

Prediction and mediation of alcohol and drug abuse in criminals

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Running Head: substance use and criminals

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Although there is considerable overlap between antisociality and substance use problems, particularly among men, the basis of this connection is not well understood. Moreover, examination of the specific relationships, if any, between the constituent factors of psychopathy (i.e., emotional detachment and antisocial behavior) and substance use disorders is essentially uncharted.

The study of incarcerated criminals, with their often significant alcohol and drug abuse histories, affords a unique opportunity to examine these relationships. In the present study, diagnostic, case file, and self-report data collected on 329 male prisoners included Short Michigan Alcohol Screening Test (SMAST) and Short Drug Abuse Screening Test (SDAST) indices of problem drinking and other drug abuse, respectively. These scores served as dependent variables in regression analyses of data from three other measures: The Psychopathy Checklist-Revised (PCL-R), the Alcohol Family Tree, the Drinking Motives Questionnaire (DRM), and the Multidimensional Personality Questionnaire (MPQ). Psychopathy evaluations yielded three PCL-R scores: a total and two factor scores. Factor 1, termed emotional detachment, represents callous, manipulative and selfish traits and a lack of remorse, empathy, and emotional depth. Factor 2, reflects simpler antisocial behavior, and includes impulsivity, sensation seeking, and early conduct problems.

SPECIFIC AIMS

1. To replicate the general observation of a significant relationship between antisociality and substance use disorders, and then examine the more specific hypothesis (Smith & Newman, 1990) that *only* the antisocial characteristics, but not the core personality features of psychopathy, are significantly related to problematic substance use.
2. To ascertain if among prisoners, like their non-institutionalized counterparts, a paternal history of problematic drinking increases risk for problematic substance use.
3. To determine whether prisoners' self-reported motives for drinking predict problematic alcohol use.
4. To explore the role of personality dimensions, especially those related to stress, in problematic substance use.
5. Assuming the emergence of one or more of the relationships outlined in Specific Aims 1-3, to examine how psychopathy indices, drinking motives, and/or personality variables might act as mediators or moderators in the prediction of problematic substance use among male criminals.

METHOD

Participants:

Participants were drawn from the Federal Correctional Institution in Tallahassee, Florida. Three hundred twenty nine male prisoners (mean age = 32.36, std. dev.=7.80) volunteered for this study. Ethnic groups were represented in the following proportions: 45.6% Caucasian, 39.8% Black, 12.8% Hispanic and 0.3% Asian.

Materials and Procedures:

Diagnostic, case file, and self-report measures were collected for each participant. The following were considered in the present analysis:

- ◆ *Psychopathy Checklist-Revised* (PCL-R; Hare, 1990) Following PCL-R protocol, two independent ratings of psychopathy were derived from a two-hour structured interview and review of files. These were averaged to yield three PCL-R scores: two factor scores (as defined above) and a total score (PCL-TOT). Inter-rater reliability of PCL-R ratings were $r = 0.91, 0.82, \text{ and } 0.88$, respectively.

FACTOR I: Emotional Detachment (PCL-DET)

- GLIBNESS
- EGOCENTRISM
- DECEIT
- SHALLOW AFFECT, CALLOUSNESS
- LACK OF REMORSE/ BLAMING

FACTOR II: Antisociality (PCL-ANT)

- SENSATION-SEEKING
- EARLY CONDUCT PROBLEMS
- IRRESPONSIBILITY
- POOR BEHAVIOR CONTROL

- ◆ *Alcohol Family Tree* (FTR; Mann et al, 1985) provides a measure of problematic drinking among the participant's grandparents, parents, and siblings. For each of these relatives, the participant records a number coding for the type of drinking behavior exhibited by the relative (i.e., 1 = NEVER DRANK, 2 = SOCIAL DRINKER, 3 = POSSIBLE PROBLEM DRINKER, 4 = DEFINITE PROBLEM DRINKER, 5 = NO RELATIVE, 6 = DON'T KNOW/DON'T REMEMBER). Only history of alcohol use among fathers was considered in the current analysis.
- ◆ *Drinking Motives Questionnaire* (DRM; Cooper et al, 1992): This self-report questionnaire contains 15 items reflecting several possible motivations for alcoholic beverage consumption. Using a 4-point scale, participants rate how frequently each of the 15 listed reasons inspires them to drink. This measure yields three scale scores reflecting different motives for drinking alcohol: 1) Social motives (SOC), 2) Coping motives (COP), and 3) Enhancement motives (ENH).
- ◆ *Multidimensional Personality Questionnaire* (MPQ; Tellegen, A., 1982): This 300-item self-report inventory is designed to measure a broad spectrum of normal personality traits. The MPQ comprises 11 primary scales, measuring attributes including cheerfulness (Wellbeing, WEB), dominance (Social Potency, SOP), general anxiousness (Stress Reaction, STR), sociability (Social Closeness, SOC), impulsivity (Control, CTL), sensation seeking (Harm Avoidance, HAV), achievement (ACH), alienation (ALN), aggression (AGG), absorption (ABS), and traditionalism (TRD). These primary scales, when factor analyzed, cluster along 3 higher-order, orthogonal temperament dimensions: (a) Positive Emotionality (PEM), (b) Negative Emotionality (NEM), and (c) Constraint (CON).
- ◆ *Short Michigan Alcohol Screening Test* (SMAST; Selzer et al, 1975): This 13-item questionnaire, requiring participants to respond with "Yes" or "No" to each item, provided an index of problem drinking. Higher scores are indicative of increased problems with alcohol. The following cutoff scores were utilized in the classification of participants as problem/non-problem drinkers: 0-1= non-problem, 2= potential problem, 3+= problem.

