Do Core Interpersonal and Affective Traits of PCL-R Psychopathy Interact With Antisocial Behavior and Disinhibition to Predict Violence?

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The utility of psychopathy measures in predicting violence is largely explained by their assessment of social deviance (e.g., antisocial behavior; disinhibition). A key question is whether social deviance *interacts* with the core interpersonal-affective traits of psychopathy to predict violence. Do core psychopathic traits multiply the (already high) risk of violence among disinhibited individuals with a dense history of misbehavior? This meta-analysis of 32 effect sizes ($N = 10,555$) tested whether an interaction between the Psychopathy Checklist-Revised (PCL-R; R. D. Hare, 2003) Interpersonal-Affective and Social Deviance scales predicted violence beyond the simple additive effects of each scale. Results indicate that Social Deviance is more uniquely predictive of violence ($d = .40$) than Interpersonal-Affective traits ($d = .11$), and these two scales do not interact ($d = .00$) to increase power in predicting violence. In fact, Social Deviance alone would predict better than the Interpersonal-Affective scale and any interaction in 81% and 96% of studies, respectively. These findings have fundamental practical implications for risk assessment and theoretical implications for some conceptualizations of psychopathy.

Keywords: psychopathy, antisocial behavior, disinhibition, violence, risk assessment

In recent years, psychopathy has become regularly referenced within both forensic research and practice settings. In fact, surveys of forensic diplomates in the United States indicate that the Psychopathy Checklist-Revised (PCL-R; Hare, 2003) is the instrument that is the most often recommended and the most often used to assess individuals' future risk of violence (Lally, 2003; Tolman & Mullendore, 2003). This is somewhat surprising given that the PCL-R was designed to assess psychopathy rather than risk (Hare, 2006). Nonetheless, the widespread use of the measure is primarily based on its predictive utility for violent and general recidivism. At

first glance, the PCL-R's predictive utility seems consistent with a belief that psychopaths are "remorseless predators who use charm, intimidation and, if necessary, impulsive and cold-blooded violence to attain their ends" (Hare, 1996b, p. 1). As shown next, this belief is more consistent with public perceptions of psychopathy (see Helfgott, 1997) than empirical evidence.

PCL-R and Violence

The results of early factor analytic studies suggested that two correlated factors underpin the PCL-R (Hare et al., 1990; Harpur, Hare, & Hakstian, 1989). Although moderately correlated ($r = \sim.50$), these factors chiefly reflect interpersonal and affective personality features of psychopathy, on the one hand (Factor 1), and impulsive and criminal behavior, on the other hand (Factor 2; Hare et al., 1990; Harpur et al., 1989). Specifically, PCL Factor 1 (i.e., "Interpersonal-Affective" [IA] scale; Hare, 2003) is uniquely distinguished by superficial charm, a deceitful interpersonal style, a lack of empathy, and shallow affect. In contrast, PCL Factor 2 (i.e., "Social Deviance" [SD] scale; Hare, 2003) is characterized by general impulsivity, irresponsibility, and past criminal and antisocial behavior. Although it largely references behavior, Factor 2 also captures the general trait of disinhibition, or impulsivity and negative affectivity; this is a trait that most would not regard as specific to psychopathy (see Patrick, Fowles, & Krueger, 2009).

One might assume that the PCL-R's measurement of personality features or both personality and behavioral features of psychopathy drives its utility in predicting violence. As observed by Hare (1996a),

I could never understand, for example, why two individuals with much the same scores on some actuarial device—based on similar criminal and demographic characteristics—but one egocentric, cold-blooded, and remorseless and the other not, could possibly present the same risk. (p. 39)

However, a growing body of research challenges this assumption.

Research suggests that the PCL-R's utility is driven more by its measurement of past antisocial behavior and disinhibition than by its assessment of interpersonal and affective traits of psychopathy per se (Skeem, Miller, Mulvey, Tiemann, & Monahan, 2005; Skeem & Mulvey, 2001). Meta-analyses suggest that SD predicts violence more strongly than the IA scale, with zero-order effect sizes of $r_w = .28$ and .18, respectively (Walters, 2003; Walters, Knight, Grann, & Dahle, 2008). Similarly, most, but not all, studies suggest that the IA scale adds no incremental utility to the SD scale after controlling for the scales' shared variance (Harris, Rice, & Quinsey, 1993; Hicks, Rogers, & Cashel, 2000; Serin, 1996; Skeem & Mulvey, 2001; cf. Brandt, Kennedy, Patrick, & Curtin, 1997; Heilbrun et al., 1998). Given the limited contribution of the IA scale, some have argued that it could be excluded for purposes of risk assessment when resources are limited (Skeem & Mulvey, 2001) and that use of the label *psychopath* should be avoided to leave behind the "emotional baggage" of stigmatization including untreatability (Gendreau, Goggin, & Smith, 2002).

Theoretical Considerations and Tests

Such positions raise questions about what PCL psychopathy is, exactly. The PCL embodies a long-standing debate between personality-based and behavior-based conceptualizations of psychopathy (Lilienfeld, 1998). The PCL IA scale references traits that personality-based theorists favor as central to psychopathy, including superficial charm, egocentricity, poverty in affective reactions, failure to establish close interpersonal bonds, and lack of anxiety (Cleckley, 1941, 1976; Lykken, 1995; McCord & McCord, 1964). The PCL SD scale emphasizes a chronic history of criminal and other antisocial behavior; these ostensibly objective and observable features are favored by behavior-based theorists and reflected in *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) diagnoses of antisocial personality disorder (ASPD; American Psychiatric Association, 1980, 1994; Robins, 1978). In fact, SD scores correlate strongly with ASPD symptom counts (*Mr = .69*; Hare, 2003). Personality theorists often view behavior-based conceptualizations as tautological: "Why has this man done these terrible things? Because he is a psychopath. And how do you know that he is a psychopath? Because he has done these terrible things" (Ellard, 1988, p. 387).

