discrepancy for PPD, as the development of future effective treatment for the disorder may decrease its costly burden on health and justice systems.

**Keywords:** psychopathic personality disorder, cost of illness, crime costs, violence, social burden

**Supplemental materials:** <https://doi.org/10.1037/per0000575.supp>

Cost of illness (COI) research has demonstrated that mental disorders have a significant burden on quality of life and result in substantial financial costs (Gustavsson et al., 2011; Murray et al., 2007; Whiteford et al., 2013). These COI outcomes are significant guiding factors in policy planning, financial allocation, and intervention selection (Jo, 2014). The research deriving these financial data can take one of two approaches: Disorder prevalence and associated costs can inform total expenditure costs in a “top-down” approach (Segel, 2006; Tarricone, 2006), or individual unit costs can be estimated, multiplied by their prevalence within a

certain sample, and then extrapolated to a population level in a “bottom-up” approach (Chapko et al., 2009; Tarricone, 2006). Research using such methods over the past several decades has identified considerable costs of mental illnesses at national and global levels (McGrath et al., 2008; Whiteford et al., 2013). For instance, the estimated cost of European brain diseases, including mental disorders and organic brain disorders, was €798 billion annually (Gustavsson et al., 2011), and national annual costs of schizophrenia across different countries have been estimated to fall between US\$94 million and US\$102 billion (Chong et al., 2016; Goeree et al., 2005).

When examining specific mental disorders, their global burden can be defined as a function of disorder prevalence and severity. For instance, schizophrenia makes a moderate contribution to the global burden of disease (McGrath et al., 2008; Saha et al., 2005) because its low prevalence is balanced by a severity weight that was highest among 220 disease states (Salomon et al., 2012). Although mental disorders such as schizophrenia and depression have been studied at the global level, personality disorders have been excluded from global analyses because epidemiological data have been inadequate to produce reliable estimates (Whiteford et al., 2013). However, personality

---

Dylan T. Gatner  <https://orcid.org/0000-0001-5945-5884>

Although this project did not have participants or individuals data (and as such no data repository was created), information about the coding of effects, formulas, and simulations can be requested from Dylan T. Gatner.

Correspondence concerning this article should be addressed to Dylan T. Gatner, Department of Psychology, Simon Fraser University, 8888 University Drive, Burnaby BC, V5A 1S6, Canada. Email: [dylangatner@gmail.com](mailto:dylangatner@gmail.com)

disorders have been subject to some economic cost estimation at continental and national levels, with substantial variability in value. In Europe, personality disorder costs were estimated at €27.35 billion in 2011 or €6,328 per patient (Gustavsson et al., 2011), whereas within a large Dutch sample, direct medical costs and indirect costs were estimated at almost twice as much (i.e., €11,126; Soeteman et al., 2008). Even higher costs (£65,545) for each patient were estimated over just 6 months in a study of individuals with severe and dangerous personality disorders completing intensive inpatient treatment (Barrett et al., 2005). These estimates suggest that mental disorders, including personality disorders, strongly contribute toward many nations' costs of overall illness.

Research has been equivocal on whether specific personality disorders cost more than other mental disorders such as generalized anxiety and schizophrenia (Barrett et al., 2005; Gustavsson et al., 2011; Soeteman et al., 2008). Given the pervasive dysfunction associated with personality disorders, they have a high likelihood for large financial associations across various social systems. In particular, substantial research has been conducted on the costs of borderline personality disorder (BPD), with estimates across developed countries ranging from £5,240 to US\$52,562 per person annually for direct costs (Bateman & Fonagy, 2003; Hall et al., 2001; Hörz et al., 2010; Jerschke et al., 1998; Palmer et al., 2006) and from €16,852 to €28,026 per person annually when indirect costs are included (Salvador-Carulla et al., 2014; Van Asselt et al., 2007; Wagner et al., 2014). Moreover, a study that used top-down COI methodology estimated the annual cost of BPD in Germany at €8.69 billion (Wunsch et al., 2014), demonstrating that the annual national costs of certain personality disorders may be equivalent to, or greater than, the costs of other mental disorders.

Aside from BPD, a noticeable gap in the literature exists for the economic burden of personality disorders. Psychopathic personality disorder, which can be conceptualized as a more severe version of antisocial personality disorder (Coid & Ullrich, 2010; Yoon et al., 2021), is characterized by longstanding problems with empathy, manipulateness, irresponsibility, impulsivity, dishonesty, and a pattern of social misconduct (Cleckley, 1941, 1976; Cooke et al., 2012; Hare, 2003). Considering the substantial intraindividual comorbidity of personality disorders (Mullins-Sweatt, 2013; Widiger et al., 2009; Widiger & Trull, 2007) and the conceptual and empirical overlap between BPD and PPD (Miller et al., 2010; Pauli et al., 2018; Viljoen et al., 2015), an established body of PPD COI research may be expected. Yet, this reasoning does not prove true. Few examinations of the economic cost of PPD exist, regardless of the individual- and societal-level dysfunction linked with this personality disorder.

### Harmful Outcomes of PPD

Previous research has linked PPD to multiple negative outcomes. Higher scores on the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), a common and validated tool for the measurement of PPD (Acheson & Olmi, 2005; Hart et al., 1995; Storey et al., 2016), are associated with illicit substance use (Hemphill et al., 1994; Walsh et al., 2007) and suicidality (Douglas et al., 2006; Verona et al., 2012). The negative impact of PPD may also extend to the workplace, as scholars have suggested that psychopathic employees may contribute to significant financial losses since the early 20th century (Powers, 1920). More recently, there is evidence that PPD is associated with risky financial

decision-making and poor financial success (Boccio & Beaver, 2015; Costello et al., 2019; ten Brinke et al., 2018). In addition to these dysfunctional correlates, previous research has most commonly focused on the associations between PPD, violence, and crime. PPD has been described as a robust moderate predictor of criminal recidivism across samples of adult and juvenile offenders and forensic psychiatric inpatients (Guy et al., 2010; Hawes et al., 2013; Leistico et al., 2008). Moreover, those with the disorder have been reported with higher rates of violent recidivism and higher recidivism severity (Baskin-Sommers et al., 2013; Howard et al., 2014; Leistico et al., 2008; Salekin et al., 1996).

Psychopathy is often conceptualized as a dimensional construct (Maraun & Hart, 2016; Sellbom & Drislane, 2021); however, in clinical practice and field settings, categorical classifications (i.e., PPD vs. non-PPD) are used, often based on a PCL-R cutoff score of approximately 30 (Hare, 2003). From this categorical perspective, the prevalence of PPD has been crudely estimated at approximately 1% of the general population (Blair et al., 2005; Hare, 1991). Yet, those with PPD comprise a much larger proportion of incarcerated populations (15%–25%; Hare, 1999)<sup>1</sup>, and as noted earlier, this disorder is associated with many harmful outcomes. These concerns have led scholars to suggest that a serious social burden is associated with PPD (Beaver et al., 2014; Hare, 1999; Kiehl & Hoffman, 2011; Reidy et al., 2015; Viding et al., 2014). However, extant research has made few efforts to quantify the economic severity of this burden—a pressing concern due to the considerable crime cost estimated for Western nations.

### Psychopathic Personality Disorder Cost Estimations

Modern crime costing dates back several decades (Cohen, 1988) and has been described as a central way to inform policy and augment societal well-being (Cohen, 2020). The cost of crime in each nation must be quantified before estimating what portion of it is attributable to individuals with PPD. In a systematic review of national crime costs in developed countries, substantial cost variability emerged across nationalities and studies reporting on the same country (e.g., Australian total crime costs ranged from AUD9 to AUD35 billion; Wickramasekera et al., 2015). The United States had the highest national costs of crime (US\$450 billion to US\$3.20 trillion), whereas Canadian crime costs were estimated at CAD100 billion in 2008 and CAD81.50 billion in 2011, respectively (Easton et al., 2014; Zhang, 2011).

