Psychological Assessment
2003, Vol. 15, No. 1, 41–55

1040-3590/03/$12.00 DOI: 10.1037/1040-3590.15.1.41

Applicability of Traditional and Revised Models of Psychopathy to the Psychopathy Checklist: Screening Version

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Recently, psychopathy has become virtually synonymous with the Psychopathy Checklist (PCL) measures. However, the "gold standard" 2-factor model that underlies these measures has been questioned for its uncertain empirical support and emphasis on antisocial behavior that is not specific to psychopathic personality deviation. This study ($N = 870$ civil psychiatric patients) compares the fit of the traditional 2-factor model with that of a revised 3-factor model of psychopathy. The revised model better describes the structure of the Screening Version of the PCL (PCL:SV) than the traditional model. Although the revised model's exclusion of some items that assess antisocial behavior reduces the PCL:SV's power in predicting patient violence, this model arguably assesses psychopathy in a more specific, theoretically coherent fashion that may reduce misapplications of the construct. Implications for future research are discussed.

There has been a dramatic increase in research on psychopathy over recent years, based largely on the advent of the Psychopathy Checklist (PCL; Hare, 1991) measures and their relatively robust ability to predict violent behavior among correctional, forensic, and civil psychiatric samples (Douglas, Ogloff, Nicholls, & Grant 1999; Hemphill, Templeman, Wong, & Hare, 1998; Salekin, Rogers, & Sewell, 1996; Skeem & Mulvey, 2001). Despite the fact that numerous conceptualizations of psychopathy have been carefully articulated (see Maughs, 1941a, 1941b; Millon, Simonsen, & Birket-Smith, 1998; Thomas-Peters, 1992) and several measures have been created (e.g., Blackburn, 1987, 1996; Hare et al., 1990; Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld & Andrews, 1996), in most contemporary North American literature, psychopathy has become virtually synonymous with the revised PCL (PCL–R; Hare, 1991). Certainly, the personality disorder field is fortunate to have a "gold standard," predominant measure of psychopathy. Even with its limitations, use of the PCL/PCL–R in this way facilitates the comparison of research results across studies and clarifies communication among practitioners and researchers. If science is an iterative process between data and theory (Poincare, 1905/2001), then focusing the field's efforts on sequentially investigating and refining the PCL measures and developing their theory will aid in advancing an understanding of the construct.

This study is designed to contribute to this process. In this article, we first describe the development of the PCL measures and their underlying two-factor model of psychopathy and then present Cooke and Michie's (2001) modification of the PCL measures in developing their three-factor model of psychopathy. We then analyze (a) the extent to which the two-factor or three-factor model of psychopathy best fit data on a large sample of civil psychiatric patients and (b) the relationship between the three-factor model of psychopathy and violence in this patient sample.

Development of the Two-Factor Model

The early development of the PCL was an exercise in the constructive exchange between theory and data. The precursor to the PCL specifically was designed to assess Cleckley's (1976) 16-descriptor conceptualization of psychopathy (see Rogers, 1995). The PCL was developed by choosing 22 items from a pool of 100 items written to differentiate between psychopathic and nonpsychopathic correctional inmates. The items were chosen in part on the basis of the extent to which they correlated with clinicians' global ratings of individuals across Cleckley's 16 descriptors. The subsequent PCL–R was developed by dropping 2 of

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Work on this article was supported by the MacArthur Foundation Research Network on Mental Health and the Law and by National Institute of Mental Health Grant 5-34282 (for the collection of collateral data). We thank Judith Stein and Jodie Ullman for their helpful comments on the confirmatory factor analytic approach described here, as well as John Monahan for his helpful feedback on earlier versions of this article.

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the PCL's items and modifying some scoring criteria (Hare, 1991; Hart, Cox, & Hare, 1995; Rogers, 1995). Because they were developed in correctional populations, however, the PCL and the PCL–R are weighted much more heavily with criminality and socially deviant behavior than Cleckley's original conceptualization of psychopathy (Rogers, 1995). Nevertheless, Hare (1991) asserted that the PCL and the PCL–R were designed to assess the interpersonal, affective, and behavioral traits of psychopathy that are "most clearly exemplified by Cleckley's *Mask of Sanity*" (p. 1).

Based largely on the putative structure of the PCL and the PCL–R, the most dominant, contemporary theoretical model of psychopathy is the *two-factor model* (Forth, Kosson, & Hare, in press; Hare, 1991; Hart et al., 1995). According to the model, psychopathy consists of two correlated (r = .50) but distinct factors that are interpreted as a single construct (Hare et al., 1990; Hart et al., 1995). An individual must manifest features of both factors to be deemed psychopathic (see Skeem & Mulvey, 2001). The first factor reflects the interpersonal and affective core of psychopathy, or the "selfish, callous, and exploitive use of others" (Harpur, Hare, & Hakistan, 1989, p. 6). The second factor describes a collection of socially deviant and antisocial behaviors, or a "chronically unstable and antisocial lifestyle" (p. 6). Factors 1 and 2 may be aptly labeled (and are referred to throughout this article) as *emotional detachment* and *antisocial behavior*, respectively (after Patrick, Bradley, & Lang, 1993).

Recently, this two-factor model has come under fire, partially based on its shortcomings in defining psychopathy as a coherent personality construct (for reviews, see Lilienfeld, 1994, 1998). As noted by Widiger and Lynam (1998), the two-factor model is "not particularly satisfying if psychopathy is to be understood as a constellation of personality traits" (p. 180) rooted in Cleckley's (1976) model. Arguably, the two-factor model does not define psychopathy as much as embody a long and ongoing debate about "the primacy of and relationship between two constructs that are consistently distinguished in the literature" (Pilkonis & Klein, 1997, p. 109). Particularly during the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) field trials, there was considerable controversy about whether the disorder was better defined by core personality traits of "emotional detachment" or a long history of socially deviant and "antisocial behavior" (see Hare, Hart, & Harpur, 1991; Robins, 1966; Widiger et al., 1996). According to Cleckley and later proponents of the personality-based approach, antisocial behavior is neither necessary nor sufficient for a diagnosis of psychopathy (Lilienfeld, Purcell, & Jones-Alexander, 1997). In fact, because antisocial behavior may be caused by a host of factors other than personality deviation, focusing on antisocial behavior may result in overdiagnosing psychopathy (Blackburn, 1998; Hare et al., 1991; Harpur et al., 1989). According to this perspective, the two-factor model and PCL measures are heavily contaminated with nonspecific indices of socially deviant and antisocial behavior.

The underpinnings of the PCL measures are being questioned not only on theoretical grounds but also on the basis of empirical findings. First, the emotional detachment factor appears more important in defining psychopathy per se than the antisocial behavior factor. Item response theory (IRT) analyses suggest that the emotional detachment factor is more specific and precise in defining psychopathy or more discriminating at higher levels of the trait (Cooke & Michie, 1997; see also Cooke, Michie, Hart, & Hare, 1999). Similarly, clinicians' ratings of the extent to which individuals are prototypic of psychopathy correlate substantially more highly with individuals' scores on the emotional detachment factor than the antisocial behavior factor (Hare, 1991).

Second, on the basis of their review, Cooke and Michie (2001) argued that most past studies that claim support for a two-factor model used insufficient methods (exploratory factor analyses and congruence coefficients) to assess the consistency of their results with the two-factor model. Only five studies have applied confirmatory factor analytic techniques to address this issue. In the two focused on the PCL–R, the fit indices indicated that the two-factor model did not fit their data (Brandt, Kennedy, Patrick, & Curtin, 1997; Darke, Kaye, Finlay-Jones, & Hall, 1998). The three studies that used the Screening Version of the PCL (PCL:SV; Hart et al., 1995) found somewhat more positive results. First, Hart et al. (1995) found that the two-factor model fit their data quite well (e.g., goodness-of-fit index [GFI] = .94) and significantly better than a unidimensional model. Second, Rogers et al. (2000) found that the two-factor model "was approaching a good fit" (p. 10), with a robust comparative fit index (CFI) of .85 (Bentler, 1995) and a root-mean-square error of approximation (RMSEA) of .07. Third, on the basis of confirmatory and exploratory factor analytic results, Skeem and Mulvey (2001) concluded that the two-factor model provided an adequate but clearly imperfect fit to the data (e.g., corrected CFI = .89; Satorra & Bentler, 1988). None of these PCL:SV studies, however, compared the fit of the two-factor model with alternative multiple-factor models.