Still, the PCL combines personality- and behavior-based conceptualizations that historically have been in competition (Lilienfeld, 1998). On the practical front, individuals must exhibit both interpersonal and affective traits of psychopathy and socially deviant behavior to attain a score of 30 or higher on the PCL. Although research suggests that psychopathy is dimensional (Edens, Marcus, Lilienfeld, & Poythress, 2006; Guay, Ruscio, Knight, & Hare, 2007; Walters et al., 2007), a cut score of 30 is specified in the PCL-R manual (Hare, 2003) and applied in practice to identify "psychopaths." On the theoretical front, proponents of the PCL have offered what we call a "combined perspective" on

psychopathy. Hare and Neumann (2008) argued that (a) IA personality features are "intimately tied" (p. 231) with behavioral features of SD because both stem from a cohesive higher order factor representing psychopathy and (b) these personality and behavioral features combine in a manner that is theoretically and practically informative beyond the individual components (p. 234).

Although it is not necessarily his view, Lilienfeld (1998) articulated this combined perspective over a decade ago: "it may be that Factors 1 and II both assess personality traits relevant to psychopathy, but that the traits assessed by Factor II are related to a heightened risk for antisocial behavior" (p. 105). Lilienfeld also offered an approach for testing this combined perspective—one that assesses whether the IA and SD scales of the PCL interact to predict theoretically relevant variables, beyond the main effects of the separate scales.

> If the multiplicative (i.e., interactive) effects of the PCL-R factors were found to provide incremental validity in the prediction of relevant criteria. . . . above and beyond their additive (i.e., main) effects, this would suggest that the joint presence of both factors is necessary to provide maximal predictive power (Lilienfeld, 1998, p. 105).

Proponents of the combined perspective seem to endorse this approach, as Hare and Neumann (2008) offered Zeier and Newman's (2007) finding of a multiplicative effect for performance on a selective attention task as evidence for their view.

In the present study, we apply Lilienfeld's (1998) advice to the variable of violence. A substantial main effect for the IA scale would indicate that personality-based conceptualizations of psychopathy relate uniquely to future violence. Such an effect for SD would suggest that behavior-based conceptualizations uniquely predict violence. If both scales had unique effects, then it would suggest that they work independently, but additively, to predict violence. This provides little support for the PCL's combined perspective. A number of variables could add predictive utility to the IA scale (e.g., gender, age), but this does not mean that they are features of psychopathy (Skeem & Cooke, 2010). The interaction effect is the true test of the PCL perspective in that its two scales combine to predict violence more powerfully than the simple sum of its personality- and behavior-based parts. Do these dimensions capture a unitary construct that maximally predicts violence?

Past Reports of the Utility of PCL Interactions

Despite the importance of such questions, examinations of the predictive utility of PCL scale interactions for violence have been rare. Early reports suggested that PCL scale interactions related to past violence (Harpur & Hare, 1991; as cited in Walsh & Kosson, 2008; see also Kosson, Steuerwald, Forth, & Kirkhart, 1997). However, the possibility of criterion contamination in these retrospective studies looms large, given that items on both scales may have been rated on the basis of the same incident or incidents that were used to quantify the "violent" outcome of interest. For example, if an individual had beaten someone with a tire iron without provocation, this could both serve as the criterion and elevate scores on callousness (given "reports of callous and sadistic treatment of others"; Hare, 1990, p. 22) and poor behavioral controls (given "charges and convictions for offenses involving spontaneous and unprovoked violence"; Hare, 1990, p. 23).

In an effort to address such concerns, investigators can conduct prospective studies of the utility of PCL interactions in predicting future violence and can examine partial effect sizes, which render estimates of the unique predictive utility of scales by controlling for their shared variance. Few such prospective studies have been published, however, and they have produced somewhat conflicting findings. First, in a study of 199 male jail releasees, Walsh and Kosson (2008) found a weak but significant interaction between the PCL scales in predicting violent reconviction over an average 6-year follow-up period. Second, both Skeem and Mulvey (2001) and Walsh and Kosson (2008) analyzed data from the MacArthur Violence Risk Assessment Study (MVRAS; Monahan et al., 2001) in which 863 civil psychiatric patients were followed for 1 year after hospital discharge. Using the standard MVRAS dichotomous outcome variable for violence (yes/no), Skeem and Mulvey (2001) found no significant relationship between the PCL-Screening Version (PCL-SV) scale interaction and future violence. Using a less conventional continuous count of the number of violent incidents, however, Walsh and Kosson (2008) identified a weak but significant interaction between the PCL-SV scales in predicting violence frequency.

The Present Study

The time is ripe for a meta-analytic test of the interaction between the PCL scales in predicting violence, given the (a) practical relevance of this question to interpreting the PCL-R in the risk assessment context in which it is most commonly applied, (b) narrow theoretical relevance to the "combined" theoretical perspective that underpins the PCL-R, (c) availability of substantial (unreported) data on this topic, and (d) conflicting findings reported in a handful of published studies (Rosenthal & DiMatteo, 2001). In this study, we meta-analytically tested the PCL-derived hypothesis that the interpersonal and affective features of psychopathy multiply the risk of violence among disinhibited individuals with a dense history of antisocial behavior. Given past research, we expect the behavior-based scale of the PCL to explain most of the measure's predictive utility, without an interaction with the personality-based scale.

Method

The meta-analysis was composed of three steps: study identification/compilation, coding for methodological quality and potential moderators, and statistical analysis. Each step is described in this section.

