A comparison of factor models on the PCL-R with mentally disordered offenders - The development of a four-factor model

A COMPARISON OF FACTOR MODELS ON THE PCL-R WITH MENTALLY DISORDERED OFFENDERS

The Development of a Four-Factor Model

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For more than a decade, researchers and practitioners have generally accepted a two-factor model for the Psychopathy Checklist–Revised (PCL-R) composed of core personality features and an antisocial lifestyle. Very recently, Cooke and Michie (2001) proposed a three-factor solution that divided the core personality features into two dimensions while eliminating antisocial behavior. This study of male, mentally disordered offenders ($N = 96$) directly compared factor models via confirmatory factor analysis (CFA). When using testlets to combine theoretically similar items into single ratings, the nested three-factor model was an excellent fit. Of importance, the development of a four-factor model with the inclusion of antisocial items also produced an excellent fit. Combined with recent research, these findings have important ramifications for the construct validity of the PCL-R.

Keywords: psychopathy; CFA; mentally disordered offenders

Psychopathy has proven to be an important construct in the evaluation of mentally disordered offenders, especially for risk assessment. Offenders with high scores on the Psychopathy Checklist–Revised (PCL-R) and the Psychopathy Checklist: Screening Version (PCL:SV) have demonstrated high levels of violent recidivism (Barbaree, Seto, Langton, & Peacock, 2001; Glover, Nicholson, & Hemmati, 2002; Hemphill, Hare, & Wong, 1998; Salekin, Rogers, & Sewell, 1996), poor treatment outcomes (Loving, 2001; Ogloff, Wong, & Greenwood, 1990; Reid & Gacono, 2000), and a strong likelihood of committing institutional infractions (Buffington-Vollum, Edens, Johnson, & Johnson, 2002; Hicks, Rogers, & Cashel, 2000). Moreover, high scores on the PCL-R predict spouse abuse (Goodman, Dutton, & Bennett, 2000; Hilton, Harris, & Rice, 2001) and using violence for personal gain (Cornell et al., 1996). Given the ominous outcomes associated with psychopathy, understanding its underlying dimensions is critical to both construct validation and its forensic applications. The next sections examine both the traditional two-factor PCL-R model and the recently proposed three-factor model.

THE TWO-FACTOR MODEL

Cleckley (1941) developed the classic conceptualization of psychopathy. Influenced by psychodynamic theory, his description of psychopathy included both personality and behavioral variables. Based on Cleckley's initial work, Hare (1985) developed the Psychopathy Checklist, a semistructured interview designed to assess specific personality and behavioral characteristics most representative of psychopathy. The integration of personality and behavioral characteristics, á la Cleckley, forms the foundation for the two-factor model of the PCL-R (Hare, Hart, & Harpur, 1991). The initial construct validity of the PCL-R was established through a common factor analysis with oblique rotation in a sample of 925 prisoners and 356 forensic inpatients (Hare et al., 1990). A two-factor solution was found: F_1, which

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was labeled the selfish, callous, remorseless use of others; and F_2, which was labeled chronic antisocial behavior. The two-factor model has been widely utilized in studies of adult prisoners, incarcerated adolescents, and mentally disordered offenders (Hare et al., 1991; Rogers et al., 2000).

Despite extensive research, few studies have tested the two-factor model with rigorous confirmatory factor analysis (CFA). CFA provides two major advantages over exploratory factor analysis: It allows investigators to test statistically (a) the fit of a specified model and (b) the comparative fit of competing theoretical models. In the first CFA study evaluating the two-factor model, Brandt, Kennedy, Patrick, and Curtin (1997) used a modified version of the PCL-R with 130 adolescents recently released from a secure residential facility. The authors concluded "the value of the Comparative Fit Index [CFI] = .83, indicating a moderate fit with the predicted factor structure" (p. 432). However, this conclusion is overstated given the inadequate CFI (i.e., < .90). Subsequently, Darke, Kaye, Finlay-Jones, and Hall (1998) were unable to validate the two-factor model via CFA with a sample of 376 Australian prisoners. Similarly, McDermott et al. (2000) failed to confirm the two-factor PCL-R model with a CFA on 326 male prisoners and 620 substance-abusing patients. Most recently, Cooke and Michie (2001) used a series of CFAs in attempting to confirm the PCL-R two-factor model with 1,389 individuals from correctional and forensic settings in North America; however, the data failed to confirm the traditional two-factor model (Non-Normed Fit Index [NNFI] = .75 and CFI = .78).