With such large economic burdens attributed to crime, it is surprising that comprehensive estimations of the burden of adult manifestations of PPD have not been fully conducted. A recent empirical examination (DeLisi et al., 2018) reported that certain self-reported psychopathic features (e.g., callous unemotionality) were associated with increased crime costs; however, these findings were derived from a sample of delinquent youth. At the adult level, a brief top-down estimate by Kiehl and Hoffman (2011) indicated that PPD was associated with US\$460 billion in direct costs. However, this estimate carries some limitations. The authors

<sup>1</sup> The current analysis conceptualized psychopathy from a disorder perspective rather than a variable- or continuum-centric approach, which allowed us to conduct a COI study. In turn, this allowed person-centric implications for those who are classified as having PPD or being highly psychopathic.

did not account for the differing prevalence rates of PPD, which fluctuates across offenders depending on institution type (e.g., security level, federal vs. state/provincial, and community-based) and the increased relative offending rates of those with PPD. Furthermore, this estimation did not account for indirect crime costs (e.g., victim pain and suffering), which has previously been shown to be the largest cost category (Wickramasekera et al., 2015; Zhang, 2011). In considering these limitations, the aforementioned estimate is a starting point of understanding the crime costs attributable to PPD. However, a comprehensive estimation remains warranted to investigate the veracity of Kiehl and Sinnott-Armstrong's (2013) claim that PPD might be "the most expensive mental health disorder known to man" (p. 1).

### Current Study

The purpose of the current study was to fill a literature gap by comprehensively estimating financial costs of PPD among adults in the United States and Canada as a result of crime. Using a top-down approach, we estimated the prevalence and offending rates of individuals with PPD. We applied these parameters in an aim to refine the previous estimations of costs of crime made by Kiehl and Hoffman (2011), using bounded cost estimates. We hypothesized that the cost of crime associated with PPD would be disproportionately higher than for offenders without PPD, considering the increased rates and severity of offending in individuals with PPD (Baskin-Sommers et al., 2013; Howard et al., 2014; Leistico et al., 2008). Given that the cost of crime accounts for significant portions of the national gross domestic product (GDP; Anderson, 2012; Easton et al., 2014; Zhang, 2011), we also hypothesized that the estimated national PPD crime costs would be comparable with the overall costs of BPD and schizophrenia, two other mental disorders that are associated with substantial economic burden.

### Method

#### Procedure

We selected a prevalence-based, top-down approach to estimate the cost of crime associated with PPD. Approval was received by the relevant institutional review board. A prevalence-based approach was chosen over an incidence approach (i.e., number of new PPD diagnoses) because PPD is predominantly assessed using measures such as the PCL-R (Hare, 2003), which evaluates a static lifetime prevalence of the disorder. Reasonably accurate population-level base rates are required for a top-down approach, but in contrast to bottom-up sample-driven estimations, cost extrapolation is not necessary, which negates sampling generalizability concerns (Tiainen & Rehnberg, 2010). That is, a top-down approach is not bounded by institutional unit costs that can be too specific to generalize to larger populations (e.g., national costs).

#### Assumed Model Parameters

##### *PPD Prevalence*

An accurate assessment of PPD prevalence in the general population is difficult to estimate, as it requires extensive and multi-sourced collateral information that is typically unavailable in most

countries. Due to the current study's focus on the estimated cost of crime, the prevalence of PPD was only assessed for correctional populations. In North American provincial/state and federal incarcerated samples, PPD prevalence has ranged from 11% to 38% when specified diagnostic criteria was a PCL-R score  $\geq 30$  or a PCL:SV score  $\geq 18$  (Gatner et al., 2018; Hare, 1991, 2003; Harpur & Hare, 1994; Hart et al., 1995; Olver & Wong, 2015; Storey et al., 2016; see online supplemental materials).<sup>2</sup> Canadian studies have produced prevalence rates that were higher and lower than American PPD rates, but given the apparent overlap in prevalence ranges, the rates were assumed to be equal between both countries for incarcerated offenders.

The reported difference of PPD prevalence in offending populations serving their sentence in prison versus the community has been equivocal. Some findings have suggested that PPD prevalence is lower among offenders being supervised in the community (i.e., 2% to 9%; Douglas, 2018; Guy et al., 2015; Storey et al., 2009), whereas other literature has reported less disparate prevalence among Canadian and U.S. community-based offender samples (i.e., 13% to 30%; Gunter et al., 2011; Harris, 2001; Jackson, 2016; Porter et al., 2001). Overall, these studies suggest that psychopathy rates are likely partially but not completely reduced among a range of offenders serving community-based sentences. Therefore, to account for offenders serving community-based sentences, we assumed an 80% reduction in the prevalence of PPD (i.e., 20% the prevalence of in custody settings) for 50% of the North American offending population. This 50% reflects the proportion of individuals in the United States and Canada that were reported to be serving a probation or provincial community sentence, respectively (Kaeble & Cowhig, 2018; Malakieh, 2018). When accounting for this reduction, the overall offender PPD prevalence was assumed to be 60% the rate estimated from research on incarcerated individuals. Thus, the North American PPD prevalence of all offenders was estimated to range from 6.6% to 20.4%.

##### *Rate of Crime of Individuals With PPD*

Previous meta-analyses have examined the association between violence, crime, and psychopathy. To include research with diverse effect size estimates, all effect sizes reported in previous meta-analyses (i.e.,  $d$  values, log odds ratios,  $r$  values, area under the curve values) were converted into odds ratios (ORs). A meta-analytic calculator (Wilson, 2018) was used to convert log odds ratios to ORs, whereas area under the curve values were first converted to  $d$  values using Rice and Harris's (2005) formula. All Cohen's  $d$  values were converted to ORs using the formula  $\log(\text{OR}) = d(\pi/\sqrt{3})$ . Bivariate correlation  $r$  values were converted to  $d$  (and subsequently to ORs) using the formula  $d = 2r/\sqrt{1-r^2}$ .

Because the analyses focused on PPD as an entire disorder, the Walters (2003b) meta-analysis effects were pooled, as it reported only PCL-R factor score effects (i.e., no total score effects were reported). That is, its OR effects for general recidivism (Walters, 2003b) were 1.72 and 3.43 for PCL-R Factor 1 (interpersonal-affective deficits) and Factor 2 (impulsive-antisocial deficits), respectively (see online supplemental materials). After dividing

<sup>2</sup> One study that reported a PPD prevalence of 38% was removed from the primary analyses of this study because it was deemed far higher than is typically reported in the broad PPD literature.

the sum of these effects in half, the pooled OR effect size was 2.58. These estimates were not exact reflections of the total scores, but they served the purpose of increasing the number of considered effects. Across the identified meta-analyses, the OR range was 2.08 to 3.08, with an unweighted mean effect (i.e., 18.39/7 effects) of 2.63. We are not aware of reliable research on the potentially different rate of undetected crime between offenders with and without PPD, so it was assumed that PPD offending rates for detected and undetected crime were equal.

### National Cost of Crime

**United States.** The estimated economic burden of crime in the United States was \$1.7 to \$3.2 trillion in 2012 (Anderson, 2012). Anderson derived these costs using a bottom-up approach based on market-based estimates (financial statements of direct costs such as correctional facility costs), hedonic pricing (increased costs resulting from crime such as housing costs in safer neighborhoods), and contingent valuation methods (surveys of intangible costs of pain and suffering). Several major subcategories underpinned Anderson's overall estimate: crime-induced production cost or cost of goods and services that would not exist without crime, such as corrections and security systems (\$646 billion); opportunity cost such as offenders' and victims' lost time and resources (\$253 billion); risks to life and health (\$756 billion); transfers of goods and services using criminal means, such as selling stolen goods and online fraud (\$1,561 billion). Because transfers do not equate to a net financial loss, the lower crime cost estimate excluded transfers and the higher estimate included transfers. When accounting for inflation at the time of this study in 2020, Anderson's (2012) U.S. cost of crime estimate ranged from US\$1.92 to US\$3.61 trillion. Specifically, crime-induced costs were \$727.62 billion, opportunity costs were \$285.25 billion, risks to life and health costs were \$852.35 billion, and transfers of goods and services using criminal means were \$1,759.93 billion.

