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BEYOND SOCIAL DEVIANCE: SUBSTANCE USE DISORDERS AND THE DIMENSIONS OF PSYCHOPATHY

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High rates of comorbidity between psychopathy and substance use disorders (SUD) have long been recognized. However, the extent to which relationships between SUD and psychopathy extends beyond shared relationship with general antisociality remains undetermined. We examined zero-order and unique relationships between the elements of psychopathy and four categories of SUD; alcohol, cannabis, cocaine, and opioid dependence. The sample consisted of 399 European American and African American male county jail inmates. The relationship between psychopathy and SUD extended beyond general antisociality to core features of the psychopathic personality. Relationships were relatively stable across ethnicity but were more generalized across SUD categories for European American inmates. The relationship between SUD and impulsive and irresponsible behavior was most consistent across categories of SUD; relationships with other elements of psychopathy varied according to category of SUD.

The relationship between substance use disorders (SUD) and antisocial behavior is well established. A considerable proportion of crimes are drug related, and dramatically elevated rates of SUDs have been identified among arrestees (Ruth & Reitz, 2003). High levels of comorbidity have also been identified between SUDs and psychological disorders in which antisocial behavior is a prominent feature, such as psychopathy and antisocial personality disorder (APD) (see Rutherford, Alterman, & Cacciola, 2000; Hare, 2003 for reviews). Indeed, SUD and antisocial behavior have been

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proposed to share a common genetic vulnerability (Hicks, Krueger, Iacono, McGue, & Patrick, 2004; Kendler, Prescott, Myers, & Neale 2003). However, the extent to which SUDs are related to core features of psychopathy remains unclear and, because the vast majority of individuals meeting criteria for psychopathy also meet criteria for APD, the extent to which the relationship between psychopathy and SUD extends beyond APD symptomatology and general antisociality is largely undetermined. We aimed to clarify the nature of these relationships by (a) determining the extent to which relationships between psychopathy and SUD extend beyond general antisociality to core features of the psychopathic personality, and by (b) examining the simple and unique relationships between specific aspects of psychopathy and several categories of SUD criteria.

Psychopathy is a syndrome of personality pathology characterized by interpersonal manipulation, callousness, and impulsive antisocial behavior. As measured by the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 2003), psychopathy is among the most widely researched individual difference predictors of criminality (see Hare, 2003 for a review). Two correlated dimensions have been reported to underlie PCL-R measured psychopathy: The first, Factor 1, measures callous and unemotional and interpersonal features; the second, Factor 2, measures a generally antisocial and impulsive lifestyle (Harpur, Hare, & Hakstian, 1989). Recently, a three-factor and a four-facet model of psychopathy have emerged (Cooke & Michie, 2001; Hare, 2003), in which items are organized into correlated facets. In the four-facet model, Factor 1 is comprised of a facet measuring arrogant and manipulative interpersonal style (Facet 1a) and a facet measuring deficient affective experience (Facet 1b), and Factor 2 is comprised of a facet measuring impulsive and irresponsible lifestyle (Facet 2a) and a facet measuring persistent criminality and antisocial behavior (Facet 2b). The three-factor model is comprised solely of the core personality features of the disorder (Facet 1a, Facet 1b, and Facet 2a); it differs from the four-facet model in excluding the items that comprise Facet 2b.

Some proponents of the three-factor model have criticized the inclusion of Facet 2b for measuring consequences rather than direct symptoms of the disorder, thereby contaminating the assessment of the construct (Cooke, Michie, Hart, & Clark, 2004). The determination of whether a three-factor or four-facet model best represents the structure of the disorder remains controversial. Some studies have reported good fit for the three-factor model but not for the four-facet model (Cooke et al., 2004), whereas others have provided evidence of good fit for both the three-factor and four-facet models and argue that the latter is superior based on a more parsimonious parameter: data point ratio (Vitacco, Rogers, Neumann, Harrison, & Vincent, 2005; Neumann, Kosson, Forth, & Hare, 2006; Neumann, Vitacco, Hare, & Wupperman, 2005). The further determination of whether psychopathy is best captured by three or four subcomponents is beyond the scope of the current investigation. Fortunately, it is not necessary to choose one of these models to examine the relation-

ships between SUD criteria and the putative dimensions underlying psychopathy.