Identifying/compiling studies. Studies of youth were excluded, given limited knowledge of the stability of psychopathic features during the transition from adolescence to adulthood (Seagrave & Grisso, 2002; Skeem & Cauffman, 2003). Examinations of verbal aggression and relational aggression were excluded to focus on the more policy-relevant criterion variable of actual physical violence (e.g., including crimes of assault, murder/manslaughter, rape, and robbery). Focus was directed toward studies in which violence was assessed prospectively to limit problems with criterion contamination. Because a limited number of prospective studies were available, "pseudoprospective" studies (i.e., retrospective studies in which an independent rater scored the PCL on the basis of file information that predated and excluded the

violent outcome of interest) were sought out. A small convenience sample of retrospective studies was also included, mainly to explore methodological quality as a potential moderator of effect size.

Consistent with Lipsey and Wilson's (2001) guidelines, the prospective and pseudoprospective studies of interest were identified on the basis of varied sources of information. Specifically, studies were identified by (a) inspecting prior meta-analyses of the relation between PCL scores and violence and by reviewing the PCL-R manual; (b) searching PsycINFO, using keyword combinations of *violence* or *violent* with *PCL*, *PCL-R*, *PCL: SV*, *Psychopathy Checklist*, *Psychopathy Checklist Revised*, and *Psychopathy Checklist Screening Version*; and (c) contacting authors who were known to, or might have, possessed large published or unpublished data sets. This process identified 42 studies.

Next, authors of these studies were contacted to request data for the meta-analysis, given how rarely the interaction between PCL scales had been reported. Specifically, authors were provided with SPSS syntax for calculating relevant PCL scale scores and conducting a hierarchical logistic regression (for details, see the Analyses section below). Authors either performed the analyses themselves or sent data sets to the authors of the present study for analysis. Of the original 42 studies identified, 26 were included in this meta-analysis (see Table 1). The remaining 16 were studies excluded because their authors did not respond or did not have data readily available (62%), refused participation (19%), or could not be located (19%). Of the 26 studies included in this meta-analysis 54% were prospective, 35% were pseudoprospective, and 12% were retrospective. For the reasons described below, the six studies that included both genders were disaggregated into separate effect estimates for men and women, yielding a total of 32 effect sizes representing 10,555 individuals for this meta-analysis.

Coding methodological quality and moderators. Once data were obtained, the studies were coded for methodological quality and other potential moderators of effect size. We did so to address two compelling criticisms of meta-analysis, that is, inclusion of poor quality studies and mixing dissimilar studies (see Sharpe, 1997). First, the methodological integrity of the studies was coded. Specifically, a study was coded as "methodologically sound" if it (a) focused on male participants, given indications that PCL items function differently with women (Cooke, Michie, Hart, & Hare, 1999); (b) based PCL scores on both interview and file information; and (c) prospectively followed participants for an average of 1 year or more to assess involvement in violence (the latter two criteria are from Walters, 2003). Application of these criteria yielded a subset of 12 methodologically sound studies. Second, to avoid mixing potentially dissimilar results, five additional potential moderators were coded: (a) sample gender (male/female), (b) sample type (general offenders, forensic patients, psychiatric patients, and sex offenders), (c) study location (Canada, United States, or other), (d) study design (prospective, pseudoprospective, and retrospective), and (e) information source for violence outcome (official criminal records obtained prospectively or pseudoprospectively, official criminal records combined with hospital records and/or self- and collateral report obtained prospectively or pseudoprospectively, or official criminal records combined with self-report obtained retrospectively).

Analyses. As suggested earlier, effect sizes for each study were calculated via hierarchical logistic regression (HLR). For