THE THREE-FACTOR MODEL

Given the discouraging results for the two-factor model, Cooke and Michie (2001) attempted to build a better fitting model for the PCL-R through the use of testlets. Testlets are designed to counteract local dependence, which occurs when several individual items are more strongly associated with each other than the underlying trait (Steinberg & Thissen, 1996). The creation of testlets combines theoretically similar items into a single rating. Cooke and Michie (2001)

combined 13 items into six testlets that were tested on 2,067 individuals. They produced a three-factor model with excellent fit (Normed Fit Index [NFI] = .95 and NNFI = .94).

The Cooke and Michie (2001) testlet model was composed of three factors: Arrogant and Deceitful Interpersonal Style (ADI), Deficient Affective Experience (DAE), and Impulsive and Irresponsible Lifestyle (IIL). They concluded that each of the three factors (i.e., ADI, DAE, and IIL) were hierarchically related and nested under a superordinate psychopathy factor. This model is fundamentally different from the traditional two factors in (a) its disaggregation of Factor 1 into two discrete dimensions, accentuating psychopathic personality traits (see Cleckley, 1941; Jackson, Rogers, Neumann, & Lambert, 2002; Lilienfeld, 1998) and (b) its de-emphasis of criminal behavior.

The three-factor model has started to generate important research using current PCL instruments (i.e., PCL-R and PCL:SV). Tubb (2002), with a sample of 127 Hispanic federal inmates, found the three-factor hierarchal model produced a better fit than the traditional two-factor model. Likewise, Jackson et al. (2002) found the hierarchal three-factor model was a good fit (CFI = .89, Robust Comparative Fit Index [RCFI] = .98) in their sample of 119 incarcerated women. Research on the three-factor model also has been applied to the screening version of the PCL-R, the PCL:SV. Hill, Neumann, and Rogers (in press) found both the Hare (1991) and Cooke and Michie (2001) models had an adequate fit in a sample of mentally disordered offenders. Of interest, they found the ADI and IIL factors were significantly related to institutional aggression.

The three-factor model, with its emphasis on personality traits, has important implications for the etiology of psychopathy. Christian, Frick, and Hill (1997) found children with high levels of callous traits engage in more antisocial behavior with frequent police contacts. Moreover, these children are less distressed by their antisocial conduct than are children and adolescents without these characteristics (Barry et al., 2000). Although the temporal stability of psychopathy has not been rigorously tested (for reviews, see Edens, Skeem, Cruise, & Caufmann, 2001; Seagrave & Grisso, 2002), personality characteristics may play a critical role in understanding the potential continuity between adolescent and adult antisocial behavior.

CURRENT STUDY

The current study is designed to test the underlying dimensions of the PCL-R in a sample of mentally disordered offenders. To achieve this goal, CFAs will be calculated for both the two-factor and three-factor models of the PCL-R. A critical aspect of this article is the test of a four-factor model that includes items related to antisocial behavior (Hare, 2003). Consistent with recommendations by Hu and Bentler (1999), the current study used the RCFI (Bentler, 1995), which avoids underestimation of fit and sampling variability associated with other fit indices. RCFI indices are considered good with values greater than .95. Hu and Bentler (1999) also recommend the use of at least one absolute fit index. We used the standardized version of the squared root mean residual (SRMR; Joreskog & Sorbom, 1981). The SRMR is particularly sensitive to model misspecification (Hu & Bentler, 1998, 1999). Model fit is considered good when SRMR values are near .08. The CFAs were conducted using EQS (Version 5.6; Bentler, 1995) for the Power Macintosh, which provided all noted fit indices.

METHOD

Participants

The sample consisted of 96 male inmates detained at the Tarrant County Jail in Fort Worth, Texas. All participants reside on the Mental Health Pod, a pod that provides mental health treatment and medication management. The sample ranged in age from 18 to 66 ($M = 37.99$, $SD = 10.40$), with an average education of high school graduate ($M =$ 12.05 years, $SD = 2.05$). The majority of the sample was European American ($n = 72$; 75.0%), with 18 African Americans (18.8%), 3 Hispanic Americans (3.1%), and 3 classified as biracial (3.1%).

Measure

PCL-R. The PCL-R (Hare, 1991, 2003) is an extensive semistructured interview designed to assess for psychopathy. Interview and col-

lateral data (e.g., correctional records) are scored on 20 PCL-R ratings. Ratings are recorded on a 3-point scale: 0 for trait cannot be detected, 1 for trait present but not to a substantial degree, and 2 for trait present to a substantial degree. The PCL-R is considered an extremely reliable and valid instrument for the assessment of psychopathy with extensive validation studies (Rogers, 2001).

Procedure

With approval from the University of North Texas Institutional Review Board and jail administration, participants were recruited on the Mental Health Pod through individual contact with the researchers. With written informed consent, the research was conducted in a private room on the mental health unit.