**Canada.** Easton et al. (2014) used a variety of governmental reports and national social surveys to estimate the annual Canadian cost of crime across the 2000s. The authors used various methods to estimate direct (reported policing, correctional, judicial, and private security financial costs) and indirect (e.g., injury compensation values weighted by crime severity and estimated productivity losses) costs of crime for both reported crimes and estimated unreported crime from victimization surveys. For 2009, the estimated cost of crime was CAD85.2 billion, comprising a total criminal justice system cost of \$19.3 billion (i.e., policing, courts, and corrections) and an intangible victim pain and suffering cost of \$47 billion. Easton et al.'s (2014) cost estimate of crime in 2009 was deemed reasonably conservative due to the exclusion of distress or fear and costs to secondary parties such as family from estimated victim suffering costs, the exclusion of drug-related medical care from estimated medical costs, and the use of the lower bound of a confidence interval generated by meta-analysis to estimate the cost of a criminal fatality (\$5.5 million; Viscusi & Aldy, 2003).

Using common costing estimation methods (e.g., injury compensation values and economic valuation of individual lives) and information sources (e.g., governmental spending surveys and social surveys) Zhang (2011) also estimated the cost of crime in Canada in 2008 at approximately \$100 billion. Specifically, the tangible costs of crime (e.g., criminal justice system costs, direct

victim costs, and third-party costs) amounted to \$31.4 billion, whereas the intangible costs (e.g., loss of life, pain, and suffering) were estimated at \$68.2 billion. Transformed to account for inflation, Easton et al.'s (2014) and Zhang's (2011) total Canadian costs of crime estimates in 2020 dollars were \$94.84 billion and \$120.18 billion, respectively.

### Cost Estimation Analysis

The estimated cost of crime attributable to PPD was based off the following original formula:

Cost of Crime Associated With PPD = (Proportion of Total Crime Accounted for by Those With PPD)  $\times$  (the Total Cost of Crime), where the first parenthetical component (i.e., proportion of total crime accounted for by those with psychopathy) was estimated by using the following formula: Total Proportion of Crime = Proportion of PPD Crime + Proportion of Non-PPD Crime. More specifically, Total Proportion of Crime =  $x(\text{PPD Rate of Crime})(\text{PPD Offender Prevalence}) + x(\text{Non-PPD Relative Offending Rate; Non-PPD Offender Prevalence})$ .

Sensitivity analyses were conducted to provide bounded estimates, given that each parameter has its own set of fixed and random error. These sensitivity analyses estimated the dispersion of annual crime costs attributable to PPD. The parameters ranged from the upper and lower values reported across relevant studies as well as the unweighted mean offending rate (cost of crime = 2 estimates, offending rate = 3 estimates, PPD prevalence = 2 estimates). Twelve separate estimates were reported for the United States and Canada for a total of 24 cost estimations.

To estimate the central tendency of PPD-related crime while modeling for variability in the underpinning parameters, we conducted Monte Carlo simulations, which allow repeated sampling to model numeric results in the face of uncertain parameters (Hunt & Miles, 2015). Monte Carlo simulation requires that parameters and the nature of chance are specified (Barreto & Howland, 2005). The Monte Carlo quantitative model was selected by considering the cost estimate formula of the PPD proportion of crime. The distribution was specified for this formula by considering the data's nature (i.e., discrete proportions) and their limits (i.e., proportions bounded from 0 to 1). The data shape was specified as relatively symmetrical input, which was centered around the mean without extreme outliers, given that it is highly unlikely that all or no crime would be committed by those with PPD. Based on these parameters, a binomial distribution was selected as the best fitting distribution (Mun, 2008). The probability of PPD-attributable crime in the binomial distribution was specified from the average of all possible combinations of PPD prevalence and offending rates. These combinations produced 63 North American proportions ( $M = 26.85\%$ ;  $SD = 9.62\%$ ).

## Results

### Dispersion: Single-Estimate Sensitivity Analysis

Sensitivity analyses were conducted to estimate the dispersion of the PPD-related national crime costs across various parameter assumptions. The results revealed a wide range of national economic costs attributable to PPD. For the 12 U.S. estimates (Table 1), the lowest annual total cost of crime attributable to PPD was

**Table 1**  
*Total Cost of Crime in the United States Associated With Psychopathic Personality Disorder*

PPD prevalence (%)	PPD crime rate ( <i>OR</i> )	PPD proportion of crime (%)	U.S. cost of crime (billions)	PPD total cost of crime (billions)
6.6	2.08	12.8	\$1,918	\$245.50
6.6	2.63	15.7	\$1,918	\$301.13
6.6	3.08	17.9	\$1,918	\$343.32
20.4	2.08	34.8	\$1,918	\$667.46
20.4	2.63	40.3	\$1,918	\$772.95
20.4	3.08	44.1	\$1,918	\$845.84
6.6	2.08	12.8	\$3,609	\$461.95
6.6	2.63	15.7	\$3,609	\$566.61
6.6	3.08	17.9	\$3,609	\$646.01
20.4	2.08	34.8	\$3,609	\$1,255.93
20.4	2.63	40.3	\$3,609	\$1,454.43
20.4	3.08	44.1	\$3,609	\$1,591.57

\$245.50 billion, whereas the highest U.S. cost was \$1,591.57 billion or \$1.59 trillion. For the 12 Canadian estimates (Table 2), the lowest cost of crime attributable to PPD ranged from \$12.14 billion to \$53.00 billion. Per capita costs of PPD-related crime followed the same trend: costs ranged from US\$742 to US\$4,807 for the United States and CAD322 to CAD1,405 for Canada.<sup>3</sup>

### Central Tendency: Monte Carlo Simulation

When Monte Carlo simulations were conducted to analyze the central tendency of the PPD cost estimates, the mean proportions of PPD-related crime in North America ( $M = .2617$ ;  $SD = .0456$ ) were consistent with the single-estimate sensitivity analyses. The simulated interquartile range (IQR) was .06 (.2400 to .3000), and the overall simulated range of proportions (.1500 to .4300) fell within the minimum and maximum estimates that resulted from these sensitivity analyses.

When multiplying the low and high 2020 Canadian costs of crime with these simulated proportions, the mean cost of PPD-related crime in Canada was estimated at \$25.33 billion (IQR = \$22.76 to \$28.45) and \$32.10 billion (IQR = \$28.84 to \$36.05), respectively. In the United States, the 2020 mean cost of PPD-related crime was estimated at \$512.83 billion (IQR = \$460.80 to \$576.00) for the lower estimate and \$964.23 billion (IQR = \$866.40 to \$1,083.00) for the higher estimate. These results demonstrate that PPD accounted for substantial crime costs, which were disproportionate to the relatively small PPD prevalence estimates within the offender population. For instance, using a low-end single prevalence estimate (6.6%) with an average recidivism odds ratio ( $OR = 2.63$ ), offenders with PPD are associated with approximately 2.51 times the proportion of crime costs relative to their prevalence.<sup>4</sup>

### Discussion

In this top-down cost estimation study, our results suggest that PPD is associated with a large economic burden as a result of crime. These costs warrant a shift in how systems, policymakers, and clinicians attempt to treat and manage those with prominent psychopathic features. To our knowledge, this is the first econometric analysis of the social burden of PPD among adults using systematic and varied epidemiological assumptions to provide a range of financial estimates for the United States and Canada. In addition to a range of single-point estimates, we conducted Monte

Carlo simulations to estimate a central tendency for PPD-attributed crime costs. The results support our hypothesis that the PPD-related cost of crime would be disproportionately higher relative to PPD prevalence. These results dovetail with research findings that demonstrate associations between higher levels of PPD, violent behavior, and pervasive recidivism (Baskin-Sommers et al., 2013; Howard et al., 2014; Leistico et al., 2008).