Table 1
The Psychopathy Checklist and Violence

Study	Location	N	Gender	Age	Description	Predictor	Outcome	D	Follow-up	F1 (SE)	F2 (SE)	F1 × F2 (SE)
Alterman et al. (1998)	United States	252	M	Adult	Substance abuse patients	PCL-R Int + File	Any violent crimes	R	—	.13 (.05)	.04 (.05)	−.03 (.01)
Alterman et al. (1998)	United States	39	F	Adult	Substance abuse patients	PCL-R Int + File	Any violent crimes	R	—	1.19 (.50)	−.75 (.38)	−.35 (.28)
Barbaree et al. (2001)	Canada	443	M	21–68	Incarcerated sex offenders	PCL-R Int + File	Violent charge	P	4.5 yrs (variable)	−.08 (.04)	.21 (.03)	.02 (.01)
Cooke & Michie (1999); Cooke et al. (2001)	Scotland	349	M	18–40	Prison inmates	PCL-R Int + File	Violent reconviction	P	2 yrs (variable)	.03 (.05)	.06 (.03)	−.02 (.01)
Dahle (2006)	Germany	307	M	22–50	Criminal offenders entering prison	PCL-R file	Violent conviction	S	10 yrs (fixed)	.13 (.07)	.18 (.04)	.00 (.02)
Douglas et al. (1999)	Canada	117	M	17–84 (17–86)	Civilly committed patients	PCL:SV file	Any physical violence	P	626 days (variable)	.25 (.11)	.09 (.11)	−.05 (.04)
Douglas et al. (1999)	Canada	75	F	19–88 (20–89)	Civilly committed patients	PCL:SV file	Any physical violence	P	626 days (variable)	−.01 (.27)	.23 (.20)	.46 (.17)
Douglas et al. (2003)	Canada	91	M	17–65	Psychiatric patients	PCL-R file	Any physical violence	S	42.91 mo. (variable)	.06 (.12)	.09 (.09)	−.03 (.03)
Douglas et al. (2005)	Canada	184	M	20–74	Federal prison inmates	PCL-R file	Violent arrest	S	—	−.03 (.05)	.27 (.05)	−.01 (.01)
Glover et al. (2002)	Canada	105	M	17–50	Federal prison inmates	PCL-R Int + File	Violent recidivism	P	1.9 yrs (variable)	−.10 (.08)	.19 (.08)	−.03 (.03)
Gram et al. (1999)	Sweden	318	M	16–68	Forensic psych. evaluations	PCL-R file	Violent conviction	S	3.6 yrs (variable)	.02 (.04)	.14 (.03)	.00 (.01)
Gram et al. (1999)	Sweden	34	F	18–72	Forensic psych. evaluations	PCL-R file	Violent conviction	S	4.6 yrs (variable)	−.19 (.24)	.20 (.21)	−.06 (.09)
Harris et al. (1993); Rice & Harris (1992)	Canada	603	M	Adult	Max. security hospital inmates	PCL-R file	Violent charge	S	7.3 yrs (variable)	.02 (.02)	.14 (.02)	.00 (.00)
Harris et al. (2007)	Canada	396	M	Adult	Sex offenders	PCL-R file	Violent charge	S	5.1 yrs (variable)	−.07 (.03)	.20 (.03)	.01 (.01)
Heilbrun et al. (1998)	Canada	183	M	17–71	Forensic hospital inmates	PCL Int + File	Violence arrest	P	4.2 yrs (variable)	.02 (.03)	.04 (.03)	.00 (.00)
Knight & Thornton (2007)	United States	496	M	17–79	Sex offenders	PCL-R file	Violent charge	S	2 yrs (fixed)	.01 (.05)	.13 (.04)	−.01 (.01)
Kroner et al. (2005)	Canada	206	M	18–55	Federal prison inmates	PCL-R Int + File	Violent conviction	P	3.5 yrs (variable)	.02 (.07)	.06 (.06)	−.01 (.01)
Kroner & Loza (2001); Loza & Loza-Fanous (2001)	Canada	194	M	18–61	Federal prison inmates	PCL-R Int + File	Violent conviction	P	3.5 yrs (variable)	−.02 (.06)	.12 (.05)	−.01 (.01)
Newman[a]	United States	2,836	M	18–40	Prison inmates	PCL-R Int + File	Any violent crimes	R	—	.10 (.02)	.10 (.02)	.00 (.00)
Olver & Wong (2006)	Canada	113	M	Adult	Federal sex offenders	PCL-R file	Violent conviction	S	9.9 yrs (variable)	.10 (.07)	.13 (.05)	−.02 (.02)
Patrick, Zempolich, & Levenston (1997)	United States	323	M	19–60	Prison inmates	PCL-R Int + File	Any violent crimes	R	—	.01 (.04)	.17 (.04)	.00 (.01)
Pham et al. (2005)	Belgium	213	M	23–73	Forensic inmate/patients	PCL-R Int + File	Arrest for violent offense	P	2.8 yrs (variable)	.09 (.07)	.14 (.06)	.00 (.02)
Poythress et al. (2006)	United States	901	M	17–59	Prison inmates and court-mandated substance abuse patients	PCL-R Int + File	Violent recidivism	P	1 yr (fixed)	.11 (.04)	.03 (.04)	.00 (.01)

Table 1 (*continued*)

Study	Location	N	Gender	Age	Description	Predictor	Outcome	D	Follow-up	F1 (*SE*)	F2 (*SE*)	F1 × F2 (*SE*)
Poythress et al. (2006)	United States	188	F	18–52	Prison inmates and court-mandated substance abuse patients	PCL-R Int + File	Violent recidivism	P	1 yr (fixed)	−.06 (.19)	.07 (.19)	−.06 (.06)
Ross, Hart, & Webster (1998)	Canada	72	M	17–68	Psychiatric patients	PCL:SV file	Violent recidivism	P	6 mths (fixed)	.49 (.24)	−.14 (.19)	.12 (.07)
Ross, Hart, & Webster (1998)	Canada	35	F	18–63	Psychiatric patients	PCL:SV file	Violent recidivism	P	6 mths (fixed)	−.60 (.71)	.56 (.45)	−.15 (.27)
Skeem & Mulvey (2001)	United States	496	M	18–40	Psychiatric patients	PCL:SV Int + File	Any violence	P	1 yr (fixed)	.09 (.04)	.26 (.04)	−.02 (.01)
Skeem & Mulvey (2001)	United States	367	F	18–40	Psychiatric patients	PCL:SV Int + File	Any violence	P	1 yr (fixed)	.03 (.05)	.24 (.05)	−.02 (.01)
Urbaniok, Endrass, Rossegger, & Noll (2007)	Switzerland	99	M	18–77	Violent and sexual offenders	PCL:SV file	Violent recidivism	S	18–32 yrs (variable)	.15 (.07)	.03 (.07)	−.01 (.02)
Walsh & Kosson (2008)	United States	199	M	17–40	Jail inmates	PCL-R Int + File	Violent recidivism	P	6.1 yrs (variable)	.05 (.07)	.09 (.06)	.03 (.02)
Walters & Duncan (2005)	United States	122	M	20–64	Federal prison forensic eval.	PCL-R Int + File	Arrest for violent off.	P	5.0 yrs (variable)	−.01 (.08)	.10 (.09)	−.02 (.02)
Wilson (2000)	New Zealand	199	M	21–87	Incarcerated offenders	PCL:SV Int + File	Violent conviction	P	5 yrs (fixed)	.02 (.07)	.28 (.07)	−.01 (.02)

Note. Age = age range of sample. Iin some cases, age range was not available and so a more general term (i.e., *Adult*) is used. Predictor = version of the Psychopathy Checklist used and whether this was based on either an interview and file review or a file review only. D = design (R = retrospective; P = prospective; S = pseudoprospective; all retrospective designs are retrospective follow-up studies in which the Psychopathy Checklist-Revised (PCL-R) was scored just before, during, or after the outcome data had been collected, although the file information used to score the PCL-R existed before the start of the follow-up period. In all cases, different individuals scored the PCL-R and collected the outcome data. Follow-up = mean follow-up in months (fixed = all participants followed for the same period of time; variable = participants followed for differing periods of time). F1 = Factor 1, unstandardized logistic regression coefficients, or logged odds ratios (B in SPSS output file). F2 = Factor 2. Int + File = Interview and File review; PCL:SV = Psychopathy Checklist: Screening Version; psych. = psychiatric; Max. = Maximum; eval. = evaluation. Dashes indicate follow-up period was not featured in the study.