The two interviewers were doctoral students in clinical psychology with training and supervision in structured interviews. Although the interrater reliability of the PCL-R is well established, it was checked in the current study on eight randomly selected cases and was found to be excellent for the PCL-R total (r = .93) and both factor (rs ≥ .89) scores.

RESULTS

The entire sample demonstrated a moderate level of psychopathy (M = 18.36, SD = 7.30), with total PCL-R scores ranging from 3 to 35. Of interest, African American participants (M = 23.77, SD = 4.04) manifested higher scores than their European American counterparts (M = 17.79, SD = 7.13) for total scores, F_2 = 11.69, p < .01, Cohen's d = .90. This result is consistent with Cooke, Kosson, and Michie (2001), who found, based on item response theory, subtle differences at the item level between African American and European American inmates primarily on Factor 2 but concluded the PCL-R was valid with both ethnic groups.

The internal consistency varied across the two-factor and three-factor models. For the two-factor model, the alpha coefficients ranged from good (total = .86), F_1 = .85, to adequate, F_2 = .79. In contrast, the

three-factor model was more variable, with good internal consistency for total (.84) and DAE (.85) scores but only marginal alphas for ADI (.67) and IIL (.68). The variability in alphas for the three-factor model likely reflects the small number of items per scale. Nevertheless, these alphas may constrain their applications to forensic practice. Prior to conducting CFAs, the normality of the data was evaluated for skew and kurtosis. Minimal skew (range = –.44 to .03) and kurtosis (range = –1.50 to –.25) were observed for the PCL-R items. Based on these analyses, it was determined that the PCL-R items were sufficiently normal to proceed with the CFAs. All CFAs utilized 96 PCL-R scores.

Two-Factor Model

In evaluating model fit, CFAs were first utilized to examine the comparative fit of the traditional PCL-R model (Hare, 1991). As presented in Table 1, we first tested Hare's (1991) traditional two-factor model that included 17 items (i.e., 3 items do not load on either factor). This traditional item-based model without testlets produced a poor fit. As observed by Cooke and Michie (2001), local dependence on the PCL-R is the primary reason for the disappointing results using the two-factor model. Local dependence occurs when two or more items share information; therefore, the "true score" is actually between the two item ratings (Cooke & Michie, 2001).

To counteract local dependency, testlets were created. We used the six testlets established by Cooke and Michie (2001) and organized the remaining four items into a testlet representing antisocial behavior (see Table 2). However, this model also yielded a poor fit (see Table 1). We then tested a 13-item, two-factor testlet model of the PCL-R that eliminated items assessing antisocial behavior. As presented in Table 1, the RCFI (1.00) indicated a good fit. In addition, the relationship between the two factors was significant ($r = .58$, $p < .05$). As enumerated in Table 3, 8 of 13 items loaded substantially on their testlet, with a substantial mean loading ($M = .73$) across the 13 items. All six testlets loaded substantially on the two factors (M loading = .84). These loadings indicate that the two-factor testlet model fit the PCL-R data for the mentally disordered offenders.

TABLE 1: Models of Psychopathy and Fit Indices for the PCL-R: A Comparison of Model Fits With and Without Testlets

Model	*Items*[a]	*Testlets*[b]	N	*S-B* χ^2	df	*RCFI*	*SRMR*
Two-factor	17	No	96	354.92	118	.64	.11
Two-factor	17	Yes	96	328.93	111	.69	.11
Two-factor	13	Yes	96	158.24	58	1.00	.09
Three-factor	13	No	96	178.92	62	.75	.10
Three-factor	13	Yes	96	154.54	56	1.00	.08
Four-factor	18	No	96	367.01	130	1.00	.10

Note. S-B χ^2 = Satorra-Bentler chi-square; RCFI = Robust Comparative Fit Index; SRMR = standardized version of the root mean squared residual error.
a. Denotes the number of Psychopathy Checklist–Revised (PCL-R) items used in the confirmatory factor analysis (CFA).
b. Denotes if testlets were used in the CFA.

TABLE 2: Items and Factor Structure for the Two-, Three-, and Four-Factor Good-Fitting CFA Models