In the first systematic investigation of the relationship between psychopathy and SUD Hart and Hare (1989) identified relationships between SUD and PCL-R total and Factor 2 scores, but found no relationship between SUD and Factor 1 scores. This line of inquiry was extended by Smith and Newman (1990), who demonstrated that psychopathic prison inmates exhibited more symptoms of alcohol and drug dependence than did nonpsychopathic inmates. Smith and Newman (1990) also identified relationships between symptoms and scores on Factor 2 but reported no significant relationships with Factor 1. Subsequent studies (Hemphill, Hart, & Hare, 1994) have also identified strong relationships between SUD and Factor 2, but have concluded only small or nonsignificant relationships with Factor 1. Based on these findings, Hare (2003) concluded that the relationship between SUD and psychopathy is due primarily to Factor 2.

Although the relationship between Factor 2 and SUD is well established, the extent to which this relationship is due to the lifestyle (2a) versus the antisocial (2b) facets that comprise Factor 2 remains undetermined as, to date, no facet-level analyses have been published. Such a determination is relevant in light of Cooke et al.'s (2004) assertion that Facet 2b does not belong in the psychopathy construct. Although that assertion is not at issue in the current study, the determination of whether the relationship between SUD and Factor 2 is confined solely to Facet 2b may have implications for proponents of the three-factor model. Specifically, if the relationship between SUD and psychopathy is attributable solely to antisocial behavior, then proponents of the three-factor model might argue that the relationship between SUD and psychopathy is artifactual. Additionally, although prior studies have identified only small relationships between Factor 1 and SUD, the extent to which these relationships are consistent across the facets that comprise this factor remains unclear.

Relationships have also been identified between SUD and APD (Collins, Schlenger, & Jordan, 1988). Although the vast majority of psychopathic individuals meet diagnostic criteria for APD, the criteria for APD emphasize antisocial and deviant behavior and include relatively few components that tap the core affective and interpersonal traits of psychopathy. Interestingly, the relationship between APD and psychopathy appears similar to that between SUD and psychopathy; APD is strongly related to Factor 2 of the PCL-R, and only modestly related to Factor 1 (Harpur et al., 1989). In light of the interrelationships between APD, psychopathy, and SUD, it could be argued that the relationship between SUD and psychopathy does not reflect traits specific to psychopathy, but is due instead to overlap with APD, or with the generally criminal behavior that is common to both disorders. However, to our knowledge, no published study has examined the extent to which the relationship between psychopathy and SUD remains after controlling for symptoms of APD.

Given that psychopathy has been proposed to exist on a "continuum

with normal personality" (Widiger & Lynam, 1998, p. 185), prior investigations of relationships between normal personality traits and SUD may inform our understanding of relationships between SUD and components of psychopathy. Among the most reliable personality correlates of SUD in nonantisocial populations are traits related to negative affect and disinhibition. Negative affect correlates positively with substance use, and these relationships have been proposed to reflect the self-administration of drugs to relieve negative affect (Stewart, Karp, Pihl, & Peterson, 1997). Relationships have also been identified between SUD and personality traits associated with disinhibition (Trull, Waudby, & Sher, 2004), and neurobehavioral disinhibition during childhood predicts substance abuse in young adults (Tarter, Kirisci, Habeych, Reynolds, & Vanyukov, 2004).

Both disinhibition and negative affect have also been related to psychopathy. Disinhibition is an important feature of psychopathy and is addressed by items in Facet 2a such as impulsivity and sensation seeking. Traditional views of the relationship between psychopathy and negative affect suggest that the psychopath is incapable of experiencing lasting and pervasive depression or anxiety (Cleckley, 1976). However, evidence of a relationship between psychopathy and self-reported negative affect has been weak and inconclusive. Relatedly, there is evidence that relationships vary across elements of psychopathy; positive relationships have been identified between negative affect and the antisocial behavior measured by Factor 2 (Verona, Patrick, & Joiner, 2001; Hale, Goldstein, Abramowitz, Calamari, & Kosson, 2004), and inverse relationships have sometimes been identified between negative affect and the callous unemotional traits captured by Factor 1 (Hare, 2003). Moreover, these patterns of divergent correlations are more pronounced in examinations that focus on the variance that is unique to each of the intercorrelated elements of psychopathy (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999; Patrick, 1994; but see Hale et al., 2004).