The estimated 2020 U.S. cost of crime attributable to PPD ranged from \$245.50 billion to \$1.59 trillion, whereas Canadian costs ranged from CAD12.14 to CAD53.00 billion. When using lower or more conservative assumptions, mean simulated costs of crime were \$512.83 billion (U.S.); the Canadian cost of crime associated with PPD was CAD25.33 billion. To place these estimates into perspective, the U.S. GDP was US\$21.43 trillion and the Canadian GDP was CAD2.26 trillion, indicating the mean simulated cost of crime attributable to PPD would account for the approximate equivalent of 2.4% of the U.S. GDP and 1.1% of the Canadian GDP. Notwithstanding indexing these PPD costs to national GDP, direct comparisons between the United States and Canada should not be made based on the current PPD costs because of other relevant factors that affect crime costs within each country (e.g., U.S. incarceration rates are disproportionately higher; Weiss & MacKenzie, 2010). For comparison with other national costs, American PPD-related costs were higher than direct costs of American motor vehicle crashes in 2010 (\$242 billion) and for certain estimates, PPD crime costs were similar to American motor vehicle costs including quality-of-life losses (\$836 billion, Blincoe et al., 2015). Canadian PPD-associated costs greatly exceeded all annual transportation injury costs in Canada (i.e., \$4.30 billion; Parachute, 2015) and costs associated with Canadian tobacco use (Dobrescu et al., 2017).

<sup>3</sup> In initial analyses, we had included meta-analytic ORs related to violent recidivism and had assumed that PPD prevalence in community correctional supervision contexts was 50% of the custodial PPD prevalence. Higher estimated PPD costs resulted when applying these more generous assumptions. For instance, the US costs ranged from \$331.76 to \$2,255.31 billion, and the Canadian costs ranged from \$16.40 billion to \$75.12 billion.

<sup>4</sup> Again, when initially applying more generous assumptions (see Footnote 2), the mean Canadian cost of PPD-related crime was estimated at \$34.57 billion; the mean U.S. cost of PPD-related crime was estimated at \$699.18 billion.

**Table 2***Total Cost of Crime in Canada Associated With Psychopathic Personality Disorder*

PPD prevalence (%)	PPD crime rate (OR)	PPD proportion of crime (%)	Canadian cost of crime (billions)	PPD total cost of crime (billions)
6.6	2.08	12.8	\$94.84	\$12.14
6.6	2.63	15.7	\$94.84	\$14.89
6.6	3.08	17.9	\$94.84	\$16.98
20.4	2.08	34.8	\$94.84	\$33.00
20.4	2.63	40.3	\$94.84	\$38.22
20.4	3.08	44.1	\$94.84	\$41.82
6.6	2.08	12.8	\$120.18	\$15.38
6.6	2.63	15.7	\$120.18	\$18.87
6.6	3.08	17.9	\$120.18	\$21.51
20.4	2.08	34.8	\$120.18	\$41.82
20.4	2.63	40.3	\$120.18	\$48.43
20.4	3.08	44.1	\$120.18	\$53.00

When comparing the economic impacts of PPD to other mental disorders, these findings support the hypothesis that PPD-related crime costs were at least comparable with overall economic COI estimates for either BPD or schizophrenia. European annual national cost estimates of BPD have ranged from €2.22 to €8.69 billion (Van Asselt et al., 2007; Wunsch et al., 2014), whereas in Canada, schizophrenia was estimated to cost \$6.85 billion in 2004 (Goeree et al., 2005). These mental health costs are well below the estimated U.S. and Canadian PPD-related crime costs, providing initial data that PPD may have similar or greater societal costs than BPD or schizophrenia. However, this claim requires further empirical research, as diverse costing methodologies and outcomes have been more reliably considered across these latter disorders. It is possible, for instance, that the cost of self-injurious behaviors that is associated with BPD (Oldham, 2006) may balance the cost of PPD-associated violence. In addition, treatment services are provided less frequently to those with PPD than psychotic disorders or BPD, which may result in substantial differences in health-care costs. Nevertheless, the present findings suggest that greater resources and more emphasis should be given to treating and managing PPD because its economic impact is possibly similar to disorders such as BPD and schizophrenia, which rightfully lie at the forefront of clinical research.

### Limitations

Our study results are underpinned by methodological decisions and assumptions surrounding three primary parameters of interest: PPD prevalence, PPD relative offending rates, and national crime costs. Although we aimed to use conservative estimates for these parameters (e.g., removing outlier prevalence rates and excluding violence-only effects), readers should nevertheless consider the possibility of inflated PPD prevalence and offending rates and attend to the entire range of PPD-related crime cost estimates provided in the current study, including the Monte Carlo simulations. Moreover, the current study took a prevalence-based COI approach, which can be susceptible to overestimating costs if the illness incidence is declining across cohorts while disability costs are either declining over time or rising over the course of the illness (Tarricone, 2006). However, there is no evidence suggesting the incidence of PPD is declining or that there are fluctuations in treatment and disability costs.

This study also assumed that each crime was independent of other crimes, when it is possible that some crimes may share direct costs (e.g., one unit of policing costs is applied to five convictions that occurred concurrently). It is unclear whether people with PPD are more, less, or similarly likely to commit crimes concurrently. If PPD is associated with more crimes that are handled concurrently, this study may have overestimated direct PPD-related crime costs; however, these direct criminal justice costs account for a small portion of the total cost of crime. It is also unclear whether the government reports that informed most estimates of national crime underwent the same scrutiny as peer-reviewed journal articles. The U.S. cost of crime (Anderson, 2012) was the exception and provided two different estimates, but an independent cost estimation from a separate source would increase American crime cost reliability. The crime cost estimations were also required to be transformed to 2020 values, and actual costs of crime may not have followed the same trajectory as inflation. If there was a significant mismatch between inflation and changes in crime costs in these years, additional error would be introduced into the current cost estimates.

Finally, it is possible that we have underestimated rather than overestimated PPD costs. We assumed undetected and detected crimes held similar offending ratios between those with and without PPD. To the extent that undetected crime or the dark figure of crime is even more strongly associated with PPD, then we may have underestimated overall crime costs associated with the disorder. Moreover, this was not a comprehensive COI study because we only estimated crime costs (e.g., health and direct productivity costs were not considered). To the extent that PPD is associated with early mortality, increased use of health services, or underproductivity due to lower educational and employment accomplishments, the overall cost of PPD is likely much higher than our crime-related estimates. As such, PPD researchers interested in the disorder's broad social burden should test different financial assumptions and outcomes to achieve a better sense of the central tendency and dispersion of PPD crime and other costs.

### Conclusions and Implications

Diversifying methods and correlates of crime costs have been described as an important undertaking (Cohen, 2020), and the

current study attempted to understand crimes costs through this unique lens. Quantifying PPD-related crime costs is a novel undertaking within the psychopathy literature, and understanding the national crime costs associated with PPD can provide additional context to its dysfunctional impact. Our findings demonstrated that PPD was associated with sizable crime costs, suggesting that the disorder may have a significant societal burden. Even at the lowest and most conservative estimates, PPD-related financial costs were objectively meaningful and warrant economic, policy, and clinical intervention. Specifically, the estimated cost of crime attributable to PPD in the United States (i.e., interquartile ranges of US \$460.80 to US\$576.00 billion and US\$866.40 to US\$1,083.00 billion) typically exceeded the estimates of Kiehl and Hoffman (2011), who reported \$460 billion.

Because PPD is associated with an increased offending rate, those with prominent psychopathic features will account for a disproportionate amount of crime costs relative to their prevalence. Still, those with PPD account for only a subset of the full offender population. As such, our findings also suggest that overall, more crime costs are associated with those without PPD. PPD is only one key risk factor for criminal recidivism (Andrews & Bonta, 2010), and there may be ways to identify high-cost individuals using various criminogenic risk factors. As such, it is possible that we overestimated the crime costs associated directly with PPD, although this may be offset by other potential economic costs (e.g., health care and job productivity) that should be explored in future COI research of PPD. This issue notwithstanding, the current economic estimates lead us to recommend that policymakers prioritize research, treatment, and correctional management methods for PPD to reduce recidivism costs associated with the disorder.