	Two-Factor		*Three-Factor*		*Four-Factor*
Item	*Testlet*	*Factor*	*Testlet*	*Factor*	*Factor*
Glibness/Superficial Charm	1	CRU	1	ADI	ADI
Grandiose Sense of Self	1	CRU	1	ADI	ADI
Need for Stimulation	5	ANT	5	IIL	IIL
Pathological Lying	2	CRU	2	ADI	ADI
Conning/Manipulative	2	CRU	2	ADI	ADI
Lack of Remorse/Guilt	4	CRU	4	DAE	DAE
Shallow Affect	3	CRU	3	DAE	DAE
Callous/Lack of Empathy	3	CRU	3	DAE	DAE
Parasitic Lifestyle	6	ANT	6	IIL	IIL
Poor Behavioral Controls	7	ANT	X	X	ANT
Promiscuous Sexual Behavior	X	X	X	X	X
Early Behavioral Problems	6	ANT	6	IIL	IIL
Lack of Long-Term Goals	7	ANT	X	X	ANT
Impulsivity	5	ANT	5	IIL	IIL
Irresponsibility	5	ANT	5	ILL	IIL
Failure to Accept Responsibility	4	CRU	4	ADI	ADI
Short-Term Marital Relationships	X	X	X	X	X
Juvenile Delinquency	7	ANT	X	X	ANT
Revocation of Conditional Release	7	ANT	X	X	ANT
Criminal Versatility	X	X	X	X	ANT

Note. X = no loading or testlet; ANT = Antisocial Behavior; CRU = Callous/Remorseless Use of Others; ADI = Arrogant and Deceitful Experience, DAE = Deficient Affective Experience; IIL = Impulsive and Irresponsible Lifestyle; CFA = confirmatory factor analysis.

Three-Factor Model

The next step was testing the Cooke and Michie (2001) three-factor model, both without and with testlets (see Table 2). Not surprisingly, the three-factor model without testlets yielded a poor fit (see Table 1). We then tested the three-factor testlet model developed by Cooke and Michie (2001). In contrast to the item-only model, the three-factor testlet model produced a very strong model fit (RCFI = 1.00; see Table 1). The relationships between the factors were all significant: the relationship between ADI and DAE was high ($r = .83$, $p < .01$), with mod-

TABLE 3: Standardized Estimates From Confirmatory Factor Analysis for the Two-Factor PCL-R Testlet Model

	Testlets						*Factors*		
PCL-R	*t1*	*t2*	*t3*	*t4*	*t5*	*t6*	*Factor 1*	*Factor 2*	*Error/Uniqueness*
Items									
1	**.68**								.74
2	**.80**								.60
3		.55							.83
5		.59							.81
7			**.73**						.69
8			**.92**						.40
6				**.97**					.27
16				**.78**					.62
13					.45				.89
14					**.90**				.45
15					.56				.83
9						.56			.83
4					**1.00**			.00	
Testlet loadings									
t1							**.86**		.52
t2							**.66**		.76
t3							**.84**		.54
t4							**.92**		.40
t5								**.76**	.66
t6								**1.00**	.00

Note. PCL-R = Psychopathy Checklist–Revised. Substantial loadings (≥ .60) are presented in bold.

TABLE 4: Standardized Estimates From Confirmatory Factor Analysis for the Three-Factor PCL-R Testlet Model

	Testlets						*Factors*			
PCL-R	*t1*	*t2*	*t3*	*t4*	*t5*	*t6*	*ADI*	*DAE*	*IIL*	*Error/Uniqueness*
Items										
1	**.68**									.74
2	**.80**									.60
3		.48								.88
5		.58								.81
7			**.73**							.69
8			**.92**							.40
6				**.97**						.25
16				**.78**						.62
13					.45					.89
14					**.89**					.44
15					.56					.83
9						**.75**				.82
4						**1.00**				.83
Testlet loadings										
t1							**1.00**			.00
t2							**.74**			.67
t3								**.83**		.55
t4								**.94**		.35
t5									**.75**	.66
t6									**1.00**	.00

Note. Substantial loadings (≥ .60) are presented in bold. PCL-R = Psychopathy Checklist–Revised; ADI = Arrogant and Deceitful Experience; DAE = Deficient Affective Experience; IIL = Impulsive and Irresponsible Lifestyle.

erate correlations between ADI and ILL ($r = .50, p < .05$) and DAE and ILL ($r = .56, p < .05$). As illustrated in Table 4, 9 of 13 items loaded substantially on their testlet. The mean loading across all 13 item was very substantial ($M = .74$; see Table 4). As a further test of model fit, we also inspected the testlet loadings on the three factors. Demonstrating an excellent fit, all six testlets loaded substantially onto their factors (M loading = .88).

When conducting CFA with the same items, the chi-square statistic has traditionally been used to assess model fit (Bentler, 1980). A nonsignificant chi-square indicates that a model's reproduced variances and covariances do not differ substantially from the observed data. Moreover, the chi-square values and degrees of freedom from separate models can be used to conduct a chi-square difference test to determine if one particular model provides a significantly better fit compared to a second model. In comparing the two- and three-factor testlet models, the chi-square difference test fell short of significance, $\chi^2(2, N = 96) = 5.20, p > .05$, indicating that the models did not statistically differ in terms of their degree of fit to the data.