Attenuated negative affect in psychopaths may be relevant to the relationship between SUD and psychopathy in that it may result in an attenuated demand for affective self-regulation (i.e., use of psychoactive substances in order to relieve negative affect), which is thought to drive the relationship between negative affect and SUD. Indeed, Smith and Newman (1990) reported that, after controlling for Factor 2 (Lifestyle and Antisocial), small, nonsignificant negative relationships were observed between Factor 1 (Interpersonal and Affective) and SUD. In addition, Reardon, Lang, and Patrick (2002) found that individuals with high scores on both Factor 2 and Factor 1 had lower scores on a self-report measure of alcoholism than did individuals with high scores on Factor 2 and low scores on Factor 1. In light of prior research, we hypothesized positive relationships between SUD and the facet which most directly taps disinhibition (Facet 2a) and inverse relationships with the facet that most directly taps attenuated negative affect (Facet 1b).

Whereas negative affect and disinhibition represent risk factors for SUD

in general, some relationships between SUD and personality may differ according to substance of abuse. Indeed, differences in personality correlates across substances have been identified using several measures of normal personality. For example, LeBon et al. (2004) found that heroin users exhibit higher levels of Novelty-Seeking and lower levels of Harm Avoidance than alcohol users. Flory, Lynam, Milich, Leukefeld, and Clayton (2002) found that cannabis abuse was associated with high Openness to Experience and low Extraversion in the Five Factor Model, whereas alcohol abuse was associated with high Extraversion and low Conscientiousness. In contrast, McGue, Slutske, and Iacono (1999) found that alcoholics were characterized by higher levels of Negative Emotionality than nonalcoholics, whereas users of illicit substances were characterized primarily by lower levels of Constraint (i.e., more impulsivity) than nonusers. However, some studies have not reported substance-specific relationships (Greene, Adyanthaya, Morse, & Davis, 1993; Craig, 1988), and the use of different measures of personality complicates comparisons across studies. Nonetheless, in light of these potentially important differences, we concurrently examined criteria for several substances.

Ethnic differences have been identified in both the prevalence and correlates of SUD (Substance Abuse and Mental Health Services Administration, 1998; Brown, Flory, Lynam, Leukefeld, & Clayton, 2004). Furthermore, although the psychometric properties of PCL-R total scores appear to be generally similar for African American and European American offenders (Cooke, Kosson, & Michie, 2001), some of the cognitive and affective mechanisms proposed to underlie psychopathy do not appear to generalize across ethnicity (Lorenz & Newman, 2002; Newman & Schmitt, 1998), and the nature of the relationship between psychopathy and ethnicity remains controversial (Skeem, Edens, Sanford, & Colwell, 2003). In light of these potentially important ethnic differences on both criteria and predictor variables, in addition to examining the sample as a whole, we conducted parallel analyses separately for European American and African American participants.

In summary, prior studies have replicated links between psychopathy and SUD but have not determined the extent to which these relationships are due to overlap with general antisociality and APD, and have not examined these relationships using the four-facet model of psychopathy. In light of prior research, we predicted that SUD criteria would be related to general antisociality (Facet 2b). However, we also predicted that the relationship between psychopathy and SUD would not be limited to this aspect of psychopathy. Specifically, we predicted that SUD criteria would be positively related to impulsive and irresponsible lifestyle (Facet 2a) and inversely related to deficient affective experience (Facet 1b), and that these relationships would persist after controlling for measures of antisocial behavior (i.e., Facet 2b and symptoms of APD). We made no predictions regarding the Interpersonal facet (1a). No predictions were made regarding whether findings would generalize across ethnicity.

METHOD

PARTICIPANTS

Participants were 190 African American and 209 European American male inmates at a county jail near Chicago serving terms of one year or less. Inmates were invited to participate if they had been convicted of a felony or misdemeanor, had estimated IQ scores of 70 or greater, were not taking psychotropic medications, and were able to read and speak English. Of those invited, approximately 70% agreed to participate. After providing written consent, participants completed a semi-structured interview addressing psychopathy and APD, a structured interview addressing SUD, and several self-report measures. Participants were paid $5–$8 for their participation. Sample characteristics are presented in Table 1.

MEASURES

Psychopathy. Psychopathy was assessed with the 20-item PCL-R, based on an in-depth semi-structured interview and a review of participants' institutional files. Substantial research attests to the reliability and validity of psychopathy among male European American offenders (Hare, 2003), and there is evidence that the PCL-R can also be used validly among male African American offenders (Cooke, Kosson, & Michie, 2001). The interview was designed to permit assessment of both psychopathy and APD. It addressed each inmate's family, social, sexual, parenting, educational,