[a] Newman, J. P., MacCoon, D. G., Vaughan, L. J., and Sadeh, N. (2005); Brinkley, C. A., Newman, J. P., Widiger, T. A., & Lynam, D. R. (2004); Bolt, D. M., Hare, R. D., Vitale, J. E., & Newman, J. P. (2004); Schmitt, W. A., & Newman, J. P. (1999); Arnett, P. A., Smith, S. S., & Newman, J. P. (1997); Newman, J. P., Schmitt, W. A., & Voss, W. (1997).

each HLR, violence (yes/no) was the predicted outcome, the IA and SD scale scores were entered on the first step, and the interaction term of the PCL scales was entered on the second step (as suggested by Lilienfeld, 1998). HLR yields regression coefficients that are logged odds ratios, which can be used as effect sizes in meta-analysis without further transformation (D. Wilson, personal communication, May 20, 2008). The effect sizes used in this meta-analysis were logged odds ratios that reflect (a) the unique utility of the IA and SD scales in predicting violence while controlling for the scales' shared variance (from the first HLR step) and (b) the incremental utility of the IA × SD interaction in predicting violence, beyond the additive main effects of the separate scales (from the second HLR step).

Because coefficients control for shared variance among scales, those that are used in this meta-analysis are, in essence, partial coefficients. Although concerns have been raised about the interpretability of such coefficients (Lynam, Hoyle, & Newman, 2006), they are used because doing so is necessary to test the incremental utility of the interaction between PCL scales in predicting violence. The results of multiple past meta-analyses are available to describe the basic (zero-order) utility of the PCL scales in predicting violence (Leistico, Salekin, DeCoster, & Rogers, 2008; Salekin, Rogers, & Sewell, 1996; Walters, 2003; Walters et al., 2008). Compared with such prior research, the magnitude of associations between the PCL scales and violence will be lower in the present meta-analysis because shared variance is removed.

The *Meta* user-written command in STATA Version 10.1 was applied, which aggregates the logged odds ratios of each study by weighting effect size as the inverse of its standard error via the inverse-variance weighting method (Sterne, Bradburn, & Egger, 2001) and tests whether the pooled effect size is significantly different from zero. To enhance interpretability, the pooled effect size is reported as an odds ratio in two different forms: (a) a "traditional" odds ratio that represents an increase in the odds of violence for each 1-point increase on the PCL and (b) a "clinically meaningful" odds ratio that represents an increase in the odds of violence for every one standard deviation increase on the PCL. Standard deviations for male forensic psychiatric patients were obtained from the PCL-R manual (Hare, 2003): A standard deviation is 3.5 and 4.0 points on Factors 1 and 2, respectively.

All odds ratios are estimated by random effects models. Such models assume effect sizes vary by population, which is important for the purposes of this study given the variation in sample demographic information for studies included in this meta-analysis (Cooper & Hedges, 1994; Rosenthal & DiMatteo, 2001). For moderation analyses, *Metareg* in STATA Version 10.1 was used (see Harbord & Higgins, 2008). For analyses that addressed the possibility of publication bias, *Metatrim* and *Metabias* routines from the same software package were used.

Although the meta-analytic strategy described here chiefly has been established for additive effect sizes, recent research suggests that it also is appropriate for aggregating effect sizes for interaction terms. On the basis of a simulation study, Simmonds and Higgins (2007) concluded that the meta-analysis of interaction terms is appropriate even when high levels of heterogeneity are present. Taylor and Kim-Cohen (2007) applied this method to aggregate gene–environment interaction effects (i.e., monoamine oxidase A by childhood maltreatment) on antisocial behavior. Taken together, these studies suggest that effect sizes of interaction terms can be aggregated via this strategy.

Results

We conducted the meta-analyses in four basic steps: (a) a basic meta-analysis of all studies, (b) an exploration of the generalizability of findings across subgroups and methodologically sound studies, (c) a computation of relative effect sizes via common language effect size statistics, and (d) an estimation of the effect of publication bias and the "file-drawer effect." Each step is described next.

Conducting the basic meta-analysis. Table 2 presents the unique main effects of the PCL scale scores and their interaction in predicting violence (which also is shown graphically in Figure 1), the mean-weighted effect sizes, 95% confidence intervals, and homogeneity coefficients. Results indicate that the SD scale (range = 0–20 points) most strongly predicted violence; the "traditional" odds ratio corresponding to a 1-point increase on this scale was 1.15 ($p < .001$), and the "clinically meaningful" odds ratio corresponding to a one standard deviation (i.e., 4-point) increase was 1.60 ($p < .001$). This is a small to medium effect size ($d = .40$), applying Cohen's (1988) estimates and guidelines. The IA scale (range = 0–16 points) weakly, but significantly, predicted violence; the "traditional" odds ratio corresponding to a 1-point increase on this scale was 1.04 ($p < .05$), and the "clinically meaningful" odds ratio corresponding to a one standard deviation (i.e., 3.5-point) increase was 1.14 ($p < .05$). This is a small effect size ($d = .11$), using Cohen's (1988) estimates and guidelines. However, the interaction of interest between the PCL scales did not predict violence ("traditional" and "clinically meaningful" $ORs = 1.00$, *ns*). Thus, the behavior-based (SD) and, to a lesser extent, personality-based (IA) approaches to defining psychopathy manifest some unique, additive utility in predicting violence. However, the scales manifest no multiplicative effect that would support the PCL's combined definition of psychopathy. The joint presence of these features does not exponentially increase risk for violence.