Whether the two-factor model of psychopathy is a sound reflection of this construct is more than simply an issue of theoretical coherence and psychometric neatness. The structure of the model has implications for the interpretation of this construct as a predictor or correlate of other personality constructs and behaviors. For example, Skeem and Mulvey (2001) recently found that the PCL:SV is a relatively strong predictor of violence in civil psychiatric samples. However, its predictive power was not based on its assessment of core traits of emotional detachment. Even after a host of covariates that reflect antisocial behavior and substance abuse were controlled for, the predictive power of the PCL:SV was based chiefly on its assessment of socially deviant or antisocial behavior. Thus, it is important to determine what violence-predictive constructs the PCL:SV antisocial behavior scale may tap (e.g., poor self-control) and how they relate to the core traits of emotional detachment.

In summary, both theoretical and empirical questions have been raised about the adequacy of the PCL two-factor model of psychopathy. It is certainly possible that there has been some "psychometric drift" (Meehl, 1978, p. 816) away from Cleckley's (1976) and others' seminal theories of psychopathy as the PCL measures were iteratively refined in correctional, heavily antisocial populations. Also, there may have been concomitant "conceptual drift" (Meehl, 1978, p. 816) over recent years, as the very meaning of psychopathy has come to be associated with the PCL measures' fallible indicators. Although revising the measures may constitute a change in the theoretical concept of psychopathy, such change is an advance if one believes that the refinement of scientific constructs is accomplished through iterative feedback between theory

and data (Poincare, 1905/2001). To move ahead, the field must address questions about the adequacy of the two-factor model of psychopathy and use this information to revise existing measures and theory.

Cooke and Michie's (2001) Three-Factor Model

Recently, Cooke and Michie (2001) addressed some of these issues and proposed a hierarchical three-factor model of psychopathy. This model was developed on the basis of an interplay between (a) a long-standing theory that psychopathy manifests in interpersonal, affective, and behavioral components (Blackburn, 1998; Cleckley, 1976; Hare, 1991; Lilienfeld, 1994) and (b) application of IRT and confirmatory factor analyses (CFAs) to several large data sets to refine the PCL–R and determine its structure. The three-factor model makes two crucial changes to the two-factor model. First, it divides the original emotional detachment factor into separate interpersonal (Arrogant and Deceitful Interpersonal Style) and affective (Deficient Emotional Experience) factors. Second, almost half of the items from the PCL–R antisocial behavior factor are deleted, based on findings that the items were poor indicators of psychopathy. In placing less emphasis on nonspecific indices of socially deviant behavior, this factor (Impulsive and Irresponsible Behavioral Style) addresses some of the concerns of personality theorists discussed earlier and "places the definition of psychopathy firmly within the domain of personality pathology" (Cooke & Michie, 2001, p. 185).

In essence, the three-factor model posits that a 13-item PCL–R assesses the superordinate factor of Psychopathy, which is underpinned by the three factors: Arrogant and Deceitful Interpersonal Style (Items 1, 2, 4, and 5), Deficient Emotional Experience (Items 6, 7, 8, and 16), and Impulsive and Irresponsible Behavioral Style (Items 3, 9, 13, 14, and 15). In a series of seven studies, this model of psychopathy was (a) developed and cross-validated in North American ($n = 2{,}067$) and Scottish ($n = 596$) forensic and correctional subsamples using the PCL–R and then (b) cross-validated on alternative measures of psychopathy, including the PCL:SV and the closely related psychopathy personality disorder criteria from the *DSM–IV* field trial. The latter samples (from the PCL:SV and field trial studies) included civil psychiatric patients. In each study, the fit of the proposed model was compared with that of several competing models, including the two-factor model. The hierarchical three-factor model was found to fit the data consistently and to fit significantly better than competing models. The further question of the extent to which these three factors are differentially related to external correlates (e.g., violence, narcissism) in a theoretically coherent manner, however, has not been addressed.

The chief goal of this article was to independently cross-validate the new three-factor model, using the PCL:SV and a large sample of civil psychiatric patients. We specifically analyzed the extent to which the structure of the PCL:SV is consonant with the traditional two-factor model or the new three-factor model of psychopathy. A subsidiary goal of this article was to analyze the relationship between the three-factor model of psychopathy and future violence so as to refine our understanding of the previously demonstrated predictive power of the PCL:SV in this sample (Skeem & Mulvey, 2001).

Method

Participants

The data analyzed in this study were collected as part of the MacArthur Violence Risk Assessment Study. The methodological details and primary results of the larger study (e.g., see Monahan et al., 2001; Silver, Mulvey, & Monahan, 1999; Steadman et al., 1998, 2000) and those pertaining to psychopathy (Skeem & Mulvey, 2001) are reported elsewhere. Participants were sampled from psychiatric inpatient facilities at three sites (Pittsburgh, Pennsylvania; Kansas City, Missouri; and Worcester, Massachusetts). Study inclusion criteria were (a) civil admission; (b) between the ages of 18 and 40 years; (c) English-speaking; (d) White or African American ethnicity (or Hispanic in Worcester only); and (e) a medical record diagnosis of schizophrenia, schizophreniform disorder, schizoaffective disorder, depression, dysthymia, mania, brief reactive psychosis, delusional disorder, alcohol or other drug abuse or dependence, or personality disorder. Eligible patients were sampled according to age, gender, and ethnicity to maintain a consistent distribution of these characteristics across sites. During the study period, 12,873 patients were admitted to the research facilities, and 7,740 met criteria for inclusion in the study. Research interviewers invited a quota sample of 1,695 patients to participate, and the refusal rate was 29%. The final sample size of patients who were interviewed in a hospital was 1,136. Steadman et al. (1998) described their characteristics as well as analyses related to sample recruitment and retention.

The bulk of analyses reported in this article are based on a sample of 870 patients who were administered the PCL:SV.[1] As in the larger sample, these patients were young ($M = 30$ years, $SD = 6$), White (69%; African American, 29%; Hispanic, 2%), male (58%), voluntarily admitted (68%) patients. These patients had independently determined diagnoses of depression (41%), schizophrenia (18%), bipolar disorder (16%), other psychotic disorder (4%), alcohol abuse or dependence (45%), other drug abuse or dependence (36%), or personality disorder only (2%). Some 41% of patients had a co-occurring major mental disorder[2] and substance abuse or dependence disorder.

Procedure

Initial Hospital and Follow-Up Community Interviews

First, patients were interviewed in the hospital (a) by a research interviewer to obtain data on demographic and historical factors and then (b) by a research clinician (with a PhD or an MA/MSW) to confirm the medical record diagnosis using the *DSM–III–R* (American Psychiatric Association, 1987) checklist (Janca & Helzer, 1990) and to administer several clinical scales. The median length of hospitalization for study participants was 9 days.

Next, research interviewers attempted to recontact enrolled patients in the community and interview them five times (every 10 weeks) over the 1-year period from the date of discharge from the index hospitalization to obtain information about a range of factors, including the patients' involvement in violence. A collateral informant for each patient was also interviewed on the same schedule. This collateral informant was nominated by the patient during each follow-up interview as the person who was most familiar with his or her current activities. Collateral informants were most

[1] Although 871 patients completed the PCL:SV, one multivariate outlier ($p < .01$, based on Mahalanobis distance across the 12 PCL:SV items) was deleted from the data set to prevent it from heavily influencing the factor solution.

[2] Major mental disorder includes schizophrenia, schizophreniform disorder, schizoaffective disorder, depression, dysthymia, mania, cyclothymia, and other psychotic disorders.

often family members (47%) but were also friends (24%), professionals (14%), significant others (12%), or others (3%). Patients and collateral informants were paid for their participation.

To reduce the difficulties inherent in validly measuring personality disorder during the acute phases of an Axis I disorder (see Loranger et al., 1991), we administered the PCL:SV interview during the follow-up period (typically at Follow-Up 1 or 2) rather than during hospitalization. The interview was completed on the basis of information from both official records and patient interviews.[3]

Review of Official Records

In addition to patient and collateral interviews, official records were used as a source of information. Hospital records were reviewed to assist in the completion of scales including the PCL:SV, and arrest records were reviewed to provide information about offense histories and arrests that occurred during the follow-up period.

Measures

Psychopathy

As mentioned earlier, the PCL and the PCL–R were designed for use with criminal samples (Hart et al., 1995). In response to the potential limitations posed by this fact, Hart et al. developed a shorter Screening Version of the PCL (the PCL:SV) to assess for psychopathy in noncriminal settings and to screen for psychopathy in criminal settings. Although normed partially on civil psychiatric samples, the PCL:SV is very strongly associated with the PCL–R (weighted mean $r = .80$) and is highly similar to the PCL–R in its structure and pattern of relationships to external variables (Hart et al., 1995).