TABLE 1. Sample Characteristics. Means and Standard Deviations

	EA	AA
N	209	190
Age	25.43 (6.94)	26.58 (6.68)
1a	4.17 (2.18)	4.45 (2.12)
1b	4.43 (2.08)*	4.96 (1.88)*
2a	6.42 (2.11)	6.41 (2.12)
2b	6.13 (2.36)	6.18 (2.52)
PCL-R	22.74 (6.87)	23.80 (7.15)
APD	3.12 (1.76)	3.34 (1.81)
Alcohol Symptoms	2.76 (2.49)*	2.01 (2.26)*
Cannabis Symptoms	2.11 (1.97)	1.73 (1.95)
Cocaine Symptoms	1.64 (2.46)*	1.16 (2.25)*
Opioid Symptoms	.64 (1.74)*	.33 (1.32)*

Note. EA = European Americans; AA = African Americans; Alcohol symptoms = number of DSM-IV alcohol dependence symptoms met; cannabis symptoms = number of DSM-IV cannabis dependence symptoms met; cocaine symptoms = number of DSM-IV cocaine dependence symptoms met; opioid symptoms = number of DSM-IV opioid dependence symptoms met; 1a = score on PCL-R interpersonal facet; 1b = score on PCL-R affective facet; 2a = score on PCL-R impulsive and irresponsible lifestyle facet; 2b = score on antisocial behavior facet; PCL-R = total score on the Psychopathy Checklist-Revised; APD = number of DSM-IV antisocial personality disorder symptoms met; * = groups differ $p < .05$.

work, and criminal histories. Observers were present for 17% of the interviews. Reliability was good, for total scores average intraclass $r = .92$, Cronbach's $\alpha = .92$, for F1, $r = .84$, $\alpha = .83$, for F2 $r = .92$, $\alpha = .92$; for 1a, $r = .78$, $\alpha = .78$, for 1b, $r = .83$, $\alpha = .82$, for 2a, $r = .88$, $\alpha = .88$, and for 2b, $r = .84$, $\alpha = .83$.

The item scores summed to produce Facet 2a scores are based in part on information that could overlap with information used to diagnose SUD. Specifically, scores on the item "Need for stimulation/proneness to boredom" may be affected by reports of substance use. Scores on the item "Irresponsibility" may also be related to SUD to the extent that they take into account driving while intoxicated and other irresponsible behaviors related to SUD. In order to minimize the possibility of predictor-criterion contamination we conducted parallel supplementary analyses which excluded these items.

Symptoms of Antisocial Personality Disorder (APD). Based on *Diagnostic and Statistical Manual of Mental Disorders-4th Edition* (DSM-IV, American Psychiatric Association, 1994) criteria, the number of APD symptoms met was assessed during the semi-structured interview described above. The APD symptom count was unavailable for 129 participants, leaving 270 men in analyses involving this variable. Number of APD symptoms was moderately to highly correlated with all psychopathy criteria: Facet 1a ($r = .38$, $p < .01$), Facet 1b ($r = .50$, $p < .01$), Facet 2a ($r = .65$, $p < .01$), Facet 2b ($r = .64$, $p < .01$), Factor 1 ($r = .53$, $p < .01$), Factor 2 ($r = .74$, $p < .01$), and PCL-R total ($r = .76$, $p < .01$). Small to moderate correlations were also identified between APD and SUD: alcohol symptoms ($r = .29$, $p < .01$), cannabis symptoms ($r = .15$, $p < .05$), cocaine symptoms ($r = .25$, $p < .01$), opioid symptoms ($r = .19$, $p < .01$).

Substance Use Disorders (SUD). Criteria for SUD were derived from dependence symptoms for four substances; alcohol, cannabis, cocaine, and opioids. The alcohol dependence and substance dependence modules of the Structured Clinical Interview for the DSM-IV (SCID-I; First, Spitzer, Gibbon, & Williams, 2002) were used to assess the lifetime *number of symptoms* for each substance based on DSM-IV criteria for dependence on that substance. With regard to DSM-IV cut-off criteria for substance dependence disorders (i.e., three or more of the seven dependence criteria for any of these four substances within a 12-month period), 30% did not meet criteria for any SUD, 37% met criteria for one SUD, 24% met criteria for two SUDs, 8% met criteria for three SUDs, and 2% met criteria for all SUDs.