Policymakers and clinicians in criminal justice and psychiatric systems should be concerned about the burden–treatment discrepancy for individuals with PPD. This group, with such a large financial burden, has a limited body of evidence for treatment and management efficacy. For example, a review of North American research funding databases shows a substantial disparity in monetary value of grants for studying the treatment of PPD versus BPD (e.g., \$1,227,818 vs. \$3,341,505; Canadian Research Information System, 2018). This funding inequality may be due, in part, to the stigma that PPD has intuitively been proposed to carry (Sheehan et al., 2016). It is possible that such stigmatizing effects may be lessened and policy buy-in may increase with the use of system-congruent language (e.g., *crime-prevention program over mental health treatment*), as the majority of PPD treatment and management will occur within correctional systems. By translating PPD's association with crime and violence into financial values, funding agencies and policymakers may be able to digest this information more easily than traditional statistical effect sizes, which also may serve as motivation to increase treatment and management strategies for PPD.

Given the costs outlined in the current study, what options are there to reduce costs and improve healthy outcomes for those affected by PPD? The extant intervention literature on PPD has provided some evidence that investing early in the developmental trajectory may be beneficial, as PPD may be more malleable earlier in life (Hawes et al., 2013) and early intervention has been demonstrated to be efficacious and cost-effective for at-risk youth (Cohen & Piquero, 2009; National Institute for Health & Clinical Excellence, 2010).

Among adults, some evidence supports schema therapy among offenders with personality disorders (Bernstein et al., 2021) and intensive cognitive–behavioral interventions for treating PPD and reducing recidivism (Salekin et al., 2010; Sewall & Olver, 2019). However, no prospective randomized controlled trials have investigated treatment for PPD, and most related research has found only modest effects (Davidson et al., 2009; Papalia et al., 2019).

One specific form of treatment, dialectical behavioral therapy (DBT; Linehan, 2015), has been suggested to have promising potential for offenders with PPD (Galietta & Rosenfeld, 2012). DBT shows theoretical overlap with the two-component treatment model for PPD, which is an extension of the risk-need-responsivity (RNR; Andrews & Bonta, 2010) model (i.e., PCL-R Factor 1 is conceptualized as a responsivity domain, whereas Factor 2 is conceptualized as a risk domain; Wong, 2016). The intensive multi-component nature of DBT also matches the likely elevated risk level of those with PPD (i.e., following the RNR risk principle). Case consultation in DBT regarding client–therapist issues also matches the RNR responsivity issues related to interpersonal-affective deficits commonly seen in PPD. Overall, we recommend that treatment avenues with preliminary indication of effectiveness or efficacy for PPD be further explored, given that efficacious interventions may decrease the costly national burden that was suggested by the estimations provided in the current study. The purpose of these estimations was not to further stigmatize people with PPD, who are already stigmatized enough. Rather, it was to identify evidence that may facilitate funding for research and development of correctional treatment programs targeted specifically for people with PPD, given their unique combination of risk, need, and responsivity factors.

## References

- Acheson, S. K., & Olmi, D. J. (2005). Test review of Hare Psychopathy Checklist—Revised. In R. A. Spies & B. S. Plake (Eds.), *The sixteenth mental measurements yearbook* (2nd ed.). University of Nebraska Press. <https://search-ebscohost-com.proxy.lib.sfu.ca/login.aspx?direct=true&db=mmt&AN=test.2740&site=ehost-live>
- Anderson, D. A. (2012). The cost of crime. *Foundations and Trends in Microeconomics*, 7(3), 209–265. <https://doi.org/10.1561/07000000047>
- Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct* (5th ed.). Anderson.
- Barreto, H., & Howland, R. (2005). *Introductory econometrics: Using Monte Carlo simulation with Microsoft Excel*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511809231>
- Barrett, B., Byford, S., Seivewright, H., Cooper, S., & Tyrer, P. (2005). Service costs for severe personality disorder at a special hospital. *Criminal Behaviour and Mental Health*, 15(3), 184–190. <https://doi.org/10.1002/cbm.7>
- Baskin-Sommers, A. R., Baskin, D. R., Sommers, I. B., & Newman, J. P. (2013). The intersectionality of sex, race, and psychopathology in predicting violent crimes. *Criminal Justice and Behavior*, 40(10), 1068–1091. <https://doi.org/10.1177/0093854813485412>
- Bateman, A., & Fonagy, P. (2003). Health service utilization costs for borderline personality disorder patients treated with psychoanalytically oriented partial hospitalization versus general psychiatric care. *The American Journal of Psychiatry*, 160(1), 169–171. <https://doi.org/10.1176/appi.ajp.160.1.169>
- Beaver, K. M., Nedelec, J. L., da Silva Costa, C., Poersch, A. P., Stelmach, M. C., Freddi, M. C., Gajos, J. M., & Boccio, C. (2014). The association between psychopathic personality traits and health-related outcomes. *Journal of Criminal Justice*, 42(5), 399–407. <https://doi.org/10.1016/j.jcrimjus.2014.05.005>

