

AN ECONOMIC ANALYSIS OF CRIME COSTS ASSOCIATED WITH PSYCHOPATHIC PERSONALITY DISORDER AND VIOLENCE RISK

DYLAN T. GATNER 

*Simon Fraser University
British Columbia Mental Health & Substance Use Services*

KEVIN S. DOUGLAS

*Simon Fraser University
Helse Bergen Sikkerhet Kompetansesenter
University of Oslo*

MADISON F. E. ALMOND

Simon Fraser University

STEPHEN D. HART 

*Simon Fraser University
University of Bergen*

P. RANDALL KROPP

*Simon Fraser University
British Columbia Mental Health and Substance Use Services*

Given substantial national crime costs and that psychopathic personality disorder (PPD) is a robust predictor of recidivism, a research gap exists concerning the cost of crime attributable to adults with PPD. The current study employed a bottom-up cost of illness approach to estimate the association between PPD and crime costs among Canadian men incarcerated in the federal correctional system ($n = 188$). Participants were rated using the *Psychopathy Checklist-Revised* (PCL-R) and the *Historical-Clinical-Risk Management-20* (HCR-20, version 2). Group mean crime costs were highest for participants who scored highly on the PCL-R and were rated high risk on the HCR-20, and higher scores on both measures were associated with prospective costs accrued from violent and nonviolent recidivism. The findings highlight the need to improve the treatment and management of high-risk individuals with prominent psychopathic features, as it has the potential for significant financial savings for criminal justice systems.

Keywords: psychopathy; cost of illness; crime costs; violence; risk assessment

Psychopathic personality disorder (PPD; psychopathy) is a psychiatric condition marked by deficits in interpersonal (e.g., manipulativeness and dominance), emotional (e.g., callousness and shallow affect), and behavioral (e.g., impulsivity and irresponsibility)

AUTHORS' NOTE: *Correspondence concerning this article should be addressed to Dylan T. Gatner, Department of Psychology, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, Canada V5A 1S6; e-mail: dylan.gatner@phsa.ca.*

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functioning (Cooke et al., 2012; Hare, 1991). Associations have been observed between PPD and multiple negative outcomes, such as suicidality (e.g., Verona et al., 2012), illicit substance use (Ellingson et al., 2018; Sellbom et al., 2017), and problems within intimate relationships (e.g., Mooney et al., 2019) and the workplace (e.g., Mathieu & Babiak, 2016). Given these problematic correlates, it is unsurprising that psychopathy results in substantial dysfunction and has been conceptualized as a severe personality disorder (Cooke & Logan, 2015; Crego & Widiger, 2015).

The phenomenon of psychopathy or PPD is often measured and assessed in applied settings using the Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003). PCL-R scores have been co-opted as proxies for assessment of future violent offending (Hemphill & Hare, 2004), although the tool was not intended to be a comprehensive risk assessment tool and psychopathy remains only one of many risk factors for violence (Hart, 1998). Still, research has shown robust moderate associations between PCL-R scores and antisocial outcomes (Douglas et al., 2015; Singh et al., 2011). Those with PPD are more likely to engage in violence and reoffend with greater severity across diverse samples (i.e., adult and juvenile correctional, psychiatric; Baskin-Sommers et al., 2013; Guy et al., 2010; Howard et al., 2014; Leistico et al., 2008). In particular, in comparison with Factor 1 (interpersonal and affective features) features, PCL-R Factor 2 features (antisocial history and impulsivity features) have had stronger predictive effects with antisocial outcomes (see Leistico et al., 2008; Yang et al., 2010).

Beyond its bivariate association with recidivism and violence, PPD can also be clinically relevant to case formulation in risk assessment and risk management recommendations, as it can help explain why someone chooses to commit violence at the idiographic level (Cooke & Logan, 2015; Gatner et al., 2022; Guy et al., 2010). Numerous explanatory mechanisms have been proposed that link PPD and violence, including fearlessness, diminished empathy, and deficient learning from punishment (Berkout et al., 2013) or early maladaptive schemas (i.e., insufficient self-control and mistrust; Chakhssi et al., 2014). In sum, the empirical and conceptual associations that psychopathy holds with crime and violence might explain why scholars have suggested that PPD imposes an enormous social burden (Hare, 1999; Reidy et al., 2015). However, there have been only a few attempts at quantifying this burden empirically.

ECONOMIC BURDENS OF MENTAL AND PERSONALITY DISORDERS

Cost of illness (COI) research involves calculating the economic costs attributable to disease by combining epidemiological data and financial information (Segel, 2006), which has influenced decision-making (e.g., Bloom et al., 2012) for different social systems (e.g., criminal justice and health care systems). The COI approach can be split into (a) top-down methodology, which examines the total expenditure cost based on disorder prevalence and related costs (Segel, 2006; Tarricone, 2006), and (b) bottom-up methodology, which estimates individual unit costs and multiplies these costs by their usage from a particular sample, which can then be extrapolated to a system or group level (Chapko et al., 2009; Tarricone, 2006). These studies have demonstrated that serious mental illnesses such as schizophrenia have substantial financial burdens in different countries (i.e., 94 million to 102 billion USD; Chong et al., 2016; Goeree et al., 2005). More broadly, it has been asserted that mental disorders have significant financial impacts on societal systems, globally (Whiteford et al., 2013).