The PCL:SV consists of 12 items derived from the 20-item PCL–R. Six of the PCL:SV items assess traits of emotional detachment (Factor 1) and include *superficial, grandiose, deceitful, lacks remorse, lacks empathy,* and *doesn't accept responsibility*. The remaining 6 items assess antisocial behavior, or social deviance (Factor 2) and include *impulsive, poor behavioral controls, lacks goals, irresponsible, adolescent antisocial behavior,* and *adult antisocial behavior*. To increase the PCL:SV's applicability to nonoffender populations, we used somewhat broader definitions of the latter 2 items than in the PCL–R; they include "actions that did not result in formal contact with the criminal justice system" (Hart et al., 1995, p. 15).

Prior to the study, interviewers completed a full day of training on the PCL:SV conducted by Stephen Hart and Robert Hare. Following this training, interviewers independently viewed more than 10 videotaped cases, scored each on the PCL:SV, and sent their responses to Stephen Hart for reliability analyses and approval.

On the basis of patient interviews and hospital record reviews, each of the 12 PCL:SV items was scored as 2 (*yes, item applies*), 1 (*maybe, item applies to some extent*), or 0 (*no, item does not apply*). Items that could not be completed (with a maximum of 1 item per factor per case) were prorated as recommended by Hart et al. (1995). Only 3.6% of patients' scores were prorated. The PCL:SV's psychometric characteristics in this sample are described in Skeem and Mulvey (2001). For most of the analyses presented in this article, ordinal and continuous PCL:SV scores were used (for items and scales, respectively).

Future Violence

A subsidiary goal of this study was to better define the relationship between factors of psychopathy assessed by the PCL:SV and violence among civil psychiatric patients. To measure violence, we asked patients and collateral informants at each interview whether the patient had engaged in any of eight categories of aggressive behavior (e.g., kicking, hitting) in the past 10 weeks, based on Lidz, Mulvey, and Gardner's (1993) expansion of Strauss and Gelles's (1990) Conflict Tactics Scale. When respondents endorsed an aggressive behavior, they were asked to report the number of times the behavior occurred and to describe the incidents. If multiple aggressive acts were associated with a particular incident, only the most serious act that occurred during the incident was coded. Aggressive acts reported by any information source (patients, collateral informants, or official records) at any follow-up were independently reviewed by two trained coders to obtain a single reconciled report of the act. Any coding disagreements were resolved through discussion in team meetings.

Violence in this study is defined as battery that resulted in physical injury (ranging from bruises to death), sexual assaults, assaultive acts that involved the use of a weapon, or threats made with a weapon in hand. The *future violence* variable reflects whether a patient committed any of these acts of violence in the community during the entire follow-up period (i.e., 1 year after hospital discharge).[4] The 1-year follow-up period was used primarily because psychopathy is a relatively static construct (Harpur & Hare, 1994), so risk associated with psychopathy should not fluctuate across follow-up intervals.

Key Covariates of Psychopathy as Assessed by the PCL:SV

In this study, we also assessed the relationship of a few key covariates of the PCL:SV (see Skeem & Mulvey, 2001) to the factors of psychopathy included in the traditional two- and revised three-factor models. In particular, we explored the associations between the models' factors and indices of criminal history, substance use, and antisocial personality disorder. These analyses provide a context for interpreting findings about the relationship between the three-factor model and violence by estimating the model's specificity to psychopathic personality deviation.

Criminal history and recent violence. Four indices of criminal history were used, including (a) the patient's self-reported frequency of prior arrests since age 15 (coded as none, once, twice, or three or more), (b) the patient's self-reported type of prior arrests since age 15 (coded as none; property and minor crimes; serious crimes including rape, assault, and robbery; or murder), (c) police record of arrests for crimes against persons since age 18 (coded as yes or no), and (d) police record of arrests for crimes against property since age 18 (coded as yes or no). A single index of recent violence was used and reflected the patient's self-report of whether he or she was involved in a violent act (defined in the same way as violence in the preceding section) in the 2 months preceding the index hospital admission.

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[3] Because they were typically completed during Follow-Up 1 and, to a lesser extent, Follow-Up 2, PCL:SV ratings may have been influenced by the occurrence of violence during the first 20 weeks of data collection. Thus, correlations between the PCL:SV and the occurrence of violence (a) during Follow-Up 1 or 2 and (b) during Follow-Ups 3–5 were compared. The former association ($\eta = .34$) was significantly stronger than the latter ($\eta = .24$), $T_1(807) = 2.34$, $p < .05$ (see Steiger, 1980, for tests of differences between nonindependent correlation coefficients). However, the size of the association between the PCL:SV and violence during Follow-Ups 3–5 suggests that the instrument's predictive power was not chiefly based on it being measured concomitantly with violence.

[4] This 1-year violence measure is based on all patients who completed at least one follow-up interview. Because patients completed different numbers of follow-up interviews, each patient did not have an equal likelihood of having a violent act reported. Although it would be more precise to use only those cases that completed all five follow-ups, preliminary analyses suggested that doing so did not appreciably affect the results (see Steadman et al., 1998).

Substance diagnoses and use. On the basis of the research clinician's administration of the *DSM–III–R* checklist, each patient was coded as yes or no for having an alcohol-related diagnosis (i.e., alcohol abuse or dependence) or a drug-related diagnosis (i.e., drug abuse or dependence). During each follow-up interview, patients were questioned in detail about their use of alcohol and other drugs. This information was used to code whether the patient used any alcohol or used any drug during the course of the study.

Antisocial personality disorder. Full hospital records were used to code whether the patient had been diagnosed with antisocial personality disorder.

Results

The chief purpose of this article was to compare the extent to which the traditional two-factor model or Cooke and Michie's (2001) revised three-factor model of psychopathy fit data on a large sample of civil psychiatric patients. After exploring the pattern of relations among PCL:SV items in this sample, we addressed this chief aim by (a) determining the appropriate number of factors based on all 12 PCL:SV items, (b) exploring the appropriateness of deleting the 3 PCL:SV items that Cooke and Michie deleted, (c) assessing the fit of Cooke and Michie's model and comparing its fit with that of simplified versions of the model, and (d) determining the extent to which a simplified version of this model was invariant across gender and race. To address the secondary goal of this article, we then examined the relation between two-factor and three-factor models and future patient violence.

Exploratory Factor Analyses

First, principal-axis factor analyses were performed to characterize the pattern of intercorrelations among the items of the PCL:SV in this civil psychiatric sample (see Bentler & Wu, 1995). Multiple indices (e.g., Kaiser's criterion and Cattell's scree test) suggested a two-factor solution (Kim & Mueller, 1978; Tabachnik & Fidell, 1996; Tinsley & Tinsley, 1987). Because these factors were moderately correlated, a direct oblimin rotation was applied with delta set to zero (Tabachnik & Fidell, 1996).

The two-factor solution's pattern matrix is listed in Table 1. To facilitate interpretation, we ordered and grouped variables in this table by loading size. Table 1 indicates that the two-factor solution is highly similar to the traditional two-factor model (see Hart et al., 1995). Although the order of the components was reversed in this study, the variance accounted for by each factor after rotation suggested that the factors were equally important. The correlation between these antisocial behavior and emotional detachment factors was .61, in keeping with past research (Hare, 1991).