- Bernstein, D. P., Keulen-de Vos, M., Clercx, M., de Vogel, V., Kersten, G. C. M., Lancel, M., Jonkers, P. P., Bogaerts, S., Slaats, M., Broers, N. J., Deenen, T. A. M., & Arntz, A. (2021). Schema therapy for violent PD offenders: A randomized clinical trial. *Psychological Medicine*. Advance online publications. <https://doi.org/10.1017/S0033291721001161>
- Blair, J., Mitchell, D., & Blair, K. (2005). *The psychopath, emotion, and the brain*. Blackwell Publishing.
- Blincoe, L. J., Miller, T. R., Zaloshnja, E., & Lawrence, B. A. (2015, May). *The economic and societal impact of motor vehicle crashes, 2010 (Revised)* (Report No. DOT HS 812 013). National Highway Traffic Safety Administration.
- Boccio, C. M., & Beaver, K. M. (2015). Psychopathic personality traits, intelligence, and economic success. *Journal of Forensic Psychiatry and Psychology*, 26(4), 551–569. <https://doi.org/10.1080/14789949.2015.1037330>
- Canadian Research Information System. (2018). Canadian Research Information System. [http://webapps.cihir-irsc.gc.ca/cris/Search?p\\_language=E&p\\_version=CRIS](http://webapps.cihir-irsc.gc.ca/cris/Search?p_language=E&p_version=CRIS)
- Chapko, M. K., Liu, C. F., Perkins, M., Li, Y. F., Fortney, J. C., & Maciejewski, M. L. (2009). Equivalence of two healthcare costing methods: Bottom-up and top-down. *Health Economics*, 18(10), 1188–1201. <https://doi.org/10.1002/hec.1422>
- Chong, H. Y., Teoh, S. L., Wu, D. B.-C., Kotirum, S., Chiou, C.-F., & Chaiyakunapruk, N. (2016). Global economic burden of schizophrenia: A systematic review. *Neuropsychiatric Disease and Treatment*, 12, 357–373. <https://doi.org/10.2147/NDT.S96649>
- Cleckley, H. (1941). *The mask of sanity; an attempt to reinterpret the so-called psychopathic personality*. Mosby.
- Cleckley, H. (1976). *The mask of sanity; an attempt to reinterpret the so-called psychopathic personality* (5th ed.). Mosby.
- Cohen, M. A. (1988). Pain, suffering, and jury awards: A study of the cost of crime to victims. *Law and Society Review*, 22(3), 537–555. <https://doi.org/10.2307/3053629>
- Cohen, M. A. (2020). *The costs of crime and justice* (2nd ed.). Routledge. <https://doi.org/10.4324/9780429431562>
- Cohen, M. A., & Piquero, A. R. (2009). New evidence on the monetary value of saving a high risk youth. *Journal of Quantitative Criminology*, 25(1), 25–49. <https://doi.org/10.1007/s10940-008-9057-3>
- Coid, J., & Ullrich, S. (2010). Antisocial personality disorder is on a continuum with psychopathy. *Comprehensive Psychiatry*, 51(4), 426–433. <https://doi.org/10.1016/j.comppsy.2009.09.006>
- Cooke, D. J., Hart, S. D., Logan, C., & Michie, C. (2012). Explicating the construct of psychopathy: Development and validation of a conceptual model, the comprehensive assessment of psychopathic personality (CAPP). *International Journal of Forensic Mental Health*, 11(4), 242–252. <https://doi.org/10.1080/14999013.2012.746759>
- Costello, T. H., Smith, S. F., Bowes, S. M., Riley, S., Berns, G. S., & Lilienfeld, S. O. (2019). Risky business: Psychopathy, framing effects, and financial outcomes. *Journal of Research in Personality*, 78, 125–132. <https://doi.org/10.1016/j.jrp.2018.11.006>
- Davidson, K. M., Tyrer, P., Tata, P., Cooke, D., Gumley, A., Ford, I., Walker, A., Bezlyak, V., Seivewright, H., Robertson, H., & Crawford, M. J. (2009). Cognitive behaviour therapy for violent men with antisocial personality disorder in the community: An exploratory randomized controlled trial. *Psychological Medicine*, 39(4), 569–577. <https://doi.org/10.1017/S0033291708004066>
- DeLisi, M., Reidy, D. E., Heirigs, M. H., Tostlebe, J. J., & Vaughn, M. G. (2018). Psychopathic costs: A monetization study of the fiscal toll of psychopathy features among institutionalized delinquents. *Journal of Criminal Psychology*, 8(2), 112–124. <https://doi.org/10.1108/JCP-07-2017-0031>
- Douglas, K. S. (2018). *Risk reduction among provincial offenders*. Unpublished raw data.
- Dobrescu, A., Bhandari, A., Sutherland, G., & Dinh, T. (2017, October). *The costs of tobacco use in Canada, 2012*. The Conference Board of Canada. <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/costs-tobacco-use-canada-2012/Costs-of-Tobacco-Use-in-Canada-2012-eng.pdf>
- Douglas, K. S., Herboso, S., Poythress, N. G., Belfrage, H., & Edens, J. F. (2006). Psychopathy and suicide: A multisample investigation. *Psychological Services*, 3(2), 97–116. <https://doi.org/10.1037/1541-1559.3.2.97>
- Easton, S., Furness, H., & Brantingham, P. (2014, October 16). *Cost of crime in Canada: 2014 report*. Retrieved from <https://www.fraserinstitute.org/research/cost-crime-canada-2014-report>
- Galiotta, M., & Rosenfeld, B. (2012). Adapting dialectical behavior therapy (DBT) for the treatment of psychopathy. *International Journal of Forensic Mental Health*, 11(4), 325–335. <https://doi.org/10.1080/14999013.2012.746762>
- Gatner, D. T., Blanchard, A. J. E., Douglas, K. S., Lilienfeld, S. O., & Edens, J. F. (2018). Psychopathy in a multiethnic world: Investigating multiple measures of psychopathy in Hispanic, African American, and Caucasian offenders. *Assessment*, 25(2), 206–221. <https://doi.org/10.1177/1073191116639374>
- Goeree, R., Farahati, F., Burke, N., Blackhouse, G., O'Reilly, D., Pyne, J., & Tarride, J.-E. (2005). The economic burden of schizophrenia in Canada in 2004. *Current Medical Research and Opinion*, 21(12), 2017–2028. <https://doi.org/10.1185/030079905X75087>
- Gunter, T. D., Chibnall, J. T., Antoniak, S. K., Philibert, R. A., & Hollenbeck, N. (2011). Predictors of suicidal ideation, suicide attempts, and self-harm without lethal intent in a community corrections sample. *Journal of Criminal Justice*, 39(3), 238–245. <https://doi.org/10.1016/j.jcrimjus.2011.02.005>
- Gustavsson, A., Svensson, M., Jacobi, F., Allgulander, C., Alonso, J., Beghi, E., Dodel, R., Ekman, M., Faravelli, C., Fratiglioni, L., Gannon, B., Jones, D. H., Jennum, P., Jordanova, A., Jönsson, L., Karampampa, K., Knapp, M., Kobelt, G., Kurth, T., . . . CDBE2010Study Group. (2011). Cost of disorders of the brain in Europe 2010. *European Neuropharmacology*, 21(10), 718–779. <https://doi.org/10.1016/j.euroneuro.2011.08.008>
- Guy, L. S., Douglas, K. S., & Hendry, M. C. (2010). The role of psychopathic personality disorder in violence risk assessments using the HCR-20. *Journal of Personality Disorders*, 24(5), 551–580. <https://doi.org/10.1521/pedi.2010.24.5.551>
- Guy, L. S., Kusaj, C., Packer, I. K., & Douglas, K. S. (2015). Influence of the HCR-20, LS/CMI, and PCL-R on decisions about parole suitability among lifers. *Law and Human Behavior*, 39(3), 232–243. <https://doi.org/10.1037/lhb0000111>
- Hall, J., Caleo, S., Stevenson, J., & Meares, R. (2001). An Economic analysis of psychotherapy for borderline personality disorder patients. *Journal of Mental Health Policy and Economics*, 4(1), 3–8. <https://psynet.apa.org/record/2002-06288-003>
- Hare, R. D. (1991). *The Hare Psychopathy Checklist—Revised manual*. Multi-Health Systems.
- Hare, R. D. (1999). Psychopathy as a risk factor for violence. *Psychiatric Quarterly*, 70(3), 181–197. <https://doi.org/10.1023/a:1022094925150>
- Hare, R. D. (2003). *The Hare Psychopathy Checklist—Revised: Technical manual* (2nd ed.). Multi-Health Systems.
- Harris, A. J. R. (2001). *The Psychopathy Checklist: Screening Version: Applications with parole and probation sex offender samples* (Unpublished doctoral dissertation). Simon Fraser University.
- Harpur, T. J., & Hare, R. D. (1994). Assessment of psychopathy as a function of age. *Journal of Abnormal Psychology*, 103(4), 604–609. <https://doi.org/10.1037/0021-843X.103.4.604>
- Hart, S. D., Cox, D. N., & Hare, R. D. (1995). *The Hare Psychopathy Checklist: Screening Version (PCL:SV)*. Multi-Health Systems.
- Hawes, S. W., Boccaccini, M. T., & Murrie, D. C. (2013). Psychopathy and the combination of psychopathy and sexual deviance as predictors of sexual recidivism: Meta-analytic findings using the Psychopathy Checklist—Revised. *Psychological Assessment*, 25(1), 233–243. <https://doi.org/10.1037/a0030391>