Still, the *Q* statistic was significant for the effects of the IA scale, SD scale, and their interaction. As noted by Rosenthal and DiMatteo (2001), the significance of such tests may depend on sample size and "can yield highly significant results even when there is little variation in effect sizes" (p. 74). Nevertheless, we adopted a conservative approach designed to explore the generalizability of the overall results and determine whether more homogeneous effects could be identified. This approach involved moderator analyses, sensitivity analyses, and meta-analysis of only those studies rated as methodologically sound.

Exploring the generalizability of effects.

Moderator analyses. We first tested five potential moderators of effect size: sample gender, sample type, study location, study design, and information source for violence. Of the 15 tests performed (five moderators × three effects), only one was significant. Specifically, study location moderated the effect of the IA scale on violence: effect sizes for studies conducted in the United States were significantly greater than those conducted in other countries ($b = .07$, $p < .05$).

Sensitivity analyses. Although moderator analyses did not reveal clear explanations for apparent heterogeneity in effect sizes,

Table 2
Weighted Mean Effect Sizes of PCL Factor Scores and Their Interaction as Predictors of Violence

Subsample	k	PCL Factor 1			PCL Factor 2			PCL factor interaction		
		OR	95% CI	Q	OR	95% CI	Q	OR	95% CI	Q
Overall	32	1.04*	1.01, 1.07	65.71***	1.15***	1.11, 1.18	80.73***	1.00	0.99, 1.00	45.54*
Gender										
Male	26	1.04**	1.01, 1.07	58.26***	1.14***	1.11, 1.17	69.21***	1.00	0.99, 1.00	33.07
Female	6	1.01	0.83, 1.23	7.21	1.17	0.97, 1.42	7.92	0.98	0.89, 1.08	9.80
Location										
Canada	14	1.00	0.96, 1.04	23.95*	1.15***	1.10, 1.21	35.52**	1.00	0.99, 1.01	23.36*
United States	11	1.07***	1.03, 1.11	15.90	1.13***	1.08, 1.19	30.87**	0.99	0.98, 1.00	14.89
Other	7	1.06*	1.01, 1.10	5.53	1.14***	1.08, 1.21	12.18	0.99	0.98, 1.00	3.60
Participants										
General	13	1.04	1.00, 1.08	20.57	1.14***	1.09, 1.19	28.92**	1.00	0.99, 1.00	10.30
Forensic	6	1.04	0.99, 1.10	6.05	1.10***	1.05, 1.17	6.70	1.00	0.98, 1.01	9.07
Psychiatric	8	1.08*	1.01, 1.15	14.51*	1.15**	1.06, 1.25	23.43**	0.99	0.97, 1.00	13.92
Sex offenders	5	1.01	0.93, 1.09	13.43*	1.17***	1.11, 1.24	8.06	1.00	0.99, 1.02	7.29
Design										
Prospective	18	1.03	0.99, 1.07	26.02	1.14***	1.09, 1.20	48.40***	1.00	0.99, 1.00	30.01*
Psuedoprospective	10	1.02	0.98, 1.07	15.70	1.17***	1.13, 1.21	14.10	1.00	0.99, 1.01	7.63
Retrospective	4	1.09*	1.00, 1.19	9.55*	1.10*	1.02, 1.19	9.40*	0.99	0.97, 1.01	7.26
Methodologically sound	12	1.02	0.99, 1.06	16.77	1.14***	1.08, 1.20	39.41***	1.00	0.99, 1.00	15.31

Note. PCL = Psychotherapy Checklist; k = number of effect sizes compiled; OR = odds ratio; CI = confidence interval; Q = homogeneity coefficient.
* p < .05. ** p < .01. *** p < .001.

we proceeded with sensitivity analyses to (a) identify population subgroups that might have more homogeneous effect sizes and (b) compare those homogeneous effect sizes with the overall effect sizes to estimate whether the latter were more generalizable than suggested by the Q statistic, which can be affected by sample size. Table 2 shows the Q statistic and effect size for each of 12 subgroups defined by our four potential moderators.

Three results are noteworthy. First, homogeneous effects could be isolated. For the IA, SD, and interaction effects, results were homogeneous for seven, five, and 10 of the 12 subgroups, respectively. Second, across these homogeneous subgroups, effect sizes varied very little: The standard deviations for the IA scale, standard deviation scale, and their interaction were 0.02, 0.03, and 0.01, respectively, and raw differences between the most extreme

subgroups were no greater than 0.07. Third, the average effect sizes for these homogeneous subgroups were virtually identical to the effect sizes produced for the entire (apparently heterogeneous) sample: 1.04 (and 1.04) for IA, 1.15 (and 1.15) for SD, and 0.99 (and 1.00) for the interaction. The limited variability and consistency in effects lends confidence to the generalizability of results obtained for the full sample.

Isolating methodologically sound studies. Next, we ran analyses using only the subsample of 12 methodologically sound studies. In keeping with past results (Walters, 2003), this reduced heterogeneity among effects. As shown in Table 2, Q statistics were no longer significant for the IA scale, nor the interaction, but remained significant for the SD scale. Again, however, the pattern of results was consistent with that obtained for the full (apparently
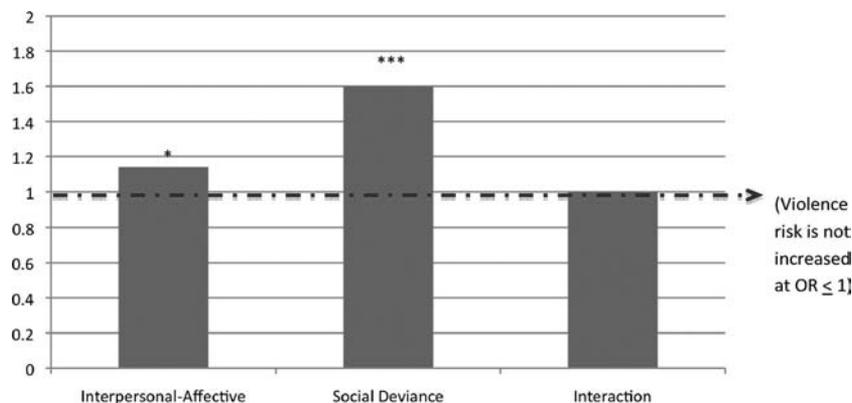