Table 1
Exploratory Component Analysis Pattern Matrix: Two-Factor Model

Item	Antisocial behavior	Emotional detachment
Adult antisocial behavior	.79	−.03
Irresponsible	.72	.02
Impulsive	.69	.03
Adolescent antisocial behavior	.60	−.06
Poor behavioral controls	.53	.13
Lacks goals	.53	.03
Superficial	−.10	.77
Lacks remorse	.08	.74
Deceitful	.11	.61
Grandiose	−.07	.60
Lacks empathy	.08	.59
Doesn't accept responsibility	.26	.51
Explained variance	22.0%	20.9%

Confirmatory Factor Analytic Strategy for Model Comparisons

Next, we compared the fit of this traditional two-factor model with various three-factor models by using CFAs (performed in EQS for Windows Version 5.7b; Bentler & Wu, 1995). Specifically, covariance data matrices were analyzed using the maximum likelihood estimation method. For the CFAs described in this article, we report several relevant indices of goodness of fit for each model because each index addresses a slightly different issue and because "good-fitting models produce consistent results on many different indices" (Ullman, 1996, p. 752). Specifically, for each model, we report (a) absolute fit indices (χ^2, χ^2/df, GFI), (b) relative fit indices (CFI, normed fit index [NFI]), (c) parsimonious fit indices (Akaike's Information Criterion [AIC] and consistent AIC [CAIC]), and (d) noncentrality-based indices (RMSEA; Bentler, 1995; Church & Burke, 1994; Kline, 1998; MacCallum & Austin, 2000; Ullman, 1996). Each of these indices and general suggestions for their interpretation are briefly described in the Appendix. Because the CFIs and NFIs are not easy to interpret and have been misinterpreted in the psychopathy literature, we note here that "models with overall fit indices of less than .90 can usually be improved substantially" (Bentler & Bonett, 1980, p. 600). In other words, minimum values of .90 for CFI and NFI statistics are conventionally required to indicate even "adequate," "satisfactory," or "acceptable" fit (Byrne, 1994; Kline, 1998; Ullman, 1996; for more stringent recommendations, see Hu & Bentler, 1999). Merely to ensure consistency in this article, we used the following heuristic labels to describe fit: *inadequate* for when most values of the GFI, CFI, and NFI are below .90 (RMSEA $>$ .10); *adequate* for when most values are between .90 and .93 (RMSEA = .05–.10); and *reasonably good* for when most values are at or near .95 (RMSEA $<$ .05).

The fit of the traditional two-factor model cannot be directly compared with that of Cooke and Michie's (2001) three-factor model because the former model (a) is based on all 12 of the PCL:SV's items whereas the latter model is based on only 9 items and (b) has a more highly hierarchical structure than the latter model. Specifically, Cooke and Michie (2001) used data on the PCL:SV to cross-validate the three-factor model that they developed using PCL–R data. To make the PCL:SV data consistent with the PCL–R data used to develop the model, Cooke and Michie (2001) dropped 3 of the PCL:SV's 12 items (poor behavioral controls, adolescent antisocial behavior, and adult antisocial behavior). Also on the basis of PCL–R analyses, Cooke and Michie's (2001) three-factor PCL:SV

model is more hierarchical than the traditional two-factor model, in that it contains a superordinate factor and a "testlet" level. Testlets reflect, in part, local item dependencies in which "the same information [may have been] . . . used to score more than one item, and thus, a pair of items may actually represent somewhere between one and two items" (Cooke & Michie, 2001, p. 175). As shown in Figure 1, Cooke and Michie's three-factor model includes the following factors: (a) Arrogant and Deceitful Interpersonal Style, which is specified by 1 item, *deceitful*, and one testlet factor (*superficial, grandiose*); (b) Deficient Affective Experience, which is specified by 1 item, *lacks empathy*, and one testlet factor (*lacks remorse, rejects responsibility*); and (c) Impulsive and Irresponsible Behavioral Style, which is specified by 1 item, *lacks goals*, and one testlet factor (*impulsive, irresponsible*). These intermediate factors load on the superordinate factor of Psychopathy.

To avoid conflating differences between the two- and three-factor models in their number of factors, number of items, and degree of hierarchical complexity, we address these issues separately below. First, we address the issue of whether one, two, or three factors better fit the full (12-item) PCL:SV data. Second, we conducted preliminary analyses to explore the appropriateness of dropping 3 of the PCL:SV items. Third, we tested various versions of the three-factor (9-item) model to determine the ideal level of hierarchical complexity.

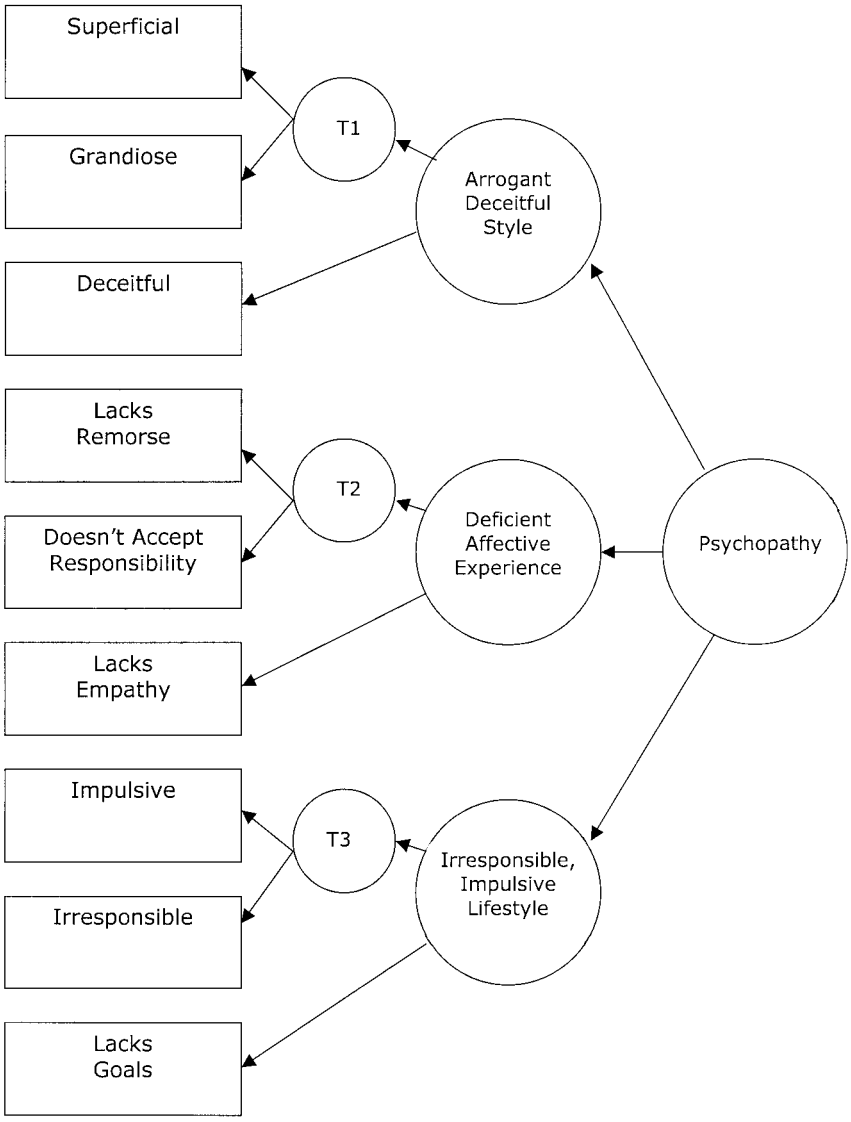

Figure 1. Cooke and Michie's (2001) three-factor model of the Psychopathy Checklist: Screening Version. T1 = Testlet 1; T2 = Testlet 2; T3 = Testlet 3. From "Refining the Construct of Psychopathy: Towards a Hierarchical Model," by D. J. Cooke and C. Michie, 2001, *Psychological Assessment, 13*, p. 181. Copyright 2001 by the American Psychological Association. Adapted with permission of the author.

How Many Factors? Testing the Relative Fit of Nested One-, Two-, and Three-Factor Models

Fitting a Three-Factor, 12-Item Model

To determine the appropriate number of PCL:SV factors, we statistically compared the fit of the traditional two-factor model with that of a nonhierarchical three-factor model that included all 12 PCL:SV items. Cooke and Michie (2001) did not drop the 3 PCL:SV items from their model on the basis of findings that they did not represent the construct of psychopathy well, but rather simply substituted "cognate PCL:SV items . . . for PCL–R items in the original model" (p. 180). Thus, we modeled a three-factor structure that added these 3 items to the Impulsive and Irresponsible Behavioral Style factor. This 12-item, three-factor model adequately fit the data, $\chi^2(51, N = 862) = 445.87$, $p < .01$; $\chi^2/df = 8.74$; GFI = .92; CFI = .90; NFI = .89; AIC = 343.87; CAIC = 50.15; RMSEA = .09.

Fitting Two-Factor and Single-Factor, 12-Item Models

Next, we modeled the traditional two-factor structure in EQS, with 6 items loading on Factor 1 (emotional detachment), 6 items loading on Factor 2 (antisocial behavior; see Table 1 for items), and correlated factors. This traditional two-factor model inadequately fit the data, $\chi^2(53, N = 862) = 516.12$, $p < .01$; $\chi^2/df = 9.74$; CFI = .89; NFI = .87; GFI = .90; AIC = 410.11; CAIC = 104.89; RMSEA = .10.[5] We also modeled a one-factor model with all 12 items loading on a single factor, which also inadequately fit the data, $\chi^2(54, N = 862) = 968.31$, $p < .01$; $\chi^2/df = 17.93$; CFI = .77; NFI = .76; GFI = .81; AIC = 860.31; CAIC = 549.31; RMSEA = .14.