When the focus is narrowed to the costs of personality disorders, the economic burden in Europe has been estimated at €27.35 billion Euros in 2011 or €6,328 per patient in one study (Gustavsson et al., 2011) and at a much larger €11,126 per patient in 2005 by another examination in the Netherlands (Soeteman et al., 2008). Research remains equivocal on the costs of personality disorders relative to other mental disorders (Barrett et al., 2005; Gustavsson et al., 2011; Soeteman et al., 2008). In particular, the total direct costs of borderline personality disorder (BPD) across developed countries have been gauged at £5,240 GBP to \$52,562 USD per person (Bateman & Fonagy, 2003; Hall et al., 1999; Hörz et al., 2010; Jerschke et al., 1998; Palmer et al., 2006), and the annual criminal justice costs of the disorder were estimated at €10.9 million or €20,236 per person in Catalonia (Salvador-Carulla et al., 2014). The existing evidence suggests that personality disorders, particularly borderline personality disorder, are associated with increased system costs, including criminal justice costs.

Given the substantial intraindividual co-occurrence of personality disorders (Hopwood et al., 2018; Mullins-Sweatt, 2013; Widiger et al., 2009) and the conceptual and empirical overlap between BPD and PPD (e.g., Miller et al., 2010; Pauli et al., 2018), one might expect an established body of PPD COI research. However, only several partial examinations exist on the cost of PPD. In a study of U.K. community members with antisocial personality disorder (APD), which can be conceptualized as an operational variant of PPD,¹ health care, social work, and criminal justice costs ranged from £31,097 to £38,004 per year (Davidson et al., 2009). A study of institutional treatment service costs associated with psychopathic features revealed that individuals with higher PCL-R scores somewhat unexpectedly created lower costs, with a 1-unit PCL-R increase resulting in a £1,135 decrease in service cost (Barrett et al., 2005). The authors speculated that their findings reflect that those with prominent PPD features might have been less likely to enter and cooperate with treatment, but they did not comment on crime costs.

PPD AND THE COST OF CRIME

Crime produces large national costs. These costs can be attributed to direct (e.g., policing and corrections costs) and indirect costs (e.g., victim pain and suffering, productivity losses; opportunity costs; see Wickramasekera et al., 2015). In the United States, Anderson (1999) estimated direct and indirect costs of crime to be approximately \$2.3 trillion USD when retroactively adjusted for 2009 inflation value in a subsequent study (Kiehl & Hoffman, 2011), which exceeds costs of life insurance purchases, outstanding mortgage debt, and yearly health expenditures. Moreover, a recent systematic review comparably estimated national costs of crime in the United States to range from 450 billion to 3.20 trillion USD annually, the highest value of all developed countries (Wickramasekera et al., 2015). Large sums were also observed in Canada, with annual national costs of crime have been estimated between \$81.5 and \$100 billion dollars (Easton et al., 2014; Zhang, 2011). Within a sample of 386 justice-involved individuals in Canada, aggregated costs of offending across three decades were estimated at more than \$671 million CAD or \$1.74 million CAD per person (Koegl & Day, 2019).

Because (a) crime costs results in significant national costs (i.e., ~ 5% of the national gross domestic product), (b) mental illness has been reported to have been associated with increased crime costs (Ostermann & Matejkowski, 2014), and (c) PPD has been

robustly associated with criminal activity (Guy et al., 2010; Leistico et al., 2008), it is plausible that PPD imposes a large economic burden on economic systems via criminal activity. To date, this line of reasoning has primarily been speculative and without comprehensive empirical quantification among adults with PPD. Kiehl and Hoffman (2011) employed a top-down societal perspective to estimate that PPD causes \$460 billion (USD) in direct U.S. costs. This conclusion was informed by assumptions that 20% of prison populations were diagnosed with PPD, that the cost of crime was \$2.3 trillion (see Anderson, 1999), and people with and without PPD offend at equal rates. However, several imitations underpin this estimate, including that prevalence of PPD is known to fluctuate across types of institutions; the rates of violence are unequal between those with and without the disorder; the national cost of crime utilized by the study included direct but not indirect costs; and the latter has been found to contribute the greatest proportion of overall crime cost (see Wickramasekera et al., 2015; Zhang, 2011). These methodological issues notwithstanding, Kiehl and Sinnott-Armstrong (2013) concluded that their estimate suggested that PPD is “likely the most expensive mental health disorder known to man” (p. 1).

DeLisi and colleagues (2018) also estimated economic costs attributable to youth with psychopathic features, using an empirical bottom-up approach. The unique effects of self-reported individual psychopathy scales were somewhat mixed, but certain psychopathic features (e.g., blame externalization, egocentricity, narcissism, and callous-unemotionality) were moderately predictive (area under the curve [AUC] = .63–.65) of high crime costs (i.e., costs above the 90th percentile) in the previous year. Overall, a delinquent youth was estimated to cost at least \$30 million USD annually (DeLisi et al., 2018). However, this study was limited by its self-report data for psychopathy and crime costs among youth and by the absence of consideration of several types of crime (e.g., break and enter, murder), some of which have been found to produce the highest crime costs (Wickramasekera et al., 2015). In considering the limitations of these two financial examinations of psychopathy, we suggest that the full cost of crime attributable to adults diagnosed with PPD remains unknown.