Figure 1. Unique utility of PCL scales and their interaction in predicting violence, based on 32 effect sizes. The figure depicts the "clinically significant" odds ratio, indicating any increase in the odds of violence for every one standard deviation increase on the PCL scale or interaction. PCL = Psychopathy Checklist; OR = odds ratio.
* p < .05. *** p < .001.

more heterogeneous) sample. That is, the SD scale significantly increased the odds of violence ($OR = 1.14$ vs. 1.15 for the full sample) and did not interact with the IA scale to do so ($OR = 1.0$ vs. 1.0 for the full sample). Although the effect of the IA scale lost statistical significance in this methodologically sound subsample ($OR = 1.02$, ns vs. 1.04, $p < .05$ for the full sample), this appears to be a function of reduced power because methodological quality did not moderate the effect of the IA scale in the full sample.

Conveying relative effect sizes. To convey the relative effect sizes of the three predictors (SD, IA, and interaction), we used the entire sample of 26 studies to compute common language effect size indicators, which indicate the probability that an effect size randomly selected from one distribution will be greater than an effect size randomly selected from another distribution (McGraw & Wong, 1992, p. 361). Results indicate that the unique predictive utility of the SD scale would exceed that of the IA scale in the vast majority of studies (80.62%) and would exceed that of the interaction between the PCL scales in virtually all studies (95.63%). Even the unique predictive utility of the IA scale would exceed that of the (nonexistent) interaction between the PCL scales in a large majority of cases (69.23%).

Addressing publication bias. Because publication bias, including the "file-drawer effect," may yield meta-analytic results that inflate the true magnitude of an effect, it must always be addressed when conducting a meta-analysis (Rosenthal & DiMatteo, 2001), To do so, we applied two alternative strategies: (a) the trim and fill funnel method to estimate how many studies were omitted from the meta-analysis and adjust effect size estimates to account for this bias (Duval & Tweedie, 2000, and (b) Egger's regressions to estimate whether the effect size funnel plots were significantly nonsymmetrical (Sterne & Egger, 2005). Both of these methods yielded no evidence of publication bias for any effect.

Discussion

This study was designed to test whether the core interpersonal and affective traits of psychopathy—combined with antisocial behavior and disinhibition—maximally predict violence. To evaluate this question, we tested whether the IA and SD scales of the PCL interact to predict violence, lending predictive utility to the scales' simple, individual effects. The key findings may be distilled into two points that largely were in keeping with our hypotheses. First, the SD scale exhibited stronger predictive utility for violence than the IA scale when controlling for their shared variance. Second, the IA scale did not interact with the SD scale to predict violence. After noting study limitations, we analyze each finding and its implication for practice in violence risk assessment and for the PCL-R conceptualization of psychopathy that combines personality and behavioral perspectives.

Five limitations must be borne in mind while interpreting the results of this study. First, although we obtained unpublished data and our analyses yielded no evidence of publication bias, it is possible that the present results overestimated the relation of the PCL scores with violence, given the "file-drawer" effect. Second, the Q statistic was statistically significant for the SD scale even in the methodologically sound studies, suggesting that this scale's effect is inconsistent across studies. This concern is tempered by findings that homogeneous effects identified in several subgroups

for the SD scale were virtually identical to those observed in both the entire sample and methodologically sound subsample (see Table 2). Third, although this meta-analysis included studies with variable follow-up periods (see Table 1), survival analysis could not be applied to account for censored data because the variables needed were not consistently available in the original studies. We recommend that studies routinely collect these data (i.e., days to first violence and days of follow-up) to permit a future meta-analysis within a survival framework. Fourth, this meta-analysis focused on the policy-relevant outcome variable of whether any violence occurred or not; we could not test whether Factor 1 plays a particular role in a smaller class of instrumental violence because most studies do not specify violence type. Given conflicting findings on whether Factor 1 specifically relates to instrumental violence (see Camp, Skeem, & Barchard, 2010), we recommend that studies routinely make such differentiations to permit a future meta-analysis. Fifth, because this study presents meta-analytically obtained group-level effect sizes, care should be taken to avoid generalizing findings to individuals (i.e., the ecological fallacy). For some individuals, IA features may relate strongly to violence or may interact with SD to do so. This is just not the case for most people.

SD and IA traits independently predict violence. In keeping with past research (Harris et al., 1993; Hicks et al., 2000; Serin, 1996; Skeem & Mulvey, 2001), the SD scale ($d = .40$) exhibited stronger predictive utility for violence than the IA scale ($d = .11$) when controlling for their shared variance. Indeed, relative effect size estimates indicated that the predictive superiority of the SD scale would be observed in the vast majority (81%) of studies. As shown in Table 2, the SD scale was more predictive than the IA scale across gender, country of study, and relatively sound study designs (i.e., methodologically sound studies, prospective studies, and pseudoprospective studies, but not retrospective studies).

Although the general effect of core interpersonal and affective traits of psychopathy was modest, an examination of Table 2 indicates that its utility was somewhat stronger in studies that were retrospective, conducted with psychiatric patients, or completed in the United States (ORs = 1.09, 1.08, 1.07). Criterion contamination may help explain the utility of this scale in retrospective studies, as past violence appears in item descriptions of even core traits (e.g., "lack of empathy or callousness can be inferred on the basis of the commission of particularly brutal, heinous acts of violence or criminal exploitation"; Widiger, 2006, pp. 160–161). Still, our results indicate that in a few contexts, not all of the PCL's utility in predicting violence is attributable to its assessment of disinhibition and past violent, criminal, and antisocial behavior. Sometimes, core interpersonal and affective features of psychopathy add predictive utility to these features. In contexts in which both scales have unique effects, this indicates that they can work independently, but additively, to predict violence.