Testing the Models' Relative Fit

In summary, the traditional two-factor model appeared to fit better than the single-factor model and worse than a 12-item, three-factor model. To provide a statistical test of relative model fit, we computed the difference in chi-squares between the traditional two-factor model and these alternative models. This test indicated that the traditional two-factor model fit significantly better than the one-factor model, $\Delta\chi^2(1, N = 862) = 452.19$, $p < .01$, and significantly worse than the three-factor model, $\Delta\chi^2(1, N = 862) = 70.25$, $p < .01$. This finding suggests that a three-factor model better fit the data than the traditional two-factor model. Notably, similar results were obtained when 9-item versions of the two- and three-factor models were statistically compared.

How Many Items? Exploring the Appropriateness of Dropping Three Items

Having determined that three factors best described the data, we explored the appropriateness of dropping the three PCL:SV items (adult antisocial behavior, adolescent antisocial behavior, and poor behavioral controls) that Cooke and Michie (2001) dropped from the traditional Antisocial Lifestyle factor. Although definitively addressing this issue (i.e., via IRT analyses) exceeds the scope of this article, we conducted exploratory analyses to estimate the extent to which the three dropped items and the three retained items (impulsive, lacks goals, and irresponsible) from the Antisocial Lifestyle factor belonged with general criminality or psychopathy. Specifically, these six PCL:SV items were entered in an exploratory factor analysis along with patients' total PCL:SV scores, arrest frequency, and antisocial personality disorder diagnoses. Multiple indices suggested an oblique, two-factor solution in which the dropped items loaded with arrest and antisocial personality disorder and the retained items loaded with total psychopathy scores. Moreover, correlational analyses suggested that the dropped items were more highly associated with indices of criminality than the retained items (e.g., the average correlation between antisocial personality disorder and dropped items was .27, whereas that with retained items was .17).

Hierarchical Complexity: Testing and Refining the Three-Factor, Nine-Item Model

Testing Cooke and Michie's (2001) Model

Having determined that three factors fit the data and that dropping 3 items might be appropriate, we assessed the fit of Cooke and Michie's (2001) PCL:SV model, as depicted in Figure 1. This factor structure was found to be a reasonably good fit to the data, $\chi^2(22, N = 869) = 194.14$, $p < .01$; $\chi^2/df = 8.82$; CFI = .94; NFI = .94; GFI = .95; AIC = 150.14; CAIC = 23.25; RMSEA = .10. In fact, the model appeared to fit better than the 12-item, three-factor model, suggesting that omitting 3 items improved fit.

Seeking a More Parsimonious Three-Factor Model

That Cooke and Michie's (2001) hierarchical model for the PCL:SV has only nine indicators for seven latent factors raises questions about overfitting associated with this model. Thus, additional models were estimated to determine whether various levels of this hierarchical model could be deleted without significantly reducing its fit (following Cooke & Michie, 2001). The highest level in the model is the superordinate Psychopathy factor. Thus, first, a model in which this superordinate factor was deleted and the three intermediate factors were correlated was estimated. This model was found to be a reasonably good fit to the data, $\chi^2(21, N = 869) = 191.97$, $p < .01$; $\chi^2/df = 9.14$; CFI = .94; NFI = .94; GFI = .95; AIC = 149.97; CAIC = 28.86; RMSEA = .09. In fact, deleting the superordinate factor did not significantly degrade the model's absolute fit, $\Delta\chi^2(1, N = 869) = 2.07$, *ns*.

Second, a model was estimated in which the intermediate factor level was deleted. When the three intermediate factors were removed, the resulting model inadequately fit the data, $\chi^2(24, N = 869) = 405.67$, $p < .01$; $\chi^2/df = 16.90$; CFI = .87; NFI = .86; GFI = .91; AIC = 357.66; CAIC = 219.26; RMSEA = .14. Deleting these intermediate factors significantly and substantially degraded the absolute fit of the model, $\Delta\chi^2(3, N = 869) = 211.53$,

[5] These fit indices differ slightly from those reported in Skeem and Mulvey (2001) because (a) one outlier was deleted and (b) prorated item scores (calculated following Hart et al., 1995) were used for this article. In prior work, we tentatively concluded that the fit of the traditional two-factor model was adequate but "not ideal."

Table 2
Goodness-of-Fit Indices for Models Tested

Model (No. of items)	χ^2	*df*	CFI	NFI	GFI	AIC	CAIC	RMSEA
One-factor (12)	968.3	54	.77	.76	.81	860.3	549.3	.14
Traditional two-factor (12)	516.1	53	.89	.87	.90	410.1	104.9	.10
Three-factor (12)	445.9	51	.90	.89	.92	343.9	50.1	.09
Cooke and Michie (2001) three-factor (9)	194.1	22	.94	.94	.95	150.1	23.3	.10
No superordinate (9)	192.0	21	.94	.94	.95	150.0	28.9	.09
No factors (9)	405.7	24	.87	.86	.91	357.7	219.3	.14
No testlets (9)	240.4	25	.93	.92	.94	190.4	46.2	.10
Simplified three-factor (9)	235.7	24	.93	.92	.94	187.7	49.2	.10

Note. CFI = comparative fit index; NFI = normed fit index; GFI = goodness-of-fit index; AIC = Akaike's Information Criterion; CAIC = Bozdogan's consistent AIC; RMSEA = root-mean-square error of approximation.

$p < .01$. Third, when the three testlet factors were deleted, the resulting model fit the data adequately, $\chi^2(25, N = 869) = 240.43$, $p < .01$; $\chi^2/df = 9.62$; CFI = .93; NFI = .92; GFI = .94; AIC = 190.43; CAIC = 46.24; RMSEA = .10. However, the difference between the chi-square values indicated that dropping the testlets significantly degraded the model's absolute fit, $\Delta\chi^2(3, N = 869) = 46.20$, $p < .01$.

In part on the basis of these results, we adopted a "simplified" three-factor model for the test of invariant factor structure, which is described below. This model deleted the superordinate factor and the testlet level. The testlet level was deleted for three primary reasons. First, it is desirable to have a minimum of two indicators per factor (e.g., Kenny, 1998; Nunnally & Bernstein, 1994). Although there are nine indicators of four factors without the testlet level, there are only nine indicators of seven factors when it is included. Second, because chi-square tends to increase with model complexity and the chi-square difference test is sensitive to sample size, even a trivial decrement in fit with the deletion of the testlet level could be significant given the size of our sample. In fact, a comparison of the full and testlet-free models' relative fit indices (see Table 2) reveals only a slight decrement in fit with the deletion of the testlets, despite the statistical significance of the $\Delta\chi^2$. Third, we wished to simplify the remaining tests for invariant factor structure by using this simplified testlet-free model, which is depicted in Figure 2. Indices of goodness of fit for each of the models reported earlier (including this simplified model) are provided in Table 2.

Testing for Invariant Factor Structure Across Gender and Race

Most research on the PCL measures, particularly the PCL and the PCL–R, has been conducted with adult, male, Caucasian prisoners. Over recent years, questions have been raised about the construct validity of the PCL measures with other populations, particularly with women and members of ethnic and racial minorities (for a review, see Harris, Skilling, & Rice, 2002). Thus, preliminary analyses were completed to assess the extent to which the three-factor measurement model of the PCL:SV fits this study's data on female and non-White patients (see Byrne, 1994, chap. 9). A two-stage analytic process was used in EQS to determine whether the simplified three-factor structure of the PCL:SV was invariant across gender and race. Specifically, analyses were performed to determine whether (a) the factor loadings of the PCL:SV items and (b) the covariances among the factors were equivalent across groups. Highly restrictive tests of whether errors and disturbances are equal across these groups were not completed.