Development of a Four-Factor Model

Excellent model fits were achieved with both the two- and three-factor testlet personality-based models. Although theoretically relevant and consistent with previous research (Cooke & Michie, 2001; Jackson et al., 2002), four items relating to antisocial behavior were removed from the PCL-R to achieve adequate model fit. However, these items appear to be theoretically important to Hare's (1991, 2003) conceptualization of psychopathy. Therefore, we developed an antisocial factor (ANT) with five items (one from IIL and four that were previously discarded). The alpha for the antisocial factor was adequate ($\alpha = .72$). Our next step was to assess the construct validity of the four-factor model with the rigorous CFA approach.

The four-factor model is consistent with Hare's (2003) four-facet model psychopathy (see Table 2). As shown in Table 1, this model achieved an excellent fit (RCFI = 1.00). Moreover, the factor loadings were very robust (M loading = .90), establishing the adequacy of the four-factor model in this sample of mentally disordered offenders (see Table 5). The four-factor model was further tested by developing

TABLE 5: Standardized Estimates From Confirmatory Factor Analysis for the Four-Factor PCL-R Model

	First-Order Factors				*Second-Order Factors*		
PCL-R	*ADI*	*DAE*	*IIL*	*ANT*	*Personality*	*Behavioral*	*Error/Uniqueness*
Items							
1	**.65**						.76
2	**.80**						.61
3			**.62**			.78	
4	.40						.92
5	.49						.87
6		**.93**					.38
7		**.62**					.79
8		**.77**					.64
9			.46				.89
10				.50			.87
12				**.72**			.70
13			.39				.92
14			**.82**				.57
15			.54				.85
16		**.79**					.61
18				**.69**			.73
19				.45			.90
20				**.70**			.71
Factor loadings							
ADI	**1.00**				**1.00**		.00/.00
DAE		**.80**			**.66**		.60/.76
IIL			**.86**			**.75**	.51/.66
ANT				**.94**		**.87**	.35/.50

Note. Substantial loadings (≥ .60) are presented in bold. PCL-R = Psychopathy Checklist–Revised; ADI = Arrogant and Deceitful Experience; DAE = Deficient Affective Experience; IIL = Impulsive and Irresponsible Lifestyle; ANT = Antisocial Behavior.

scales based on each factor (ADI, DAE, IIL, and ANT), which were allowed to load onto one of the two respective second-order factors: personality dimensions (ADI & DAE) and antisocial-behavioral dimensions (IIL & ANT). The results provided substantial support for two second-order factors because both personality (ADI = 1.00, DAE = .66) and antisocial-behavioral (ANT = .87, IIL = .75) dimensions loaded significantly. The second-order factors were moderately correlated ($r = .57$, $p < .05$).

DISCUSSION

This study compares the traditional two-factor model of psychopathy, the hierarchical three-factor model, and a new four-factor model in a sample of mentally disordered offenders. The study's highlights can be summarized in four main points. First, as suggested by Cooke and Michie (2001),the traditional factor structure of the PCL-R does not adequately fit the data in the current sample of mentally disordered offenders. Second, with the use of testlets, both two- and three-factor testlet models of the PCL-R fit the data well. However, the removal of items for adolescent and adult antisocial behavior constrains Hare's conceptualization of psychopathy and also may affect the PCL-R's predictive validity. Third, the increased focus on personality traits is congruent with several developmental models (Barry et al., 2000; Vitacco, Rogers, & Neumann, 2003); however, research has yet to demonstrate the relationship of these personality traits to antisocial behavior throughout the life span. Fourth, a four-factor PCL-R model integrating the Cooke and Michie (2001) personality-focused factors with the addition of an Antisocial factor produced an excellent fit and is a potentially exciting development with the PCL-R (Hare, 2003).

Dimensions of Psychopathy and Clinical Implications

The current study replicated previous research (Cooke & Michie, 2001; Jackson et al., 2002; Tubb, 2002) by its failure to substantiate the traditional two-factor model of the PCL-R with CFA. Using testlets, the Cooke and Michie (2001) three-factor model demon-

strated excellent fit (RCFI = 1.00) in the current sample of mentally disordered offenders. All testlets were very robust indicators of psychopathy, supporting a superordinate psychopathy factor. Of interest, a two-factor model utilizing the same 13 items also possessed an excellent fit (RCFI = 1.00). However, neither model included antisocial behavior, which places the models almost exclusively in the realm of personality pathology (Blackburn, 1998; Cooke & Michie, 2001; Lilienfeld, 1998).