CURRENT STUDY

In the present study, we estimated the association between PPD (as operationalized by the PCL-R, including its Total and Factor scores) and future crime costs among men incarcerated in the federal correctional system by employing a bottom-up COI approach. We hypothesized that the PPD group would have greater crime costs than the non-PPD group—effects that we expected to be moderate in magnitude, aligning with prior PPD–recidivism research (Leistico et al., 2008; Yang et al., 2010). As psychopathic personality and forensic risk assessment are inextricably connected (Guy et al., 2010; Hart, 1998), we examined the association between crime costs and a commonly used violence risk assessment tool, the Historical-Clinical-Risk Management-20 (HCR-20; Webster et al., 1997). Because the HCR-20 has demonstrated moderate to large predictive effects for future violence and crime (M. A. Campbell et al., 2009; Guy et al., 2010; O’Shea et al., 2013; Singh et al., 2011), and it captures a broad of criminogenic risk factors (e.g., mental illness, substance use, insight), we hypothesized that HCR-20 total scores and summary judgments would be positively associated with crime costs.

METHOD

PARTICIPANTS AND PROCEDURE

We conducted this study using data collected from an existing project (see Douglas et al., 2005) using a pseudo-prospective, known-outcomes group design. Approval was received by the relevant institutional ethical review boards. Participants were 188 men who were released from Canadian federal correctional institutions, which was a medium-sized sample of the overall federal correctional population in British Columbia, Canada. Participants were equally randomly selected from two groups: (a) individuals with known violent recidivism ($n = 93$) that resulted in provincial or federal sentences during the study timeframe and (b) individuals without official violent recidivism ($n = 95$). The community follow-up period ranged from 6 to 11 years ($M = 7.69$; $SD = 1.31$) with release dates ranging from 1989 to 1994; the follow-up period ending on June 15, 2000. All variables were coded and rated using correctional file information (i.e., no clinical interviews, although the files contained summaries of numerous interviews with the participants) by research staff with master's degrees, employed by the Correctional Service of Canada. The correctional records included a breadth of social, psychological, health, and criminal information, which was sufficient for coding the violence and psychopathy measures.

MEASURES

Psychopathy

The PCL-R (Hare, 1991) is a 20-item, clinician-rated measure of psychopathic traits. The PCL-R has demonstrated strong psychometric properties (i.e., reliability and factor, convergent, and discriminant validity; Acheson & Olmi, 2005; Hare, 1991, 2003; Hart et al., 1995; Storey et al., 2016), although there have been some concerns in particular field settings (e.g., DeMatteo et al., 2020). In the current study, interrater reliability (see Cicchetti & Sparrow, 1981) for PCL-R Total scores ($M = 18.85$; standard error [SD] = 8.68) was excellent ($n = 28$, intraclass coefficient [ICC_1] = .94, $ICC_2 = .97$)—similar interrater values were observed for PCL-R Factor 1 ($ICC_1 = .89$, $ICC_2 = .94$) and Factor 2 ($ICC_1 = .91$, $ICC_2 = .95$) scores. The PCL-R was scored using only file information, which has been deemed acceptable in research contexts when sufficient information exists (Hare, 2003; Harris et al., 2013). In the manual, file-based total scores were approximately 5.6 points lower than assessments supplemented with interview information. As such, to account for the potential of suppressed PCL-R Total scores, a cutoff score of 25 was used to categorize low and high PPD groups. Approximately one-quarter (26%) of participants were rated at or above the cutoff of 25.²

Violence Risk

HCR-20 V2 (Webster et al., 1997) is a set of structured professional judgment (SPJ) guidelines for assessing general violence. The HCR-20 includes 10 *historical* risk factors that are relatively unchanging (e.g., employment problems and relationship problems), five *clinical* risk factors capturing current and dynamic functioning (e.g., insight, violent ideation, and attitudes), and five *risk management* risk factors capturing future areas that can reduce the likelihood of violence (e.g., plans, social support, stress, and coping). In addition

to its total score (ranging from 0 to 40), the HCR-20 can inform an overall summary risk judgment of *low*, *moderate*, or *high*, which is a guided structured judgment based on the pattern of risk factors rather than a statistical formula or cutoff scores. Although Version 3 of the HCR-20 was published in 2013 (Douglas et al., 2013), Version 2 was the current version at the time of the original research (e.g., Douglas et al., 2005). The HCR-20 has shown good interrater reliability (Douglas & Shaffer, 2021). In the current study, HCR-20 Total scores ($M = 20.10$; $SD = 7.94$) had good to excellent interrater reliability ($ICC_1 = .81$ to $.93$, $ICC_2 = .89$ to $.96$). For summary risk judgments, 36% of participants were classified as low risk, 45% moderate risk, and 19% high risk. In the current study, HCR-20 Total scores were highly correlated with PCL-R Total ($r = .85$), Factor 1 ($r = .58$), and Factor 2 ($r = .88$) scores.