First, gender-related analyses were performed. A model in which the factor loadings of the PCL:SV items on the three factors were constrained to be equal for male and female patients adequately fit the data, $\chi^2(54, N = 869) = 271.31$, $p < .01$; $\chi^2/df = 5.02$; CFI = .92; NFI = .91; GFI = .93; RMSEA = .07.[6] Next, a model in which the factor loadings of the items and the covariances among the three factors of psychopathy were constrained to be equal across gender was analyzed. This model was also found to adequately fit the data, $\chi^2(57, N = 869) = 281.28$, $p < .01$; $\chi^2/df = 4.93$; CFI = .92; NFI = .90; GFI = .93; RMSEA = .07. A comparison of the fit of this model with one in which no such constraints were imposed (see Kline, 1998, chap.6; Ullman, 1996) indicated no decrement in fit, $\Delta\chi^2(9, N = 869) = 11.46$, *ns*. In keeping with Hart et al. (1995), who found similar PCL:SV factor structures in male and female participants, these results suggest that the three-factor model of psychopathy applies across gender.

Next, analyses related to race were performed. The model in which the factor loadings of the PCL:SV items on the three factors were constrained to be equal for White and non-White patients adequately fit the data, $\chi^2(54, N = 869) = 264.19$, $p < .01$; $\chi^2/df = 5.39$; CFI = .93; NFI = .91; GFI = .93; RMSEA = .07. When the covariances among the three factors were also constrained to be equal across groups, this model also fit adequately, $\chi^2(57, N = 869) = 268.72$, $p < .01$; $\chi^2/df = 4.71$; CFI = .93; NFI = .91; GFI = .93; RMSEA = .07. As before, a comparison of the fit of this model in which item loadings and factor path coefficients were constrained to be equal with one in which no

[6] For both gender- and race-related analyses, a second set of analyses were performed in which the factor loading of an item for each of the three factors that was different from that in the first set was fixed to 1.0 to identify the model. This allowed equality constraints to be imposed on variables that had received no such constraints in the first set of analyses. The results of these analyses supported those reported in the text.

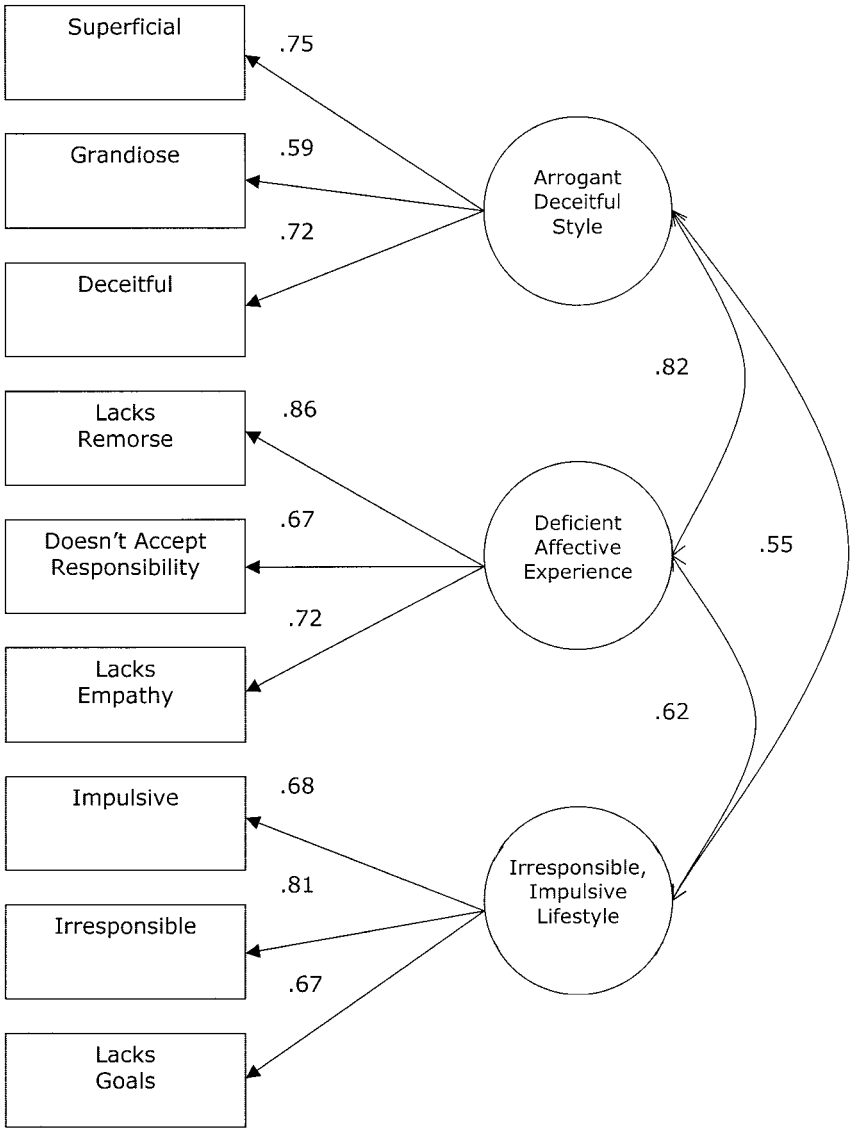

Figure 2. Simplified three-factor model of the Psychopathy Checklist: Screening Version.

such constraints were imposed indicated no decrement in fit, $\Delta\chi^2(9, N = 869) = 11.48$, *ns*.

Relation Between the Three-Factor Model and Patient Violence

Given the finding that the three-factor model fit the PCL:SV data better than the traditional two-factor model, we performed analyses to describe the predictive power and correlates of the revised three-factor model. Specifically, we performed analyses to determine (a) the predictive power of the 9-item, three-factor model for patient violence during the 1-year follow-up (future violence) and (b) the extent to which each of the three factors were related to indices of criminal history, substance abuse, and antisocial personality disorder. For the purpose of these analyses, items loading on each factor for the two- and three-factor models were summed to produce scale scores (e.g., for the traditional 12-item, two-factor model, Items 1–6 were scored to produce a Scale 1, emotional detachment score). In practice, clinicians use summed scale scores to represent the factors rather than factor scores per se.

Power in Predicting Patient Violence

Receiver operating characteristic (ROC) analyses were conducted to assess the power of the models in predicting patient violence. ROC analyses calculate and plot the true positive rate by the false positive rate of a test at every possible threshold in predicting a criterion. Because they describe the predictive accuracy of a test across a range of possible threshold values, ROC analyses are less dependent on the base rates of violence in a sample than are such traditional measures for assessing predictive accuracy as correlation coefficients (e.g., Mossman, 1994a, 1994b;

Table 3
Pattern of Correlates for Two- and Three-Factor Psychopathy Checklist: Screening Version (PCL:SV) Scales

Covariate	Traditional 12-item PCL:SV total	Factor 1: Emotional Detachment	Factor 2: Antisocial Behavior	Cooke and Michie (2001) 9-item PCL:SV total	Factor 1: Arrogant–Deceitful Interpersonal Style	Factor 2: Deficient Affective Experience	Factor 3: Impulsive–Irresponsible Lifestyle
Future violence (AUC)	.74	.68	.74	.70	.64	.67	.66
Future violence (*r*)	.36	.28	.38	.30	.24	.26	.25
Baseline violence (*r*)	.27	.21	.25	.21	.17	.22	.15
Arrest frequency (*r*)	.45	.29	.50	.37	.24	.29	.38
Arrest type (*r*)	.43	.28	.48	.36	.23	.28	.36
Person arrest (*r*)	.29	.23	.27	.26	.15	.25	.23
Property arrest (*r*)	.27	.19	.29	.24	.15	.20	.25
Alcohol diagnosis (*r*)	.33	.21	.37	.28	.19	.20	.31
Drug diagnosis (*r*)	.30	.22	.31	.26	.20	.20	.25
Alcohol use (*r*)	.15	.13	.14	.15	.11	.13	.14
Drug use (*r*)	.33	.23	.35	.28	.19	.23	.28
Antisocial personality (*r*)	.31	.25	.30	.26	.24	.21	.21

Note. All bivariate associations are significant at the $p < .01$ level; all area under the curve (AUC) values are significant at the $p < .001$ level.

Rice & Harris, 1995). The area under the curve (AUC) generated in ROC analyses may be interpreted as the probability of correctly distinguishing a (violent, nonviolent) pair.