We must examine the potential ramifications for accepting personality-only models at face value. PCL-R research (Hemphill et al., 1998; Salekin et al., 1996) has clearly demonstrated the ability of the PCL-R to predict violence. However, much of that predictive power is related to past antisocial behavior predicting future antisocial behavior. In fact, both Hill et al. (in press) and Skeem and Mulvey (2001) found that F_2 of the PCL-R substantially predicted future violence, whereas core psychopathic personality traits (i.e., F_1 and DAE) were not as robust predictors of violence. If predicting violence is a major reason to utilize the PCL-R, this goal is substantially hindered by a model of psychopathy that excludes antisocial behavior. Moreover, reliance on the three-factor model eliminates behavioral items from the PCL-R that are highly representative of the latent construct of psychopathy (Cooke et al., 2001). In other words, psychopathy is most accurately represented by both behavioral and personality facets.

The reintroduction of antisocial behavior is likely to have practical as well as theoretical implications. Extrapolating from earlier research on traditional models, antisocial behavior appears to play a central role for the use of the PCL-R in risk assessment (Hemphill et al., 1998; Salekin et al., 1996). For clinicians, these theory-based subscales may be helpful in accurately describing their clients' strengths and weaknesses (see Rogers, 2001). For researchers, the goal will be to establish the correlates and predictive validity for each PCL-R dimension.

The results for the four-factor model demonstrate that these dimensions are theoretically relevant and encompass antisocial behavior that was discarded by the three-factor model. Its results are sufficiently robust as not to require the use of testlets to achieve an excellent model fit. Although testlets are permitted for CFAs (Steinberg & Thissen, 1996), the four-factor model is achieved directly without tin-

kering with the original items. In terms of parsimony, we believe an excellent model fit based on PCL-R items represents a strong advantage over models requiring further manipulations and statistical assumptions. As a related point, the four-factor model has a greater correspondence to Hare's conceptualization of psychopathy, utilizing 18 of 20 items (90%). We are concerned with substantial decrement in correspondence required by the three-factor model retaining only 13 of 20 items (65%).

Dimensions of Psychopathy and Developmental Implications

As noted in the introduction, developmental theories of psychopathy have only been tested recently and their relationship to adult psychopathy remains poorly understood. Frick and his colleagues (Barry et al., 2000; Christian et al., 1997; Frick, 1998) have tested the Primary Pathway Model in children and adolescents. This model is consistent with personality-based models of psychopathy; it posits that the presence of psychopathic personality traits, namely, callous/unemotional traits, are the developmental precursors to severe conduct problems. Early identification of individuals at risk for psychopathy could spawn new treatment interventions aimed at ameliorating deficient affective experiences (i.e., core traits of psychopathy). Recent studies (Salekin, 2002; Skeem, Monahan, & Mulvey, 2002) have begun to challenge the concept that psychopathy is a chronic syndrome with an unremitting course. Interventions can hopefully be developed that focus on specific psychopathic pathways.

One possible explanation for the continuity of antisocial behavior is that personality facets of psychopathy, such as lack of conscience and empathy, manifest early in development and lead to increased levels of antisocial behavior (Kirkman, 2002; Vitacco et al., 2003). Therefore, these traits could be the critical variables in identifying at-risk youth who develop a persistent pattern of offending. The four-factor model may play a critical role linking early behavioral dysfunction with later antisocial behavior as it maintains the personality facets demonstrated to be critical in the conceptualization of psychopathy (Cooke & Michie, 2001; Frick, 1998; Frick & Ellis, 1999; Vitacco et al., 2003) but continues to assess critical dimensions of violence.

Limitations and Future Directions

A limitation of the current study includes its sample size and lack of outcome data. Although adequate to conduct the CFA (Bentler, 1995), a larger sample size may have produced more robust findings and allowed the cross-validation of our factor solutions. In addition, no outcome data were included as part of this study. For example, information on institutional infractions would have allowed us to test the respective contribution of each PCL-R dimension to violent and nonviolent misconduct. In particular, we could have examined both personality (ADI and DAE scales) and antisocial behavioral (ANT and IIL scales) in relationship to subsequent infractions.

The current article provides several suggestions for future avenues of research related to psychopathy. The optimum model of PCL-R-based psychopathy is far from settled. It is quite possible that different samples (e.g., nondisordered offenders or women) would produce disparate factor solutions. Factor models also need to be examined for their theoretical relevance and predictive validity. The most exacting test of PCL-R factor models is their ability to provide meaningful data from a developmental perspective. Several questions remain virtually unaddressed. For example, which dimensions of psychopathy remain consistent from youth to adults? In line with Frick and his colleagues, can specific pathways predict the future emergence of psychopathic dimensions either in adolescence or adulthood? The answer to these questions will likely resolve much of the current controversy regarding the different factor models of psychopathy.