Costs of Crime

Each follow-up crime was given a per-unit cost (see Supplemental Materials available in the online version of this article) that was derived primarily from primary empirical estimations of per-unit crime costs in Canada (Easton et al., 2014) and the United States (McCollister et al., 2010). These primary estimates were made based on common economic estimate methods (e.g., cost-of-illness and jury compensation methods). The frequency of participants' prospective charges and convictions was summed and then transformed into a financial outcome using the crime-specific costs. If American costs were used, they were transformed into Canadian dollars by a factor of 1.24—the USD to Canadian dollars (CAD) exchange rate on January 1, 2018 (Bank of Canada, 2018). All costs were transformed by inflation into December 2019 Canadian dollars and converted back into USD for the purpose of this article, using the equivalent exchange rate.

Unit costs were calculated for participants' prospective convictions, charges, and a total of both these sanctions. Charges and convictions were analyzed separately. Charges may capture a wider range of antisocial behavior that may not result in a conviction, but they are nevertheless associated with many costs, particularly indirect costs to victims. These sanctions (i.e., convictions, charges, both) were then categorized by violent, nonviolent, and combined crimes (i.e., both violent and nonviolent), resulting in a 3×3 cost matrix. Violent costs included the following crimes that caused direct physical harm: assaults, robbery, kidnapping, sexual assaults, attempted murder, and murder (including manslaughter). Nonviolent crimes included the following crimes that did not cause physical harm: drug-related, theft, break and enter, and *other* crimes. Other crimes included all crimes that could not be categorized into specific costs.³

Because participants were offended and were sentenced at different rates, each participant's cost of crime was divided by his time spent in the community during his follow-up period. Time spent in the community was calculated by first coding custodial sentence length. As actual time spent in custody during follow-up could not be precisely specified, it was estimated by dividing custodial sentence length in half to account for parole and statutory release guidelines (i.e., one-third and two-third of sentences; Government of Canada, 2016). Finally, the estimated custodial sentence length was subtracted from the participant's overall follow-up length to calculate the time spent in the community until the final data collection date: June 15, 2000.

STATISTICAL ANALYSIS

For analyses addressing continuous total scores, Tobit censored regressions (Tobin, 1958) were conducted using the AER package in the statistical program, R (see Kleiber & Zeileis, 2019) to account for left-centered and semi-continuous noncount data (i.e., many 0s; Breen, 1996; see descriptives below). Tobit regressions are common econometric analyses, and they model criterion variables' influence on the underlying latent uncensored dependent variable (Grogan-Kaylor & Otis, 2003). We conducted the remaining analyses using IBM SPSS Statistics (Version 26). Group comparisons were analyzed to determine if there are economic differences in clinical classifications (i.e., HCR risk groups, high vs. low psychopathic features). When analyzing PCL-R group differences, the cost distributions did not appropriately fit standard *t* tests. As such, the nonparametric Mann–Whitney *U* test was selected because it holds fewer assumptions and is less susceptible to Type I errors when extreme or skewed distributions exist in comparison with its parametric sibling, the *t*-test (Siegel & Castellan, 1988). For HCR-20 analyses, the Kruskal–Wallis *H* test was conducted, which is a nonparametric one-way analysis of variance of ranks test that closely resembles the Mann–Whitney *U* when analyzing three or more independent groups (e.g., HCR low, moderate, high summary risk judgments). Reported *z* scores were transformed in Pearson correlation coefficients (*r*) to provide interpretable effect sizes.

RESULTS

CRIME COSTS

We calculated specific crime costs by transforming charge and conviction frequencies as a function of unit costs per specific crimes. In our sample, there was a wide range of prospective mean costs from drug-related ($M = \$473.63$) to murder ($M = \$132,028.88$) costs (see Supplemental Materials), whereas the prospective median and mode for each crime type was 0. Of note, variability emerged for all costing outcome variables where each mean cost was substantially lower than its respective standard deviation. Much like individual crime costs, broad crime category costs (i.e., violent, non-violent, all crime; see Table 1) had higher standard deviations than means. Across all broad categories, violent crime was substantially more costly than nonviolent crime. When examining the total annual crime costs in 2019 USD across groups, the low PCL-R group mean cost was \$34,319.60, whereas the high PCL-R group mean cost was \$112,066.60. For the HCR-20 groups, the respective mean total costs for the low, moderate, and high-risk groups were \$7,886.12, \$77,844.16, and \$86,598.07.

PCL-R GROUP COST DIFFERENCES PER COMMUNITY-LIVED YEAR

Between high and low PCL-R groups (see Table 2), moderate group differences emerged for convictions ($r = .27-.30$) and combined (i.e., charges and convictions) costs per year in the community ($r = .27-.28$). A slightly divergent pattern was observed for charge-related costs where small-to-moderate differences were observed for nonviolent and combined charges ($r = .19$); however, violent charges did result in significant costs differences. Overall, a general trend emerged where the high PCL-R group had higher rank order prospective costs than the low PCL-R group.