ANALYSES

All analyses were conducted using the entire sample and separately for European Americans and African Americans. Zero-order correlations were calculated between SUD criteria and facet, factor and total scores on the PCL-R. Partial correlations were calculated to assess the unique contribu-

tions of each facet after accounting for the other facets, and to assess the unique contribution of each factor after controlling for the other. Three sets of analyses were conducted to determine whether aspects of psychopathy added to the postdiction of SUD criteria after accounting for antisociality. In the first set of analyses, Facet 2b was entered in the first step of a hierarchical multiple regression, after which Facets 1a, 1b, and 2a were allowed entry in a stepwise manner if they met criteria. In the second set of analyses, the number of APD symptoms was entered in the first step, after which all four-facets were allowed entry in a stepwise manner. Finally, to provide a particularly conservative test, a third set of analyses was conducted in which both Facet 2b and APD criteria were entered in the first step of the regression, followed by stepwise entry of the remaining three facets. The criterion for stepwise entry was set at $p < .05$ for all analyses. All results were tested using two-tailed test criteria for significance.

RESULTS

Preliminary analyses. None of the variables of interest deviated sufficiently from normality to substantially impact the power of our analyses (Tabachnick & Fidel, 2001). European American and African American participants were compared on individual difference and substance use variables. The results of these comparisons (Table 1) indicate that African Americans obtained higher scores than European Americans on Facet 1b, and that European Americans had significantly more symptoms of dependence for three of the four SUD categories.

Zero-Order Correlations. Zero-order correlations between PCL-R total, facet and factor scores, and symptoms of SUD are presented in Table 2. In the sample as a whole, PCL-R total, Factor 2, Facet 2a, and Facet 2b scores were significantly correlated with all SUD criteria. Scores on Factor 1 and Facet 1a were significantly correlated with cocaine symptoms. Results of facet level analyses performed separately by ethnicity indicated that, although relationships between core personality features and alcohol, cannabis, and opioid dependence symptoms appeared generally stable across ethnicity, relationships with symptoms of cocaine dependence were limited to European Americans.

Partial Correlations. The partial correlations of each facet with SUD criteria, after controlling for the other three facets, and partial correlations for each factor after controlling for the other, are presented in Table 3. For the sample as a whole, factor level analyses identified relationships between F2 and three of the four SUD criteria, and no relationships for F1. Unique relationships for F2 were generally consistent across ethnicity for symptoms of cocaine, cannabis, and alcohol dependence. However, the unique relationship between F2 and symptoms of opioid dependence was confined to European Americans.

TABLE 2. Zero-Order Correlations for SUD Criteria and PCL-R Total, Factor, and Facet Scores

PCL-R Dimension	Alcohol Symptoms			Cannabis Symptoms			Opioid Symptoms			Cocaine Symptoms		
	All	EA	AA	All	EA	AA	All	EA	AA	All	EA	AA
1a	.09	.08	.14	.06	.10	.03	.06	.13	–.01	.17**	.28**	.06
1b	.04	.05	.08	<.01	.06	–.04	.03	.09	–.02	.07	.15*	<.01
2a	.21**	.16*	.27**	.25**	.21**	.29**	.18**	.21**	.15*	.11*	.16*	.06
2b	.27**	.29**	.26**	.13**	.06	.21**	.12*	.19**	.04	.13*	.21**	.03
F1	.08	.08	.13	.04	.10	<.01	.06	.13	–.02	.14**	.25**	.04
F2	.26**	.25**	.28**	.25**	.18**	.31**	.17**	.24**	.09	.12*	.21**	.03
PCL-R	.24**	.23**	.28**	.18**	.17*	.21**	.14**	.23**	.04	.17**	.29**	.06

Note. 1a = score on PCL-R interpersonal facet; 1b = score on PCL-R affective facet; 2a = score on PCL-R impulsive and irresponsible lifestyle facet; 2b = score on antisocial behavior facet; F1 = score on PCL-R factor 1; F2 = score on PCL-R factor 2; PCL-R = total score on the Psychopathy Checklist-Revised; alcohol symptoms = number of DSM-IV alcohol dependence symptoms met; cannabis symptoms = number of DSM-IV cannabis dependence symptoms met; cocaine symptoms = number of DSM-IV cocaine dependence symptoms met; opioid symptoms = number of DSM-IV opioid dependence symptoms met; *p &;lt; .05; **p < .01.

Consistent with predictions, across the sample as a whole, the unique relationships between SUD criteria and psychopathy facet scores were not limited to scores on the antisocial behavior facet (2b) for any category of SUD. Examination of facet level scores separately by ethnicity revealed only one exception to this general pattern: among European Americans symptoms of alcohol dependence were related only to Facet 2b. As was the case with the zero-order correlations, psychopathy was unrelated to symptoms of cocaine dependence among African Americans.