- Hemphill, J. F., Hart, S. D., & Hare, R. D. (1994). Psychopathy and substance use. *Journal of Personality Disorders*, 8(3), 169–180. <https://doi.org/10.1521/pedi.1994.8.3.169>
- Hörz, S., Zanarini, M. C., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2010). Ten-year use of mental health services by patients with borderline personality disorder and with other axis II disorders. *Psychiatric Services*, 61(6), 612–616. <https://doi.org/10.1176/ps.2010.61.6.612>
- Howard, R. C., Khalifa, N., & Duggan, C. (2014). Antisocial personality disorder comorbid with borderline pathology and psychopathy is associated with severe violence in a forensic sample. *Journal of Forensic Psychiatry and Psychology*, 25(6), 658–672. <https://doi.org/10.1080/14789949.2014.943797>
- Hunt, P., & Miles, J. N. V. (2015). An introduction to Monte Carlo simulations in criminal psychology: Applications in evaluating biased estimators for recidivism. *Journal of Criminal Psychology*, 5(2), 149–156. <https://doi.org/10.1108/JCP-02-2015-0008>
- Jackson, K. J. (2016). *Validation of the risk for sexual violence protocol in adult sexual offenders* (Unpublished doctoral dissertation). Simon Fraser University.
- Jerschke, S., Meixner, K., Richter, H., & Bohus, M. (1998). Zur Behandlungsgeschichte und Versorgungssituation von Patientinnen mit Borderline-Persönlichkeitsstörung in der Bundesrepublik Deutschland [The treatment history of patients with borderline personality disorder in the Republic of Germany]. *Fortschritte Der Neurologie Psychiatrie*, 66(12), 545–552. <https://doi.org/10.1055/s-2007-995297>
- Jo, C. (2014). Cost-of-illness studies: Concepts, scopes, and methods. *Clinical and Molecular Hepatology*, 20(4), 327–337. <https://doi.org/10.3350/cmh.2014.20.4.327>
- Kaeble, D., & Cowhig, M. (2018). *Correctional Populations in the United States, 2016. Bureau of Justice Statistics Research Report* (NCJ No. 251211). Bureau of Justice Statistics.
- Kiehl, K. A., & Hoffman, M. B. (2011). The criminal psychopath: History, neuroscience, treatment, and economics. *Jurimetrics*, 51, 355–397.
- Kiehl, K. A., & Sinnott-Armstrong, W. P. (2013). Introduction. In K. A. Kiehl & W. P. Sinnott-Armstrong (Eds.), *Handbook on psychopathy and law* (pp. 1–2). Oxford University Press.
- Leistico, A. M., Salekin, R. T., DeCoster, J., & Rogers, R. (2008). A large-scale meta-analysis relating the hare measures of psychopathy to antisocial conduct. *Law and Human Behavior*, 32(1), 28–45. <https://doi.org/10.1007/s10979-007-9096-6>
- Linehan, M. M. (2015). *DBT skills training manual*. Guilford Press Publications.
- Malakieh, J. (2018). *Adult and youth correctional statistics in Canada, 2016/2017*. <https://www150.statcan.gc.ca/n1/pub/85-002-x/2018001/article/54972-eng.htm#a1>
- Maraun, M. D., & Hart, S. D. (2016). The taxonic latent structure and taxometrics in forensic mental health. *Psychological Reports*, 119(2), 450–486. <https://doi.org/10.1177/0033294116662443>
- McGrath, J., Saha, S., Chant, D., & Welham, J. (2008). Schizophrenia: A concise overview of incidence, prevalence, and mortality. *Epidemiologic Reviews*, 30(1), 67–76. <https://doi.org/10.1093/epirev/mxn001>
- Miller, J. D., Dir, A., Gentile, B., Wilson, L., Pryor, L. R., & Campbell, W. K. (2010). Searching for a vulnerable dark triad: Comparing Factor 2 psychopathy, vulnerable narcissism, and borderline personality disorder. *Journal of Personality*, 78(5), 1529–1564. <https://doi.org/10.1111/j.1467-6494.2010.00660.x>
- Mullins-Sweatt, S. N. (2013). Conceptual and empirical support for the clinical utility of five-factor model personality disorder diagnosis. In T. A. Widiger & P. J. Costa (Eds.), *Personality disorders and the five-factor model of personality* (pp. 311–324). American Psychological Association. <https://doi.org/10.1037/13939-020>
- Mun, J. (2008). *Advanced analytical models: Over 800 models and 300 applications from the Basel II Accord to Wall Street and beyond: Appendix C: Understanding and choosing the right probability distributions*. Wiley.
- Murray, C. J., Lopez, A. D., Black, R., Mathers, C. D., Shibuya, K., Ezzati, M., Salomon, J. A., Michaud, C. M., Walker, N., & Vos, T. (2007). Global burden of disease 2005: Call for collaborators. *Lancet*, 370(9582), 109–110. [https://doi.org/10.1016/S0140-6736\(07\)61064-2](https://doi.org/10.1016/S0140-6736(07)61064-2)
- National Institute for Health & Clinical Excellence. (2010). *Antisocial personality disorder: Treatment, management, prevention* (National Clinical Practice Guideline Number 77). The British Psychological Society.
- Oldham, J. M. (2006). Borderline personality disorder and suicidality. *The American Journal of Psychiatry*, 163(1), 20–26. <https://doi.org/10.1176/appi.ajp.163.1.20>
- Olver, M. E., & Wong, S. C. P. (2015). Short- and long-term recidivism prediction of the PCL-R and the effects of age: A 24-year follow-up. *Personality Disorders: Theory, Research, and Treatment*, 6(1), 97–105. <https://doi.org/10.1037/per0000095>
- Palmer, S., Davidson, K., Tyrer, P., Gumley, A., Tata, P., Norrie, J., Murray, H., & Seivewright, H. (2006). The cost-effectiveness of cognitive behavior therapy for borderline personality disorder: Results from the BOScot trial. *Journal of Personality Disorders*, 20(5), 466–481. <https://doi.org/10.1521/pedi.2006.20.5.466>
- Papalia, N., Spivak, B., Daffern, M., & Ogloff, J. R. P. (2019). A meta-analytic review of the efficacy of psychological treatments for violent offenders in correctional and forensic mental health settings. *Clinical Psychology: Science and Practice*, 26(2), Article e12282. <https://doi.org/10.1111/cpsp.12282>
- Parachute. (2015). *The cost of injury in Canada*. Parachute.
- Powers, M. J. (1920). The industrial cost of the psychopathic employee. *Mental Hygiene*, 4, 932–939. <https://search-ebshost-com.proxy.lib.sfu.ca/login.aspx?direct=true&db=psyh&AN=1926-05080-001&site=ehost-live>
- Pauli, M., Essemeyr, K., Sörman, K., Howner, K., Gustavsson, P., & Liljeberg, J. (2018). Gendered expressions of psychopathy: Correctional staffs' perceptions of the CAPP and CABP models. *International Journal of Forensic Mental Health*, 17(2), 97–110. <https://doi.org/10.1080/14999013.2018.1431337>
- Porter, S., Birt, A. R., & Boer, D. P. (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. <https://doi.org/10.1023/A:1012710424821>
- Reidy, D. E., Kearns, M. C., DeGue, S., Lilienfeld, S. O., Massetti, G., & Kiehl, K. A. (2015). Why psychopathy matters: Implications for public health and violence prevention. *Aggression and Violent Behavior*, 24, 214–225. <https://doi.org/10.1016/j.avb.2015.05.018>
- Rice, M. E., & Harris, G. T. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's *d*, and *r*. *Law and Human Behavior*, 29(5), 615–620. <https://doi.org/10.1007/s10979-005-6832-7>
- Saha, S., Chant, D., Welham, J., & McGrath, J. (2005). A systematic review of the prevalence of schizophrenia. *PLoS Medicine*, 2(5), Article e141. <https://doi.org/10.1371/journal.pmed.0020141>
- Salekin, R. T., Rogers, R., & Sewell, K. W. (1996). A review and meta-analysis of the Psychopathy Checklist and Psychopathy Checklist—Revised: Predictive validity of dangerousness. *Clinical Psychology: Science and Practice*, 3(3), 203–215. <https://doi.org/10.1111/j.1468-2850.1996.tb00071.x>
- Salekin, R. T., Worley, C., & Grimes, R. D. (2010). Treatment of psychopathy: A review and brief introduction to the mental model approach for psychopathy. *Behavioral Sciences and the Law*, 28(2), 235–266. <https://doi.org/10.1002/bsl.928>
- Salomon, J. A., Vos, T., Hogan, D. R., Gagnon, M., Naghavi, M., Mokdad, A., Begum, N., Shah, R., Karyana, M., Kosen, S., Farje, M. R., Moncada, G., Dutta, A., Sazawal, S., Dyer, A., Seiler, J., Aboyans, V., Baker, L., Baxter, A., . . . Jonas, J. B. (2012). Common values in assessing health outcomes from disease and injury: Disability weights