As shown in Table 3, total scores on the 9-item, three-factor model ($r = .30$, AUC = .70) were significantly less predictive of future violence than total scores on the 12-item, traditional two-factor model ($r = .36$, AUC = .74). The difference between correlation coefficients was significant, $T_2(868) = 7.85$, $p < .01$ (see Steiger, 1980).[7] As noted earlier, Skeem and Mulvey (2001) found in prior research that the 6-item, antisocial behavior factor in the traditional model explained more than the lion's share of the variance in the PCL:SV's prediction of violence. In the three-factor model, half of the antisocial behavior factor's items were deleted on the basis of the assumption that these nonspecific indices of past criminality were poor indicators of psychopathy per se. The resulting factor, Impulsive–Irresponsible Lifestyle (IIL; $r = .25$, AUC = .66) was significantly less predictive of violence than the original antisocial behavior factor ($r = .38$, AUC = .74), $T_2(868) = 8.78$, $p < .01$. This finding does not necessarily argue against the validity of the three-factor model, however, because the PCL:SV is first and foremost a measure of psychopathic personality disorder, not a violence risk assessment tool. Removing PCL:SV items that are saturated with criminality that could be based on a host of factors other than psychopathy may simultaneously improve the specificity of the PCL:SV in assessing psychopathic personality deviation and reduce the PCL:SV's capacity to predict future violence.

With these issues in mind, we assessed the extent to which the two-factor model's antisocial behavior factor and the three-factor model's IIL factor explained a disproportionate amount of the variance in predicting patient violence. In the traditional model, the partial correlation between the traits of emotional detachment and violence was only .08, when their association with the antisocial behavior factor was controlled for. However, the antisocial behavior factor's partial correlation with violence was still .27, when its association with the emotional detachment factor was controlled for, which arguably reflects the core traits of psychopathy. In the three-factor model, the Arrogant and Deceitful Interpersonal Style and the Deficient Affective Experience factors' multiple partial correlation with violence was .16, when their association with the IIL factor was controlled for. Similarly, the IIL factor's partial correlation with violence was only .12, when its association with the other two factors was controlled for.

In short, although the revised three-factor model is somewhat less predictive of violence than the traditional two-factor model, this reduction in predictive power seems largely attributable to an attenuated relationship between the antisocial behavior or IIL factors and violence. The revised model's version of this factor may more specifically measure psychopathic personality deviation than the traditional model. The revised factor's improved specificity to psychopathy apparently decreases its power in predicting violence. These results suggest that the three factors in the revised model are more equal partners in predicting violence than the traditional two-factor model, in which most of the variance in violence prediction was based on nonspecific indices of criminality captured by the antisocial behavior factor.

[7] As one reviewer for this article noted, because the two- and three-factor models are not unidimensional, the best prediction may be achieved using multivariate analyses in which additive as well as interactive terms were included. Thus, we completed two sequential stepwise logistic regression analyses (for the two- and three-factor models) to assess the incremental validity of the interaction among the PCL:SV factors in predicting violence after we controlled for the main effects of the factors. The analyses indicated that there was a good fit based on the main effects of the factors alone and that the interaction between factors was typically not significant and did not enter the model. In fact, of five potential interactions (one in the two-factor analysis and four in the three-factor analysis), only the interaction between the IIL and Arrogant and Deceitful Interpersonal Style factors was significant, and its effect was small ($\beta = -.08$, $p < .05$). These findings suggest that the joint presence of the factors in both the two- and three-factor models is not necessary to provide maximal power in predicting violence in this sample. For this reason, we emphasize the relation between total scores and future violence in the text.

Pattern of Relationships to Criminal History and Substance Abuse

The results shown in Table 3 also suggest that the IIL factor of the revised model is less heavily associated with nonspecific indices of past misconduct than the traditional antisocial behavior factor. For example, the antisocial behavior factor is strongly (r = .50) associated with the frequency of past arrests, whereas the IIL factor is only moderately so (r = .38). The IIL factor also overlaps less with diagnoses of antisocial personality disorder than the antisocial behavior factor (rs = .21 and .30, respectively).

Discussion

MacCallum and Austin (2000) recently observed that researchers who apply confirmatory factor analytic techniques "do not seem adequately sensitive to the fundamental reality that there is no true model . . . and that the best one can hope for is to identify a parsimonious, substantively meaningful model that fits observed data adequately well" (p. 213). In this study of civil psychiatric patients, we sought to identify a good-fitting, substantively meaningful, and parsimonious model of psychopathy by comparing competing models of psychopathy on their goodness of fit, theoretical coherence, and pattern of relationships with external variables and by developing a simplified version of the most promising model. The results indicate that Cooke and Michie's (2001) three-factor model of psychopathy is more plausible than the traditional PCL two-factor model with these patients because it better describes the structure of the PCL:SV and more specifically assesses personality deviation. In this study, psychopathy was best described by a PCL:SV item set that represented the factors Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, and Impulsive and Irresponsible Behavioral Style. The items excluded from this model are features of functioning (e.g., poor behavior controls, antisocial behavior) that could be caused by factors other than personality pathology. Given its relative emphasis on the specific interpersonal and affective traits of psychopathy, the three-factor model is thus more congruous with classic, personality-based theories of psychopathy (e.g., Cleckley, 1976; McCord & McCord's, 1964 "guiltless and loveless" psychopath) than the traditional model.

In fact, the three-factor model addresses many of the theoretical and empirical questions raised about the adequacy of the traditional two-factor model. The development and refinement of the PCL measures with chiefly criminal populations arguably "loaded" the measures with indices of antisocial behavior that were not central to seminal theories of psychopathy. The increasing dominance of the PCL tools in psychopathy assessment over the past decade certainly has advanced the field by facilitating the study of, and communication about, psychopathy. However, to the extent that the very meaning of psychopathy has become equated with these "gold standard," but fallible, measures, there has been some conceptual drift away from personality-based theories of psychopathy.

The three-factor model tested here may correct for some of this drift. As noted by Harris et al. (2002):

> Hare's Psychopathy Checklist is the best available tool for the measurement of psychopathy. However, that is not to say that there is no room for improvement. The PCL–R is essentially an atheoretical tool, and it may be that future versions of the PCL–R, or more theoretically-based measures of the construct of psychopathy, will lead to better identification of true psychopaths. (p. 240)

Compared with the traditional two-factor model, the three-factor model of psychopathy places less emphasis on antisocial behavior; is more weakly associated with nonspecific indices of social deviance; and, more important, appears to better fit data on criminal (Cooke & Michie, 2001) and civil psychiatric populations. Using these findings to inform revisions of existing theory and measures should substantially enhance understanding of psychopathy. However, these revisions must also be informed by studies of "normal" community samples. If we treat psychopathy less as a construct tied to criminality or psychopathology and place it back in its original conceptual domain as a form of personality deviation, then the population of choice for studying and clarifying the construct is the general population.

Ultimately, the way in which existing theories and measures of psychopathy are revised will affect the utility of psychopathy measures for predicting violence. A key secondary finding of this study is that the three-factor model's exclusion of nonspecific behavioral items to more "purely" assess psychopathy significantly reduces the power of the PCL:SV in predicting violence. This is an understandable feature of the revised model, given that the excluded items partially reflect one of the strongest predictors of violent behavior (i.e., indicators of past violence). This outcome is only marginally relevant for assessing the utility of the revised model, however, because the primary aim of the PCL measures is not to predict violence but to assess psychopathic personality disorder. Thus, deleting PCL:SV indices of past misbehavior that could be based on a host of factors other than psychopathy may both improve the specificity of the measure in assessing psychopathic personality deviation and reduce the measure's ability to predict violence.

In fact, the field's understanding and assessment of both psychopathy and violence risk may be improved if these two issues were studied as related but separable entities. The items excluded from the three-factor model, despite their nonspecificity, are highly predictive of patient violence. A useful line of research could be initiated to explore exactly what nonpsychopathic construct these items are tapping, given its promise in predicting violence. Skeem and Mulvey (2001) have speculated that such PCL:SV items tap a higher order, nonpsychopathic construct of general lack of self-control that strongly predicts patient violence. Although the results of this study seem to provide some support for this speculation, future research must address the issue systematically. Such research would have important implications, given that attributing violence potential that is based on a higher order construct to psychopathy may invite inappropriate judgments that a patient is morally "bad" or untreatable.

This study suggests several other avenues for future research. First, although the three-factor model's deletion of several PCL:SV items is consistent with principal theories of psychopathy, evidence to suggest that these particular items should be excluded is limited. In the present study, an exploratory factor analysis suggested that these deleted items were more highly associated with indices of antisociality than psychopathy per se. Moreover,

the three-factor model appeared to fit the data substantially better when these items were excluded than when they were not. Nevertheless, Cooke and Michie (2001) initially excluded these items only because they were cognate items for those that they dropped from the PCL–R. Moreover, an IRT analysis of PCL:SV data (Cooke et al., 1999) suggested that at least one of the items dropped (e.g., adult antisocial behavior) provides a substantial amount of information about psychopathy. Additional IRT analyses of the PCL:SV may aid in resolving this issue.