Partial correlations revealed unique relationships between psychopathy facets and specific categories of SUD. Specifically, impulsive irresponsible behavior (Facet 2a) was uniquely related to three of four SUD criteria. The

TABLE 3. Partial Correlations for SUD Criteria and PCL-R Total, Factor, and Facet Scores

PCL-R Dimension	Alcohol Symptoms			Cannabis Symptoms			Opioid Symptoms			Cocaine Symptoms		
	All	EA	AA	All	EA	AA	All	EA	AA	All	EA	AA
1a	<.01	<.01	.02	<.01	.05	–.06	<.01	.04	–.05	.13*	.20**	.05
1b	–.08	–.05	–.06	–.10*	–.04	–.16*	–.05	–.03	–.05	–.03	<.01	–.04
2a	.13*	.08	.17*	.23**	.19**	.26**	.15**	.14*	.16*	.04	.03	.04
2b	.22**	.26**	.16*	.06	–.02	.15*	.06	.12	<.01	.06	.12	<.01
F1	–.06	–.05	–.02	–.09	<.01	–.20**	–.03	.01	–.08	.10	.18*	.03
F2	.26**	.24**	.26**	.26**	.16*	.36**	.17**	.21**	.12	.06	.10	.01

Note. Partial correlations after controlling for other facets in the case of 1a, 1b, 2a and 2b, and after controlling for other factor in the case of F1 and F2; 1a = score on PCL-R interpersonal facet; 1b = score on PCL-R affective facet; 2a = score on PCL-R impulsive and irresponsible lifestyle facet; 2b = score on antisocial behavior facet; F1 = score on PCL-R factor 1; F2 = score on PCL-R factor 2; alcohol symptoms = number of DSM-IV alcohol dependence symptoms met; cannabis symptoms = number of DSM-IV cannabis dependence symptoms met; cocaine symptoms = number of DSM-IV cocaine dependence symptoms met; opioid symptoms = number of DSM-IV opioid dependence symptoms met; *p < .05; **p < .01.

unique relationship between psychopathy and cocaine was confined to Facet 1a, which was unrelated to dependence symptoms for other substances. Also, the inverse relationship between deficient affective experience (Facet 1b) and cannabis was the only relationship involving this facet.

Regressions. After accounting for antisocial behavior (Facet 2b), stepwise entry of the remaining three facets added to postdiction of all SUD criteria, including cocaine dependence symptoms (Facet 1a), $R^2change = .02$, $p < .01$, cannabis dependence symptoms (Facet 1b, Facet 2a), $R^2change = .06$, $p < .01$, alcohol dependence symptoms (Facet 2a), $R^2change = .01$, $p < .05$, and opioid symptoms (Facet 2a), $R^2change = .02$, $p < .01$. Analyses by ethnicity revealed a pattern of results consistent with the partial correlations: after entering Facet 2b on the first step, no other facets entered the equation for alcohol dependence among European Americans or for cocaine dependence among African Americans. Otherwise the pattern of results was generally equivalent to that produced by the analysis involving the entire sample.[1]

Analyses in which APD symptoms were entered first, followed by stepwise entry of all four psychopathy facets, indicated that elements of psychopathy added uniquely to postdiction of SUD symptoms for alcohol (Facet 1b), $R^2change = .03$, $p < .01$; cannabis (Facet 2a, Facet 2b), $R^2change = .07$, $p < .01$, and cocaine (Facet 1a), $R^2change = .02$, $p < .05$; no other facets entered the equation to predict opioid dependence symptoms. Separate analyses by ethnicity produced a pattern of results for European Americans that was similar to analyses of the sample as a whole; psychopathy facets entered the equation to postdict symptoms of alcohol, cannabis, and cocaine dependence.[2] However, among African Americans, the relationship was more circumscribed; elements of psychopathy entered only to postdict symptoms of cannabis dependence (see Footnote 2). Analyses in which both indices of antisocial behavior were entered first into the regression produced an equivalent pattern of results to analyses in which APD alone was entered first; for alcohol, $R^2change = .03$, $p < .01$; for cannabis, $R^2change = .06$, $p < .01$; and for cocaine, $R^2change = .02$, $p < .05$. Similarly, the pattern of results for analyses conducted separate by

1. Separate analyses by ethnicity in which Facet 1a, Facet 1b, and Facet 2a were allowed stepwise entry after entering Facet 2b on the first step were as follows: for European Americans, cocaine dependence symptoms (Facet 1a), $R^2change = .05$, $p < .01$, cannabis dependence symptoms (Facet 2a), $R^2change = .04$, $p < .01$, and opioid symptoms (Facet 2a), $R^2change = .02$, $p < .05$; for African Americans, cannabis dependence symptoms (Facet 1b, Facet 2a), $R^2change = .08$, $p < .01$, alcohol dependence symptoms (Facet 2a), $R^2change = .03$, $p < .05$, and opioid symptoms (Facet 2a), $R^2change = .02$, $p < .05$.