Utility of social deviance in predicting violence does not depend on core IA traits of psychopathy. Additive effects provide little support for the conceptualization of psychopathy that specifically combines personality-based and behavior-based approaches. This remains true even if measures of psychopathy predominantly are used as violence risk assessment tools: A number of variables (e.g., neighborhood disadvantage) could be added to core interpersonal and affective traits to increase the PCL's predictive utility for violence, but this would not mean those

variables were essential features of psychopathy. IA traits should interact with socially deviant features to predict theoretically relevant outcomes, if the two PCL scales combine to capture a unitary construct that is more informative than the simple sum of its personality- and behavior-based parts (see Hare & Neumann, 2008). The central finding of this meta-analysis is that the PCL scales do not interact to predict violence. This lack of effect was homogeneous across studies.

The absence of an interaction between the two scales means that the utility of SD in predicting violence does not become stronger or weaker as a function of core IA traits of psychopathy, or vice versa. Regardless of how emotionally detached or interpersonally deceitful an individual is, a chronic criminal history and impulsivity/negative affectivity will predict violence relatively strongly—an increase of one standard deviation in SD increases the risk of violence by 60% (see Figure 1). No matter how antisocial and disinhibited an individual's lifestyle has been, core psychopathic traits will predict violence relatively weakly—an increase of one standard deviation in IA traits increases the risk of violence by only 14% (see Figure 1).

Implications for assessing violence risk and conceptualizing psychopathy. The results of this meta-analysis have central practical implications, and limited but important theoretical implications. First, the limited utility of core IA traits and their failure to interact with SD in predicting violence is directly relevant to the (mis)interpretation of the PCL-R in the risk assessment context in which it is predominantly applied (see Tolman & Mullendore, 2003). Although the PCL's predictive utility is chiefly based on its behavior-based distillation of disinhibition and antisocial behavior, its personality-based *psychopathy* label connotes a more malignant and (in most cases) incorrect basis for violence propensity. When told that an individual's score on a measure of psychopathy suggests that they are at risk for violence, professionals may reason that

> because they are emotionally unconnected to the rest of humanity, and because they callously view others as little more than objects, it should be relatively easy for psychopaths to victimize the vulnerable and to use violence as a tool to obtain what they want (Hare, 1999, p. 185).

If told that an individual's impulsivity, negative affectivity, and chronic history of antisocial behavior suggest that they are at risk for violence, professionals may recall, quite simply, that past behavior predicts similar future behavior.

Our results suggest that a behavior-based conceptualization emphasizing the disinhibition and chronic criminality of ASPD are most useful for the purpose of risk assessment. Although this conceptualization is embodied by the SD scale of the PCL-R, we recommend the use of purpose-built risk assessment tools instead. Why? First, as suggested above, use of the PCL-R in this context invites mistaken assumptions that violence risk reflects emotional detachment, predation, and inalterable dangerousness (see Edens, 2001; Gendreau et al., 2002). Second, even if violence risk is correctly attributed to the tool's assessment of disinhibition and chronic antisocial behavior, this does not fully explain risk or provide direction for reducing it. After all, a trait cannot both embody violent behavior and explain it (e.g., people are violent because of ASPD, which includes violent behavior). Third, purpose-built risk assessment tools like the Revised Levels of

Services Inventory (Andrews, Bonta, & Wormith, 2006) are highly associated with the PCL-R (Kroner, Mills, & Reddon, 2005; see also Skeem, Polaschek, & Manchak, 2009), perform as well as the PCL-R in predicting violence (Gendreau et al., 2002), and assess a broader range of factors (e.g., criminogenic thinking and peer associations) that provide direction for reducing risk. Fourth, the PCL is not a resource-efficient risk assessment method, given that the PCL takes clinical expertise and 2–3 hr to complete (Hare, 2003), its IA scale contributes little to prediction, and self-report measures (including self-report psychopathy scales) often perform as well as interview-based risk appraisal in predicting violence and other criminal behavior (Walters, 2006; for psychopathy, see Camp et al., 2010; Edens, Poythress, Lilienfeld, & Patrick, 2008; Edens, Poythress, Lilienfeld, Patrick, & Test, 2008). Tools that can efficiently improve routine correctional practice (i.e., decisions about placement and release) are particularly important in today's fiscal climate.

Second, beyond practical implications for risk assessment, the results of this meta-analysis have important but limited theoretical implications. Specifically, this study casts doubt on the PCL-R grounded theory (Hare & Neumann, 2008) that factor interactions predict practically and theoretically important outcomes. A practical outcome of obvious policy relevance is violence, given that the PCL-R is typically used as a risk assessment tool. In this domain, it does not seem that the debate between behavior- and personality-based conceptualizations of psychopathy (see Pilkonis & Klein, 1997) can be resolved by simply combining them. As observed by Widiger and Lynam (1998), such combinations are "not particularly satisfying if psychopathy is to be understood as a constellation of personality traits" (p. 180), rooted in Cleckley's (1941) model.

Our findings have fewer implications for theories that are alternatives to the PCL-R combined perspective. The vast majority of such theories place no particular premium on explaining violence as an expression of core psychopathic traits. So, variables other than violence may be used to test the interaction between core IA traits and less specific disinhibited-antisocial features. Candidates include such theory-relevant variables as poor passive avoidance learning and impaired emotional processing (see Zeier & Newman, 2007).

Taken together, the results of this study challenge common assumptions about the interactive relationship assumed to exist between the PCL-R factor scores and violence. They also underscore the need for a theory-informed, iterative scientific process that can advance researchers' understanding of psychopathy (Skeem & Cooke, 2010). A refined understanding of psychopathy and related constructs can only improve psychological assessment and legal decision making in applied settings.

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