Treatment interventions with psychopathic samples have neglected the central question, namely, can dimensions of psychopathy be successfully treated. Available research has produced mixed findings on the peripheral issue of whether psychopaths respond as well as nonpsychopaths to standard interventions. Clinical interventions that ignore central personality features associated with treatment amenability and antisocial conduct are difficult to justify. Instead, interventions must be targeted on problematic personality dimensions, such as DAE. Future research could utilize the four-factor model to determine which underlying dimensions of psychopathy are most amenable to treatment.

REFERENCES

Barbaree, H. E., Seto, M. C., Langton, C. M., & Peacock, E. J. (2001). Evaluating the predictive accuracy of six assessment instruments for adult sex offenders. *Criminal Justice and Behavior*, *28*, 490-521.

Barry, C. T., Frick, P. J., DeShazo, T. M., McCoy, M. G., Ellis, M., & Loney, B. R. (2000). The importance of callous-unemotional traits for extending the concept of psychopathy to children. *Journal of Abnormal Psychology*, *109*, 335-340.

Bentler, P. M. (1980). Multivariate analysis with latent variables: Causal modeling. *Annual Review of Psychology*, *31*, 419-456.

Bentler, P. M. (1995). *EQS structural equations program manual*. Encino, CA: Multivariate Software, Inc.

Blackburn, R. (1998). Psychopathy and personality disorder: Implications of interpersonal theory. In D. Cooke, A. Forth, & R. Hare (Eds.), *Psychopathy: Theory, research, and practice* (pp. 269-301). Dordrecht, the Netherlands: Kluwer Academic.

Brandt, J. R., Kennedy, W. A., Patrick, C. J., & Curtin, J. J. (1997). Assessment of psychopathy in a population of incarcerated adolescent offenders. *Psychological Assessment*, *9*, 429-435.

Buffington-Vollum, J., Edens, J., Johnson, D. W., & Johnson, J. (2002). Psychopathy as a predictor of institutional misbehavior among sex offenders: A prospective replication. *Criminal Justice and Behavior*, *29*, 497-511.

Christian, R. E., Frick, P. J., & Hill, N. L. (1997). Psychopathy and conduct problems in children. II. Implications for subtyping children with conduct problems. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 233-241.

Cleckley, H. (1941). *The mask of sanity.* St. Louis, MO: Mosby Books.

Cooke, D. J., Kosson, D. S., & Michie, C. (2001). Psychopathy and ethnicity: Structural, item, and test generalizability of the Psychopathy Checklist-Revised (PCL-R) in Caucasian and African American participants. *Psychological Assessment*, *13*, 531-542.

Cooke, D. J., & Michie, C. (2001). Refining the concept of psychopathy: Towards a hierarchical model. *Psychological Assessment*, *13*, 171-188.

Cornell, D. G., Warren, J., Hawk, G., Stafford, E., Oram, G., & Pine, D. (1996). Psychopathy of instrumental and reactive violent offenders. *Journal of Consulting and Clinical Psychology*, *64*, 783-790.

Darke, S., Kaye, S., Finlay-Jones, R., & Hall, S. (1998). Antisocial personality disorder, psychopathy, and injecting heroin use. *Drug and Alcohol Dependence*, *52*, 63-69.

Edens, J. F., Skeem, J. L., Cruise, K. R., & Caufmann, E. (2001). Assessment of "juvenile psychopathy" and its association with violence: A critical review. *Behavioral Sciences and the Law*, *19*, 53-80.

Frick, P. J. (1998). *Conduct disorders and severe antisocial behavior.* New York: Plenum.

Frick, P. J., & Ellis, M. (1999). Callous-unemotional traits and subtypes of conduct disorder. *Clinical Child and Family Psychology Review*, *2*, 149-168.

Glover, A. J., Nicholson, D. E., & Hemmati, T. (2002). A comparison of predictors of general and violent recidivism among high-risk federal offenders. *Criminal Justice and Behavior*, *29*, 235-249.

Goodman, L. A., Dutton, M. A., & Bennett, L. (2000). Predicting repeat abuse among arrested batterers: Use of the Danger Assessment Scale in the criminal justice system. *Journal of Interpersonal Violence*, *15*, 63-74.

Hare, R. D. (1985). *The Hare Psychopathy Checklist*. Toronto, Ontario, Canada: Multi-Health Systems.

Hare, R. D. (1991). *The Hare Psychopathy Checklist–Revised*. Toronto, Ontario, Canada: Multi-Health Systems.

Hare, R. D. (2003). *The Hare Psychopathy Checklist–Revised* (2nd ed.). Toronto, Ontario, Canada: Multi-Health Systems.

Hare, R. D., Harpur, T. J., Hakstian, A. R., Forth, A. E., Hart, S. D., & Newman, J. P. (1990). The revised Psychopathy Checklist: Reliability and factor structure. *Psychological Assessment*, *2*, 338-341.