2. Separate analyses by ethnicity in which all four facets were allowed stepwise entry after entering APD symptoms on the first step were as follows: for European Americans, cocaine dependence symptoms (Facet 1a), $R^2change = .04$, $p < .01$, cannabis dependence symptoms (Facet 2a), $R^2change = .07$, $p < .01$, and alcohol dependence symptoms (Facet 2a), $R^2change = .03$, $p < .05$, for African Americans, cannabis dependence symptoms (Facet 2a), $R^2change = .05$, $p < .01$.

ethnicity was equivalent to those when APD symptoms alone were entered on the first step.[3]

Supplementary Analyses. Analyses conducted in which the item "Need for stimulation/proneness to boredom" was excluded from calculation of scores on Facet 2a revealed an equivalent pattern of results to those in which facet scores were calculated using all items. This was also the case when the item "Irresponsibility" was excluded. Analyses in which Factor 2 scores were calculated without both of these items also produced a pattern of results equivalent to those presented in the primary analyses.[4]

DISCUSSION

Our findings corroborated the hypothesis that the relationship between psychopathy and SUD is not an artifact of general social deviance. Core elements of psychopathy added to the postdiction of SUD symptoms after controlling for symptoms of APD, and after a particularly conservative test controlling for both APD symptoms and the antisocial facet of the PCL-R. At the level of PCL-R total and factor scores, our findings are consistent with prior research (Hart & Hare, 1989; Smith & Newman, 1990); significant small to moderate positive relationships were identified between all SUD criteria and both PCL-R total and Factor 2 scores, whereas the relationships between SUD and Factor 1 were more circumscribed.

With regard to understanding relationships between SUD and Factor 2, examination of zero-order correlations indicated that both facets were related to all categories of SUD and that these relationships were generally

3. Separate analyses by ethnicity in which Facet 1a, Facet 1b, and Facet 2a were allowed stepwise entry after entering both APD symptoms and Facet 2b on the first step were as follows: for European Americans, cocaine dependence symptoms (Facet 1a), $R^2change = .04$, $p < .05$, cannabis dependence symptoms (Facet 2a), $R^2change = .07$, $p < .01$, and alcohol dependence symptoms (Facet 2a), $R^2change = .03$, $p < .05$; for African Americans, cannabis dependence symptoms (Facet 1b, Facet 2a), $R^2change = .08$, $p < .01$.

4. Zero-order and partial correlations in which Facet 2a scores were calculated without the item "Irresponsibility" produced a pattern of results that did not substantially differ from the primary results. Zero-order correlations in which Facet 2a scores were calculated without the item "Need for stimulation/proneness to boredom" also produced a pattern of significant results that did not substantially differ from the primary results. The only change was that partial correlations using this variable differed from the primary analysis with regard to symptoms of alcohol dependence: the *partial r* was significant in the original analysis but not with the item excluded. Analyses by ethnicity revealed that this difference was due primarily to a weaker relationship between symptoms of alcohol dependence and Facet 2a among African Americans. Regression analyses also produced a very similar pattern of results with and without the potentially contaminating items. The only notable difference was that, after entering Facet 2b on the first step, Facet 2a no longer entered the equation to predict alcohol dependence symptoms. Although calculation of facet scores with more than one item excluded is not recommended (Hare, 2003), analyses in which both items were excluded produced a pattern of results equivalent to analyses in which only "Need for stimulation/proneness to boredom" was excluded. Finally, zero-order and partial correlations in which Factor 2 scores were calculated without both items produced a pattern of significant results identical to those reported above.

similar in magnitude for impulsive and irresponsible lifestyle (Facet 2a) and for antisocial behavior (Facet 2b). However, examination of the partial correlations suggests that, with the exception of alcohol dependence criteria, the importance of impulsive and irresponsible lifestyle may eclipse that of antisocial behavior. Indeed, Facet 2a was uniquely related to SUD criteria for three of the four categories of SUD we examined, whereas Facet 2b was related to alcohol only. The relationship between impulsive and irresponsibility behavior (Facet 2a) and SUD was consistent with our predictions, and was generally consistent with models of SUD and personality that emphasize traits related to disinhibition (i.e., Trull et al., 2004). However, the relative unimportance of general antisociality (Facet 2b) was unexpected, and suggests that the relationship between antisociality and SUD may not involve antisociality per se, but may instead reflect overlap with the impulsive and irresponsible lifestyle common to those who engage in antisocial behavior.