TABLE 1: Mean and Standard Deviation of Prospective Total Cost Estimates per Year in the Community

Sanction	Nonviolent crime (\$)	Violent crime (\$)	All crime (\$)
Charges	2,254.67 (4,954.84; $n = 122$)	5,447.20 (15,063.42; $n = 130$)	7,532.45 (7,701.85; $n = 107$)
Convictions	2,636.93 (6,197.91 $n = 120$)	43,772.27 (178,023.28; $n = 98$)	45,446.47 (46,468.51; $n = 96$)
Combined	4,842.01 (10,202.78; $n = 102$)	49,219.46 (180,467.40; $n = 89$)	54,170.36 (182,033.08; $n = 82$)

Note. Values in parentheses represent standard deviations, and the n values reflect the number of Os per category. The median was 0 for all costs, except for Combined Sanctions for both Violent Crime and All Crime costs.

TABLE 2: Mann–Whitney U Test Results for Cost Differences per Year Living in the Community Between High and Low PPD Groups (PCL-R Cut-Off of 25)

Cost outcome	Statistics		
	U	Z	r
Charges			
Nonviolent	2,625.50	2.65**	.19
Violent	2,972.00	1.48	.11
Combined	2,582.00	2.65**	.19
Convictions			
Nonviolent	2,316.00	3.73***	.27
Violent	2,132.00	4.07***	.30
Combined	2,161.50	3.96***	.29
Charges and convictions			
Nonviolent	2,249.00	3.73***	.27
Violent	2,193.00	3.79***	.28
Combined	2,150.50	3.88***	.28

Note. PPD = Psychopathic Personality Disorder; PCL-R = Psychopathy Checklist–Revised (Hare, 1991); U = Mann–Whitney U test statistic; Z = z score; r = bivariate correlation coefficient.

* $p < .05$. ** $p < .01$. *** $p < .001$.

HCR-20 SUMMARY RISK GROUP COST DIFFERENCES PER COMMUNITY-LIVED YEAR

The omnibus Kruskal–Wallis test revealed moderate and large mean rank cost differences between HCR-20 low, moderate, and high summary risk groups for every outcome, $\chi^2(2) = 18.65$ to 46.68 , $p < .001$, $\eta^2 = .09$ to $.24$. The pairwise analyses (see Table 3) also revealed higher costs per year in the community for the comparatively higher summary risk group. Large effects were typically observed between low- and high-risk HCR-20 groups ($r = .34$ – $.62$), whereas moderate effects were typically observed between the low- and moderate-risk groups ($r = .26$ – $.43$). By contrast, when comparing the moderate- and high-risk groups, the mean rank cost differences resulted in typically smaller effects ($r = .20$ – $.25$). Overall, these results demonstrate that the HCR-20 summary risk judgments were associated with prospective costs when accounting for time at-risk of offending, particularly when comparing moderate or high-risk participants with low-risk participants.

BIVARIATE ASSOCIATIONS BETWEEN CRIME COSTS AND FORENSIC TOTAL SCORES

We conducted Tobit censored regressions with single criterion variables to estimate the Total scores for both PCL-R and the HCR-20 (without the H7-psychopathy item) for their prospective effects on the latent costs of crime. The PCL-R had statistically

TABLE 3: Differences in Costs per Year in the Community Between HCR-20 Summary Risk Judgment Groups

Cost outcome	$\chi^2(2)$	L vs. M		L vs. H		M vs. H	
		Z	r	Z	r	Z	r
Charges							
Nonviolent	23.79***	-3.22**	.26	-4.70***	.46	-2.26*	.21
Violent	18.65***	-3.82***	.31	-3.47**	.34	-0.50	.05
Combined	27.51***	-4.05***	.33	-4.76***	.57	-1.66	.15
Convictions							
Nonviolent	38.12***	-4.35***	.32	-5.84***	.58	-2.52*	.23
Violent	41.82***	-4.71***	.38	-6.04***	.60	-2.43*	.22
Combined	46.68***	-4.91***	.40	-6.42***	.62	-2.67*	.24
Charges and Convictions							
Nonviolent	40.71***	-4.04***	.43	-6.07***	.60	-2.72**	.25
Violent	44.12***	-5.09***	.41	-6.05***	.60	-2.14*	.20
Combined	46.42***	-5.07***	.41	-6.31***	.62	-2.43*	.22

Note. HCR-20 = Historical-Clinical-Risk Management-20 Version 2 (Webster et al., 1997); L vs. M = low vs. moderate HCR-20 summary risk groups; L vs. H = low vs. high HCR-20 summary risk groups; M vs. H = moderate vs. high HCR-20 summary risk groups; Z = z score; r = bivariate correlation coefficient.

* $p < .05$. ** $p < .01$. *** $p < .001$.

significant main effects with all nine latent costs per community year (see Table 4). For instance, PCL-R Total scores were associated with all latent conviction costs per community year, $b = \$13,591.70$, $z = 12.95$, $p < .001$, 95% confidence interval [CI]: [11,534, 15,649], whereas it had its smallest significant association with nonviolent charges $b = \$542$, $z = 4.35$, $p < .001$, 95% CI [298, 787]. At a factor level, PCL-R Factor 1 scores were significantly associated with latent combined costs (i.e., concurrent violent and non-violent costs across charges and convictions); however, they were not significantly associated with nonviolent charges or convictions as well as violent charges. By contrast, PCL-R Factor 2 scores were associated with all nine latent costs per community (see Supplemental Materials).