Second, in light of the facts that a substantial proportion (25%) of the PCL:SV's items were dropped and five additional latent factors were added to create the three-factor model of psychopathy, future research could focus on developing new items to better represent these factors (see Cooke & Michie, 2001). As previously noted, despite the reasonable fit of the model, having only nine indicators for seven latent factors raises serious questions about parsimony and overfitting. Until these questions are addressed and a greater number of reliable and valid PCL:SV items are developed, it may be wise to adopt for psychiatric patients the simplified three-factor model examined here, which excludes the superordinate and testlet level to assess only three latent factors. Although removing the testlet (but not superordinate) level significantly reduced the model's fit, the magnitude of the difference in fit between models appears small (see Table 2), particularly in light of concerns about overfitting the complex model. Moreover, the testlets included in the complex model specify overlap in the content of particular items that may not be particularly useful in increasing one's understanding of psychopathy. Arguably, if PCL:SV items actually do form testlets, their scoring criteria should be rewritten to clearly distinguish between them (see Cooke and Michie, 2001).

In a related vein, when theoretically and empirically informed revisions of the PCL measures are completed, appropriate cut scores for diagnosing psychopathy based on the three-factor PCL:SV model can be determined. This will permit an assessment of whether the base rate of apparent psychopathy as defined by the revised model is lower than that as defined by the traditional two-factor PCL:SV model. This will aid in determining whether the revised model is more specific in diagnosing psychopathy in civil psychiatric patients than the traditional model.

Third, the extent to which the three-factor model of psychopathy applies across different demographic subgroups remains an important issue for future investigation. In this study, no substantial differences were detected across gender and racial groups in the factorial measurement (i.e., relations among scale items and factors) of the PCL:SV or its three-factor structure (i.e., relations among dimensions of psychopathy). These findings are consistent with those of Cooke, Kosson, and Michie (2001), who conducted the only similar confirmatory factor analytic study of which we are aware. As Cooke et al. noted, however, comparability of factor structure is a "necessary but not sufficient" condition for ensuring absolute generalizability of a construct across groups. For example, even when investigators find structural equivalence for a construct, there may be differences in the metric of a latent trait that could be detected with IRT analyses (D. Cooke, personal communication, November 12, 2001). Given conflicting empirical findings (cf. Cooke et al., 2001; Newman & Schmitt, 1998; Newman, Schmitt, & Voss, 1997), the issue of whether models of psychopathy are truly consistent across gender and race must still be considered an open question.

Fourth, and most important, future research must focus on replicating and validating competing models of psychopathy. Although the results of this study suggest that the three-factor model is more plausible than the two-factor model, none of the models tested here provided a good fit to the data. This study is among the first to assess the three-factor model's applicability to civil psychiatric patients. To address this study's limitations (e.g., a 29% refusal rate), researchers should replicate its results in other settings. Moreover, although internal structure analysis is a necessary condition for validating a construct, it is certainly not a sufficient one. The essential meaning of a construct inheres in its demonstrated relations with other constructs in a nomological network (see Cronbach & Meehl, 1955; MacCorquodale & Meehl, 1948). This study suggests that, as expected, the Impulsive and Irresponsible Behavioral Style factor correlated more highly than the other factors with indices of criminal history, substance abuse, and antisocial personality disorder. More sophisticated correlational and experimental research is needed, however, to determine whether the revised indicators of psychopathy are anchored in theoretically consistent ways to a broad assortment of key psychophysiological, clinical, personality, and other variables. For example, does the Deficient Affective Experience factor relate uniquely to deficits in processing and physiological measures of fearlessness? Does it correspond more closely than the other factors with observational ratings of detached, autonomous interpersonal behavior?

As we suggested earlier, such tests of construct validity ideally would be conducted with nonclinical, noncriminal samples. The "best" or "purest" model of psychopathy that would describe a random sample of the population remains to be determined. Community-based research is essential to reduce the risk that our understanding of psychopathy partially reflects artifacts of the population in which it is studied.

In summary, this study is intended to inform the continued exchange between theory and data that is essential for advancing our understanding of the construct of psychopathy. Given their wide recognition, the PCL measures may be used as valuable tools for this exchange. More research of this sort is clearly needed, particularly with community-based samples, given the centrality of psychopathy to the fields of personality disorders and violence risk assessment. Systematic refinements in theory and measures of psychopathy will help prevent misapplications and misuses of a powerful label.

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Appendix

Goodness-of-Fit Indices

Absolute Fit Indices

Chi-Square and Chi-Square/Degrees of Freedom

Maximum likelihood estimation minimizes a discrepancy function between the observed covariance matrix and the model-estimated covariance matrix, which when multiplied by a constant depending on sample size can be interpreted as a chi-square statistic with degrees of freedom equal to the difference between the number of observations and parameters (Bentler, 1995; Kline, 1998). A low and nonsignificant chi-square suggests that the data are consistent with the model being tested. However, because this study's large sample size is highly likely to inflate chi-square and lead to underestimates of fit, χ^2/df is also reported. Marsh and Hocevar (1985) suggested that χ^2/df ratios of 2:1 to 5:1 generally indicate an acceptable fit.

Goodness-of-Fit Index

The goodness-of-fit index calculates a weighted proportion of the variance in the observed covariance matrix that is accounted for by the estimated covariance matrix (Ullman, 1996). It ranges from 0 (*poor fit*) to 1 (*perfect fit*) and is analogous to a squared multiple correlation in multiple regression (Kline, 1998). It is computed as the ratio of the sum of the squared weighted variances from the estimated model covariance matrix divided by the sum of the squared weighted variances from the observed covariance matrix, or $tr(\hat{o}W\hat{o})/tr(s'Ws)$, and W is the weight matrix selected by the estimation method (Ullman, 1996).

Relative Fit Indices

Relative fit indices estimate model fit in terms of improvement, typically over a null model of uncorrelated or independent variables (i.e., no common factors). Estimating fit over this null model permits nonnested models to be compared (Church & Burke, 1993). Values of the normed fit index and comparative fit index greater than at least .90 are generally considered indicative of adequate fit (Bentler, 1995; Ullman, 1996), although values of .95 have been more recently recommended for the comparative fit index (Hu & Bentler, 1999).

Bentler–Bonett Normed Fit Index

This index is computed as $(\chi^2_{null} - \chi^2_{model})/\chi^2_{null}$ (Ullman, 1996). The value of the normed fit index indicates the "proportion in the improvement of the overall fit of the [estimated] model relative to the null model" (Kline, 1998, p. 129).

Bentler's Comparative Fit Index

This index assesses fit slightly differently by using the noncentral chi-square distribution with noncentrality parameters, τ_i. It may be less sensitive to sample size than the normed fit index (Kline, 1998). As noncentrality parameters increase, so does the model's misspecification (if the estimated model is perfect, $\tau_i = 0$). The comparative fit index is computed as $1 - (\tau_{model}/\tau_{null})$, where $\tau_{null} = \chi^2_{null} - df_{null}$ and $\tau_{model} = \chi^2_{model} - df_{model}$ (Ullman, 1996).

Parsimonious Fit Indices

Parsimonious fit indices "take into account both the statistical goodness of fit and the number of parameters that have to be estimated to achieve that degree of fit" (Bentler, 1995, p. 92). The two fit indices described below are intended to balance goodness of fit against model parsimony. For these indices, small values (relative to competing models) indicate better fit.

*Akaike's Information Criterion (*AIC*)*

The AIC is simply the estimated model's chi-square value minus two times the model's degrees of freedom.

Bozdogan's Consistent AIC

The consistent version of the AIC is the estimated model's chi-square value minus the model's degrees of freedom multiplied by $(ln\ N + 1)$.

Noncentrality-Based Index

Noncentrality parameters test the model's chi-square against a noncentral chi-square rather than against a chi-square for a perfect fit (i.e., $\chi^2 = 0$). The underlying rationale is that, even in the population, a perfect fit is unlikely because some variables will inevitably be omitted from the model and the variance for predicted variables will not be 100% explained. The root-mean-square error of approximation (RMSEA) can be calculated as the square root of $[(\chi^2_{model}/df_{model} - 1)/(N - 1)]$. For the RMSEA, smaller values indicate better fit, with good models having a value of .05 or less and adequate models having values of .10 or less.

Received March 20, 2001
Revision received June 25, 2002
Accepted August 6, 2002 ■