With regard to the relationship between SUD and Factor 1, facet level examination identified a positive relationship between SUD and callous interpersonal style (Facet 1a), and a unique inverse relationship between SUD and deficient affective experience (Facet 1b). The relationship between SUD and the interpersonal facet (1a) was unexpected, and as such, further research is required to clarify whether this element of the psychopathic personality represents a specific risk factor for cocaine use. The inverse relationship between SUD and deficient affective experience was consistent with predictions, and complements prior research that has related substance use to higher levels of negative affect (i.e., Wills, Sandy, Shinar, & Yaeger, 1999). Also, this relationship was evident only after controlling for other elements of psychopathy, which is consistent with reports that inverse relationships between negative affect and Factor 1 of the PCL-R involve elements that are unique to that factor, as opposed to elements shared with generally antisocial lifestyle (Patrick, 1994). The deficient affective experience facet of psychopathy captures, in part, the lower levels of negative affect that have been proposed to characterize individuals higher in psychopathy (Cleckley, 1976). As such, the inverse relationship between SUD and deficient affective experience may be understood to reflect a relatively attenuated demand for affective self-regulation among individuals with higher scores on this facet. However, this relationship was relatively small in magnitude and therefore, our interpretation is somewhat tentative. Nonetheless, our identification of connections between SUD and elements of the callous and unemotional and interpersonal dimension of psychopathy (Factor 1) suggests that the nature of the comorbidity between psychopathy and SUD may be more complex than prior research has is suggested.

Although relationships between psychopathy and SUD were generally consistent across ethnicity, some ethnic differences were identified. Notably, stepwise regressions indicated that relationships were more generalized across SUD categories for European Americans compared to African Americans, particularly after controlling for antisociality. Such findings

highlight the fact that, although recent scholarship has provided evidence for the construct validity of the PCL-R with African Americans and European Americans (e.g., Cooke et al., 2001), correlates of the disorder may vary across ethnicity (Lorenz & Newman, 2002; Walsh, Swogger, & Kosson, 2004). The identification of ethnic differences in the correlates of SUD is also consistent with research that has identified individual level differences in the correlates of substance use between European Americans and African Americans (Brown, Flory et al., 2004; Brown, Miller, & Clayton, 2004). In general, our identification of ethnic differences speaks to the importance of considering ethnicity when conducting research involving correlates of psychopathy or SUD.

Finally, our identification of criterion-specific relationships between categories of SUD and elements of the psychopathic personality supports proposals that the disaggregated examination of multiple substance of abuse may reveal identify relationships between personality and SUD that might be overlooked if only a single index of SUD is used (Conway, Kane, Ball, Poling, & Rounsaville, 2003). This finding is also consistent with research that has identified personality level differences among users of different substances (i.e., LeBon et al., 2004; Flory et al., 2002; McGue et al., 1999). However, it should be noted that not all studies have identified such personality differences (i.e., Greene et al., 1993; Craig, 1988). Further, the magnitude of substance-specific relationships we identified ranged from small to moderate. Therefore, although personality differences between users of different substances may have clinical value in assessment and treatment planning (Jones, Johnson, Bigelow, & Strain, 2004), caution is warranted in interpreting the clinical implications of the current findings.

Several limitations of this study must be noted. First, the correlational nature of our analyses prohibits causal inference, and arguments could be made for the etiological primacy of either psychopathy or SUD. Second, because SUD was assessed solely via interview, recall biases, impression management, and other limitations associated with uncorroborated interview data may limit the validity of our diagnoses. Nonetheless, structured clinical interviews are commonly used in research on SUD, and interview-based diagnosis of SUD has accrued substantial criterion validity (Forman, Svikis, Montoya, & Blaine, 2004). Third, our analyses included the calculation of multiple correlations; as a result, the probability of committing a type 1 error may have been slightly inflated. However, because our results were largely consistent with our predictions and with prior research on psychopathy and on personality, it is unlikely that they were spurious. Finally, the assessment of psychopathy and SUD were conducted by the same individual, which might increase the possibility of predictor-criterion contamination. However, assessments were based on separate interviews that queried different domains. In addition, supplementary analyses excluding items with the largest potential for content overlap suggested that such contamination did not influence our results.

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