Similar to the PCL-R Total scores, significant main effects emerged between the HCR-20 Total score and all the latent cost outcomes (see Table 4). That is, the HCR-20 Total score was a statistically significant criterion variable associated with all latent costs per year in the community. The largest unstandardized beta effect was observed for combined conviction costs where a 1-point increase in HCR-20 Total scores corresponded with an increase in the propensity of these prospective crime costs by \$16,945, $z = 16.19$, $p < .001$, 95% CI [14,893, 18,997]. The HCR-20 Total score had its smallest association with nonviolent charge costs, $b = \$745$, $z = 5.27$, $p < .001$, 95% CI [458, 1,001]. Overall, these findings demonstrate that both the PCL-R and the HCR-20 Total scores had meaningful associations with latent crime costs.

DISCUSSION

We conducted an empirical study of economic crime costs and their associations with the PCL-R and a structured professional judgment violence risk tool (i.e., HCR-20, Version 2), among men released from Canadian federal correctional institutions. The findings revealed

TABLE 4: Tobit Regression Results for PCL-R and HCR-20 (Without H7) Total Scores Predicting Total Costs of Crime per Year in the Community

Cost outcome	HCR-20		PCL-R	
	<i>b</i> [95% CI]	<i>Z</i>	<i>b</i> [95% CI]	<i>Z</i>
Charges				
Nonviolent	745 [467, 1,023]	5.27***	542 [298, 787]	4.35***
Violent	2,074 [1,132, 3,016]	4.32***	1,587 [778, 2,398]	3.84***
Combined	2,220 [1,455, 2,987]	5.67***	1,691 [1,021, 2,361]	4.95***
Convictions				
Nonviolent	1,137 [756, 1,518]	5.85***	743 [437, 1,048]	4.77***
Violent	16,644 [14,562, 18,726]	15.68***	13,470 [11,386, 15,553]	12.67***
Combined	16,945 [14,893, 18,997]	16.19***	13,592 [11,534, 15,649]	12.95***
Charges and convictions				
Nonviolent	1,446 [1,005, 1,887]	6.43***	1,008 [626, 1,390]	5.18***
Violent	16,179 [14,221, 18,123]	16.25***	12,933 [10,975, 14,890]	12.95***
Combined	15,895 [14,039, 17,752]	16.79***	13,046 [11,187, 14,904]	13.77***

Note. PCL-R = Psychopathy Checklist–Revised (Hare, 1991); HCR-20 = Historical-Clinical-Risk Management-20 Version 2 (Webster et al., 1997); H7 = HCR-20 historical item, psychopathy; *b* = unstandardized beta coefficient; CI = confidence interval; *Z* = *z* score.

****p* < .001.

that people with prominent PPD features and a high violence risk are likely to create substantial economic costs for themselves and others. As hypothesized, the high PPD group had relatively higher prospective crime costs, and these differences were small to moderate in effect size ($r = .19-.30$). These findings align with past suggestions that PPD imposes a large social burden (Hare, 1999; Reidy et al., 2015). In light of the current findings, we concluded that individuals who are highly psychopathic create large economic costs through violent and nonviolent crime.

The PCL-R crime cost results remained broadly consistent across dimensional and categorical conceptualizations, which supports the reliability of these findings. If the results had changed as a function of PPD operationalizations (i.e., dimensional vs. categorical), it may have suggested that the findings were a statistical aberration. From the predominant lens of viewing personality disorder and PPD dimensionally (see Douglas et al., 2015; Hopwood et al., 2018), a higher number of psychopathic traits was associated with crime costs in the current study. This suggests the possibility that similar moderate associations with crime costs could emerge in noncorrectional contexts where PPD prevalence is typically lower (e.g., civil or forensic psychiatry). At a factor level, our findings suggested that PCL-R Factor 2 scores were more reliably associated with increased crime costs than Factor 1, which was consistent with the general psychopathy—antisociality literature (Leistico et al., 2008; Yang et al., 2010). As such, Factor 2 features may be driving relatively more of the crime costs associated with PPD overall.

In contrast to a dimensional lens, there is a clinical and practical utility to stakeholders and clinicians in conceptualizing and assessing PPD categorically. From this categorical perspective, the current findings suggest those identified as highly psychopathic may represent a target group with the potential to substantially reduce crime costs. For instance, every individual assessed as highly psychopathic produced approximately \$111,000 in annual crime costs (USD). Although this study did not confirm such bold claims as PPD being

“likely the most expensive mental health disorder known to man” (Kiehl & Sinnott-Armstrong, 2013, p. 1), the present findings revealed a new form of dysfunction caused by PPD: large economic costs due to crime. These findings were based on a PCL-R conceptualization of psychopathy, and as such, crime cost associations remain undetermined for other measures and models of psychopathy (e.g., Comprehensive Assessment of Psychopathic Personality, Cooke et al., 2012).