Hare, R. D., Hart, S. D., & Harpur, T. J. (1991). Psychopathy and the DSM-IV criteria for antisocial personality disorder. *Journal of Abnormal Psychology*, *100*, 391-398.

Hemphill, J. F., Hare, R. D., & Wong, S. (1998). Psychopathy and recidivism: A review. *Legal and Correctional Psychology*, *3*, 139-170.

Hicks, M., Rogers, R., & Cashel, M. L. (2000). Predictions of violent and total infractions among institutionalized male offenders. *Journal of the American Academy of Psychiatry and Law*, *28*, 183-190.

Hill, C. D., Neumann, C. S., & Rogers, R. (in press). Confirmatory factor analysis of the Psychopathy Checklist: Screening version in offenders with Axis I disorders. *Psychological Assessment*.

Hilton, N. Z., Harris, G. T., & Rice, M. E. (2001). Predicting violence by serious wife assaulters. *Journal of Interpersonal Violence*, *16*, 408-423.

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*, 424-453.

Hu, L., & Bentler, P. M. (1999). Cut-score criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55.

Jackson, R. L., Rogers, R., Neumann, C. S., & Lambert, P. L. (2002). Female psychopathy: Does it conform to the two-factor model? *Criminal Justice and Behavior, 29*, 692-704.

Joreskog, K. G., & Sorbom, D. (1981). *LISREL V: Analysis of linear structural relationships by the method of maximum likelihood.* Chicago: National Education Resources.

Kirkman, C. A. (2002). Non-incarcerated psychopaths: Why we need to know more about the psychopaths who live amongst us. *Journal of Psychiatric and Mental Health Nursing*, *9*, 155-160.

Lilienfeld, S. O. (1998). Methodological advances and developments in the assessment of psychopathy. *Behavior Research and Therapy*, *36*, 99-125.

Loving, J. (2001). Treatment planning with the Psychopathy Checklist–Revised. *International Journal of Offender Therapy and Comparative Criminology*, *46*, 281-293.

McDermott, P. A., Alterman, A. I., Cacciola, J. S., Rutherford, M. J., Newman, J. P., & Mulholland, E. M. (2000). Generality of psychopathy checklist-revised factors over prisoners and substance-dependent patients. *Journal of Clinical and Consulting Psychology*, *68*(1), 181-186.

Ogloff, J. R., Wong, S., & Greenwood, A. (1990). Treating criminal psychopaths in a therapeutic community. *Behavioral Sciences and the Law*, *8*, 181-190.

Reid, W., & Gacono, C. (2000). Treatment of antisocial personality, psychopathy, and other characterological antisocial syndromes. *Behavioral Sciences and the Law*, *18*, 647-662.

Rogers, R. (2001). *Handbook of diagnostic and structured interviewing*. New York: Guilford.

Rogers, R., Salekin, R. T., Hill, C., Sewell, K. W., Murdock, M. E., & Neumann, C. S. (2000). The Psychopathy Checklist: Screening version. An examination of criteria and subcriteria in three forensic samples. *Assessment*, *7*, 1-15.

Salekin, R. T. (2002). Psychopathy and therapeutic pessimism: Clinical lore or clinical reality? *Clinical Psychology Review*, *22*, 79-112.

Salekin, R. T., Rogers, R., & Sewell, K. W. (1996). A review and meta-analysis of the Psychopathy Checklist and Psychopathy Checklist–Revised. *Clinical Psychology; Science and Practice*, *3*, 203-215.

Seagrave, D., & Grisso, T. (2002). Adolescent development and the measurement of juvenile psychopathy. *Law and Human Behavior*, *26*, 219-239.

Skeem, J. L., Monahan, J., & Mulvey, E. P. (2002). Psychopathy, treatment involvement, and subsequent violence among civil psychiatric patients. *Law and Human Behavior*, *26*, 577-603.

Skeem, J. L., & Mulvey, E. P. (2001). Psychopathy and community violence among civil psychiatric patients: Results from the MacArthur Violence Risk Assessment Study. *Journal of Consulting and Clinical Psychology*, *69*, 358-374.

Steinberg, L., & Thissen, D. (1996). Uses of item response theory and the testlet concept in the measurement of psychopathology. *Psychological Methods*, *1*, 81-97.

Tubb, V. A. (2002). The factor structure and psychometric prosperities of the Psychopathy Checklist–Revised: Data from an Hispanic federal inmate sample. *Dissertation Abstracts International*, *62*, 5426.

Vitacco, M. J., Rogers, R., & Neumann, C. S. (2003). The Antisocial Process Screening Device: An examination of its construct and criterion-related validity. *Assessment*, *10*, 143-150.