- measurement study for the Global Burden of Disease Study 2010. *Lancet*, 380(9859), 2129–2143. [https://doi.org/10.1016/S0140-6736\(12\)61680-8](https://doi.org/10.1016/S0140-6736(12)61680-8)
- Salvador-Carulla, L., Bendeck, M., Ferrer, M., Andi on, O., Aragon es, E., & Casas, M. (2014). Cost of borderline personality disorder in Catalonia (Spain). *European Psychiatry*, 29(8), 490–497. <https://doi.org/10.1016/j.eurpsy.2014.07.001>
- Sellbom, M., & Drislane, L. E. (2021). The classification of psychopathy. *Aggression and Violent Behavior*, 59(2), Article 101473. <https://doi.org/10.1016/j.avb.2020.101473>
- Segel, J. E. (2006). *Cost-of-illness studies@–a primer*. RTI-UNC Center of Excellence in Health Promotion Economics.
- Sewall, L. A., & Olver, M. E. (2019). Psychopathy and treatment outcome: Results from a sexual violence reduction program. *Personality Disorders: Theory, Research, and Treatment*, 10(1), 59–69. <https://doi.org/10.1037/per0000297>
- Sheehan, L., Nieweglowski, K., & Corrigan, P. (2016). The Stigma of personality disorders. *Current Psychiatry Reports*, 18(1), Article 11. <https://doi.org/10.1007/s11920-015-0654-1>
- Singh, J. P., Grann, M., & Fazel, S. (2011). A comparative study of violence risk assessment tools: A systematic review and metaregression analysis of 68 studies involving 25,980 participants. *Clinical Psychology Review*, 31(3), 499–513. <https://doi.org/10.1016/j.cpr.2010.11.009>
- Soeteman, D. I., Hakkaart-van Roijen, L., Verheul, R., & Busschbach, J. J. (2008). The economic burden of personality disorders in mental health care. *The Journal of Clinical Psychiatry*, 69(2), 259–265. <https://doi.org/10.4088/JCP.v69n0212>
- Storey, J. E., Hart, S. D., Cooke, D. J., & Michie, C. (2016). Psychometric properties of the Hare Psychopathy Checklist-Revised (PCL-R) in a representative sample of Canadian federal offenders. *Law and Human Behavior*, 40(2), 136–146. <https://doi.org/10.1037/lhb0000174>
- Storey, J. E., Hart, S. D., Meloy, J. R., & Reavis, J. A. (2009). Psychopathy and stalking. *Law and Human Behavior*, 33(3), 237–246. <https://doi.org/10.1007/s10979-008-9149-5>
- Tarricone, R. (2006). Cost-of-illness analysis. What room in health economics? *Health Policy*, 77(1), 51–63. <https://doi.org/10.1016/j.healthpol.2005.07.016>
- ten Brinke, L., Kish, A., & Keltner, D. (2018). Hedge fund managers with psychopathic tendencies make for worse investors. *Personality and Social Psychology Bulletin*, 44(2), 214–223. <https://doi.org/10.1177/0146167217733080>
- Tiainen, A., & Rehnberg, C. (2010). The economic burden of psychiatric disorders in Sweden. *The International Journal of Social Psychiatry*, 56(5), 515–526. <https://doi.org/10.1177/0020764009106140>
- van Asselt, A. D. I., Dirksen, C. D., Arntz, A., & Severens, J. L. (2007). The cost of borderline personality disorder: Societal cost of illness in BPD-patients. *European Psychiatry*, 22(6), 354–361. <https://doi.org/10.1016/j.eurpsy.2007.04.001>
- Verona, E., Sprague, J., & Javdani, S. (2012). Gender and factor-level interactions in psychopathy: Implications for self-directed violence risk and borderline personality disorder symptoms. *Personality Disorders: Theory, Research, and Treatment*, 3(3), 247–262. <https://doi.org/10.1037/a0025945>
- Viding, E., McCrory, E., & Seara-Cardoso, A. (2014). Psychopathy. *Current Biology*, 24(18), R871–R874. <https://doi.org/10.1016/j.cub.2014.06.055>
- Viljoen, S., Cook, A. N., Lim, Y. L., Layden, B. K., Bousfield, N. K., & Hart, S. D. (2015). Are psychopathic and borderline personality disorder distinct, or differently gendered expressions of the same disorder? An exploration using concept maps. *International Journal of Forensic Mental Health*, 14(4), 267–279. <https://doi.org/10.1080/14999013.2015.1114535>
- Viscusi, W. K., & Aldy, J. E. (2003). The value of a statistical life: A critical review of market estimates throughout the world. *Journal of Risk and Uncertainty*, 27(1), 5–76. <https://doi.org/10.1023/A:1025598106257>
- Wagner, T., Fydrich, T., Stiglmayr, C., Marschall, P., Salize, H. J., Renneberg, B., Fle a, S., & Roepke, S. (2014). Societal cost-of-illness in patients with borderline personality disorder one year before, during and after dialectical behavior therapy in routine outpatient care. *Behaviour Research and Therapy*, 61, 12–22. <https://doi.org/10.1016/j.brat.2014.07.004>
- Walsh, Z., Allen, L. C., & Kosson, D. S. (2007). Beyond social deviance: Substance use disorders and the dimensions of psychopathy. *Journal of Personality Disorders*, 21(3), 273–288. <https://doi.org/10.1521/pepi.2007.21.3.273>
- Walters, G. D. (2003a). Predicting criminal justice outcomes with the Psychopathy Checklist and Lifestyle Criminality Screening Form: A meta-analytic comparison. *Behavioral Sciences and the Law*, 21(1), 89–102. <https://doi.org/10.1002/bsl.519>
- Walters, G. D. (2003b). Predicting institutional adjustment and recidivism with the psychopathy checklist factor scores: A meta-analysis. *Law and Human Behavior*, 27(5), 541–558. <https://doi.org/10.1023/A:1025490207678>
- Weiss, D. B., & MacKenzie, D. L. (2010). A global perspective on incarceration: How an international focus can help the United States reconsider its incarceration rates, victims & offenders. *Victims and Offenders*, 5(3), 268–282. <https://doi.org/10.1080/15564886.2010.485910>
- Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., Charlson, F. J., Norman, R. E., Flaxman, A. D., Johns, N., Burstein, R., Murray, C. J., & Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. *Lancet*, 382(9904), 1575–1586. [https://doi.org/10.1016/S0140-6736\(13\)61611-6](https://doi.org/10.1016/S0140-6736(13)61611-6)
- Wickramasekera, N., Wright, J., Elsey, H., Murray, J., & Tubeuf, S. (2015). Cost of crime: A systematic review. *Journal of Criminal Justice*, 43(3), 218–228. <https://doi.org/10.1016/j.jcrimjus.2015.04.009>
- Widiger, T. A., Livesley, W. J., & Clark, L. A. (2009). An integrative dimensional classification of personality disorder. *Psychological Assessment*, 21(3), 243–255. <https://doi.org/10.1037/a0016606>
- Widiger, T. A., & Trull, T. J. (2007). Plate tectonics in the classification of personality disorder: Shifting to a dimensional model. *American Psychologist*, 62(2), 71–83. <https://doi.org/10.1037/0003-066X.62.2.71>
- Wilson, D. B. (2018). *Practical meta-analysis effect size calculator*. <https://www.campbellcollaboration.org/escalc/html/EffectSizeCalculator-OR5.php>
- Wong, S. C. P. (2016). Treatment of violence prone individuals with psychopathic personality traits. In J. Livesley, G. Dimaggio, & J. Clarkin (Eds.), *Integrated treatment of personality disorder: A modular approach* (pp. 345–376). Guilford Press.
- Wunsch, E. M., Kliem, S., & Kr oger, C. (2014). Population-based cost-of-illness estimation for the treatment of borderline personality disorder: Projected costs in a currently running, ideal health system. *Behaviour Research and Therapy*, 60, 1–7. <https://doi.org/10.1016/j.brat.2014.06.002>
- Yoon, D., Eher, R., & Mokros, A. (2021). Incremental validity of the Psychopathy Checklist-Revised above and beyond the diagnosis of antisocial personality disorder regarding recidivism in sexual offenders. *Journal of Criminal Justice*, Article 101780. <https://doi.org/10.1016/j.jcrimjus.2020.101780>
- Zhang, T. (2011). *Costs of crime in Canada, 2008*. Department of Justice Canada.