Given the practical and conceptual overlap between the PCL-R and HCR-20 in forensic and violence risk evaluations (Hart, 1998), we also examined the HCR-20 predictive validity of crime costs. As hypothesized, the HCR-20 was associated with increased prospective crime costs for both the summary risk judgments and Total scores. Moderate to large cost differences emerged when comparing low-risk individuals with moderate- or high-risk individuals, although fewer significant differences emerged between moderate- and high-risk groups. For instance, in comparison with low-risk groups, there was approximately a 10-fold increase in crime costs for those at elevated risk. For clinicians and policymakers, it is promising that summary risk judgments—often the primary risk communication in clinical settings—were associated with crime costs. Furthermore, these results were consistent with meta-analytic (Chevalier, 2017) evidence that SPJ summary risk judgments had medium-to-large effects predicting violence and incremental validity beyond risk tools’ total scores. For researchers—who often emphasize Total scores—the HCR-20 Total score was associated with objectively sizable crime costs (e.g., a 1-point HCR-20 Total increase resulted in a \$745 to \$16,179 latent total crime costs). These findings are consistent with the broader literature where risk assessment total scores (e.g., HCR-20) were associated with violent and general recidivism (Singh et al., 2011). Overall, the current findings suggest that the HCR-20 summary risk judgment and Total score have utility in identifying justice-involved individuals who are likely to produce substantial economic costs.

LIMITATIONS

Our study had several methodological limitations, including its known-outcome design may have increased the base rate of violence⁴ and the associated crime costs. Still, PPD was not a known outcome, and therefore, the group cost differences (i.e., PPD vs. non-PPD) were less likely to have been influenced by the study design. The follow-up period was also limited by its dated end point (i.e., 2000), which meant that the Second Version of the HCR-20 was relied upon in this study; HCR-20 versions 2 and 3 nevertheless share substantial conceptual and empirical overlap (see Douglas & Belfrage, 2014). In addition, the study outcome data were transformed to 2019-dollar values via inflation to place the potential costs in recent financial terms. It is possible that crime costs in this study were overestimated given that Canadian police-reported crime rates have generally declined since the early 1990s (Allen, 2018; Statistics Canada, 2017).

Regarding costing variables, certain crimes could not be provided a specific cost estimate, resulting in a broadened Other cost category. This broadening may have masked major cost differences between certain crimes. A breach, for instance, was evaluated to cost as much as weapon-related or vehicular crimes in this study. Moreover, although most specific unit costs were derived from a Canadian source (Easton et al., 2014) for this Canadian sample, U.S.-based estimates (McCollister et al., 2010) were also applied for several crime costs when no Canadian estimates were available. Although the Canadian and U.S. criminal justice systems share many commonalities, differences between these systems also exist

(e.g., incarceration rates; Reitano, 2017) that likely produce different national crime-type cost estimates. This issue may not only limit the generalizability of our current Canadian sample to the United States but also to other countries where PPD and criminal justice systems may differ greatly in comparison to North America. In addition, our sample was comprised entirely of men, and therefore, the current findings may not generalize to female correctional populations.

HCR-20 and PCL-R assessment ratings were made from information prior to the follow-up periods, but follow-up recidivism data were obtained retrospectively. The claims drawn from this quasi-prospective study are therefore weaker than a truly prospective design (D. T. Campbell & Stanley, 1966). Raters were, however, blind to follow-up outcome data when coding the HCR-20 and PCL-R, diminishing risks of criterion contamination. Another outcome-related limitation was the use of a single source when coding recidivism (i.e., official convictions) given that multisource methods result in higher base rates (Mulvey et al., 1994) and improved predictive validity (Douglas & Ogloff, 2003). Nevertheless, this sample had an already inflated violent recidivism rate (see above), and a sizable portion of crime costs result from official crimes. The findings from the present study are compelling and consistent; however, the aforementioned limitations suggest that the broad pattern of findings and conclusions should be prioritized over any specific financial outcomes.

CONCLUSIONS AND IMPLICATIONS

The current study was both traditional and novel. Traditionally, high-risk, highly psychopathic individuals have been found to engage in increased recidivism. Our study extended this long-standing finding, by demonstrating that these men released from Canadian federal correctional institutions (as measured by the PCL-R and HCR-20, Version 2) were also associated with greater prospective economic costs. There are certainly other costs that require further inquiry (e.g., job productivity, health care costs), but we conclude that through criminal activity alone, high-risk individuals and those with PPD are financially costly groups. Because of the present methodological limitations, specific results (e.g., specific cost valuations or effect sizes) should be extrapolated with caution. Yet, our study demonstrates a reliable pattern where an increase in recidivism risk factors, including psychopathic features, is associated with an increase in financial crime costs.

Cost estimates for a given illness have considerable heterogeneity (Bloom et al., 2012), and this assertion likely also holds for PPD and HCR-20 costing studies, which are in the early stage of research. A consistent body of scientific evidence needs to be established for PPD- and risk-related crime costs to appropriately inform policy changes. More independent work with various cost estimates (e.g., all Canadian costs), statistical procedures (e.g., multivariate models with other relevant variables), and measurement tools are needed to understand the potential variability of these findings. Only replication will develop confident conclusions about whether PPD is a definitive and substantial driver of crime costs, particularly among a subset of high-risk individuals. Still, the present findings highlight a need to improve psychiatric research funding geared toward addressing crime and cost reduction among high-risk groups with PPD.

HCR-20 cost differences were more robust when comparing moderate or high-risk individuals with those holding the lowest risk. These observed disparities are broadly consistent with the *risk principle* of the Risk-Needs-Responsivity (RNR) model of correctional rehabilitation (Andrews et al., 1990), which asserts that management services should be

commensurate with the risk level. The RNR model outlines that more services—which presumably cost more—should be proportionally delivered to those with higher risk ratings, and vice versa for low-risk groups. Similarly, the current results suggest that high-risk individuals, or those with high PPD traits, have a potential for sizable cost-saving opportunities, which implies a need for a relative increase in the intensity of correctional and psychiatric attention.

How could researchers, policy makers, and frontline professionals attempt to manage and reduce the economic costs associated with high PPD dysfunction and high-risk offending groups? In adult mental health and correctional contexts, the significant costs associated with PPD and violence risk suggest increased resource allocation and intervention intensity. However, it may be more difficult for national research and public health agencies to increase funding for PPD-focused initiatives due to the stigma associated with psychopathy (Sheehan et al., 2016). Efforts of policy makers and other professionals should be directed to dismantling this potential barrier. We acknowledge that this study was not developmental in nature, but given these issues, it may be prudent for stakeholders and clinicians to invest at earlier developmental periods, as early intervention has been found to be efficacious and cost-effective among at-risk, delinquent youth (Lipsey, 2009; National Institute for Health & Clinical Excellence, 2010).

Indeed, the evidence for reducing violent offending and treating PPD among adults is growing but remains modest (e.g., Papalia et al., 2019; Sewall & Olver, 2019). Furthermore, few if any explicit randomized-controlled trials have been conducted for PPD, highlighting a strong need for future research in this area. Dialectical Behavior Therapy (DBT; see Linehan, 1993) has been piloted among individuals with PPD (Galietta & Rosenfeld, 2012), which is consistent with professional guidelines to implement highly intensive, multimodal cognitive-behavioral to reduce recidivism (National Institute for Health & Clinical Excellence, 2010). There is budding empirical literature detailing that DBT interventions may be effective in forensic settings (Mills et al., 2018; Tomlinson, 2018). Based on the current crime cost associations, even small improvements in treatment efficacy and risk management resource allocation may result in large cost savings and warrant further empirical testing (e.g., cost-benefit analysis). The present findings suggest that such potential improvements would not only help those with PPD and at high risk for violence, but they could also financially benefit national economic systems and their taxpayers.

ORCID iDs

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

Stephen D. Hart  <https://orcid.org/0000-0002-1027-6081>

SUPPLEMENTAL MATERIAL

Supplemental Material is available in the online version of this article at <http://journals.sagepub.com/home/cjb>

NOTES

1. Antisocial and psychopathic personality can be used interchangeably as concepts; however, they differ at an operational level where APD, as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (American Psychiatric Association, 2022), has a diagnostic threshold requiring far fewer traits.

2. A similar pattern of results emerged when using a typical cut-off score of 30, but the high PPD group sample size was much smaller, which significantly reduced statistical power.

3. No differences emerged when calculating specific costs for different severities of assault and sexual assault, therefore, they were not described in detail.

4. Although the 50% base rate of 8 years may not be significantly elevated, see Davies et al. (2020) who reported violent recidivism rates of 33% at 5 years and 51% at 15 years.

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Dylan T. Gatner, PhD, is a registered psychologist and an Affiliate Investigator at BC Mental Health and Substance Use Services. His research interests include violence risk assessment, case formulation, and personality disorder.

Kevin S. Douglas, LLB, PhD, is professor of Clinical-Forensic Psychology, at Simon Fraser University, and has an appointment as a researcher at the Regional Centre for Research and Education in Forensic Psychiatry, Haukeland University Hospital, Bergen, Norway, and as a senior research advisor at the Regional Centre for Research and Education in Forensic

Psychiatry, Oslo University Hospital, Oslo, Norway. His research focuses on violence risk assessment, psychopathy, and the link between mental disorder and violence.

Madison F. E. Almond, MA, is completing her doctoral training in clinical-forensic psychology at Simon Fraser University. Her research interests broadly include the link between mental illness, personality disorders, and violent offending and specifically focus on the identification of dynamic factors and warning behaviors that indicate imminent risk of violence.

Stephen D. Hart is a professor in the Department of Psychology at Simon Fraser University. He obtained his PhD in clinical and forensic psychology from the University of British Columbia. His research and practice focus on the assessment and management of violence risk as well as psychopathic personality disorder and other mental disorders as risk factors for violence.

P. Randall Kropp, PhD, is a clinical and forensic psychologist specializing in the assessment and management of violent offenders. He works for Forensic Psychiatric Services in British Columbia, Canada, is adjunct professor of psychology at Simon Fraser University, and is a Threat Assessment Specialist with Protect International Risk and Safety Services Department. His research interests include the assessment and management of stalking and intimate partner violence.