SMAST SCORE	
0-1	non-problem drinker
2	possible problem drinker
3+	problem drinker

- ◆ *Short Drug Abuse Screening Test* (SDAST; Skinner, 1982): This 20-item questionnaire, requiring participants to respond with "Yes" or "No" to each item, was used as a measure of other drug abuse. Higher Scores are indicative of increased problems associated with drug use. The following cutoff scores were applied to classify participants as problem/non-problem users:

SDAST SCORE	
0-5	non-problem user
6+	problem user

The legitimacy of the SMAST as a useful measure of problem drinking was further established by its significant correlation with independent, self-report measures of the portion of drinking episodes that produced a "high" and the frequency of consumption of five or more drinks in a row per drinking occasion ($r=0.445$, $p<.001$ and $r=0.409$, $p<.01$, respectively).

Data Analysis Strategy:

Preliminary Analyses: The distributions of all dependent and predictor variables were examined, and, if necessary, transformed to conform to the assumptions of the analyses used and corrected for heteroscedasticity as appropriate. However, with the exception of the MPQ data, the pattern of results obtained using the modified data did not differ significantly from that obtained using the raw data, so for simplicity, only the latter are reported here. Results obtained from analyses of the MPQ data as predictors reflect square root transformations of the following variables: ACH, AGG, ASP, CON, CTL, HAV, INV, PEM, SCL, STR, TRD, VRI, and WEL.

No univariate outliers were identified by the median-interquartile method (med. +/- 2 interquartile range). Similarly, inspection of bivariate scatterplots did not suggest the presence of any additional, bivariate outliers.

Analyses: The SMAST and SDAST served as dependent variables in a series of regression analyses involving two predictors: PCL-R scores and drinking motives. In supplementary logistic regression analyses, the SMAST and SDAST were dichotomized by separating participants into problematic or non-problematic users on the basis of established cutoffs (see above). A stepwise regression analysis was performed for the MPQ content scale predictors.

Hierarchical regressions, including interaction terms, were performed to assess any mediational/moderational effects of PCL-ANT, COP, and MPQ content scales on substance use.

RESULTS

1. *PCL-R scores as predictors of substance use:*

Results of regression analyses using the PCL-R scores as predictors revealed differing relationships between psychopathy and alcohol problems as opposed to drug use. PCL-TOT did not predict continuous SMAST scores, but did significantly predict SDAST scores, adjusted $R^2=0.043$ $F(2,301)=7.8$, $p<.001$. Supplementary logistic regression analyses revealed similar results for the two measures of substance use. Increases in PCL-ANT scores were associated with increased odds of problem drinking and drug use, controlling for PCL-DET, $p<.05$. Conversely, increased PCL-DET scores were associated with decreased odds of problem drinking, controlling for PCL-ANT, $p<.05$.

Dependent Variable (continuous)	Overall Relationship
SMAST	$R^2_{adj} = .006$ $F(1, 302) = 7.787$ $p=.09$
SDAST	$R^2_{adj} = .087$ $F(1, 296) = 29.372$ $p < .001$

2. **PCL-R factor scores (PCL-ANT; PCL-DET):** PCL-ANT scores were positively related, and PCL-DET scores were negatively related, to *both* SMAST and SDAST scores.

SMAST			
	Effect Size	95% C.I.	Partial r
PCL-ANT	0.183, $p<.001$	[0.091, 0.275]	0.220
PCL-DET	-0.136, $p<.01$	[-0.239, -0.032]	-0.147
Full Model: $R^2_{adj}=0.043$ $F(2, 301) = 7.79$, $p<.001$			
SDAST			
	Effect Size	95% C.I.	Partial r
PCL-ANT	0.580, $p<.001$	[0.420, 0.740]	0.384
PCL-DET	-0.205, $p<.05$	[-0.386, -0.023]	-0.128
Full Model: $R^2_{adj}=0.150$, $F(2, 295) = 27.23$, $p<.001$			

2. *Paternal history of problematic drinking as predictor of substance use and its mediation/moderation of the relationship between antisociality and substance use:*

Using the FTR data, it was found that having a father with a history of alcohol problems was positively related to both SMAST and SDAST scores, with increasing odds (2.5, and 2.7 times more likely, respectively) of being a problematic substance user revealed in pertinent logistic regression analyses. Wald Statistic=10.83, $p < .001$ and 14.78, $p < .001$, respectively. These results indicate that like their non-institutionalized counterparts, prisoners demonstrate an increased risk of alcohol and/or other drug problems when their fathers were problem drinkers. In addition, PCL-ANT, but not PCL-DET or PCL-TOT were positively related to family history of alcoholism, $r = 0.117$, $p < .05$. Hierarchical regression analyses failed to show that paternal history of problem drinking mediated the relationship between antisociality and participant's drinking, nor did these analyses show that this relationship depended on paternal drinking.

SMAST: Classification Table

		Predicted Outcome		% Correct
		Non-Problem Drinker	Problem Drinker	
Observed Outcome	Non-Problem Drinker	104	29	78.20%
	Problem Drinker	68	48	41.38%

Overall Correct Classification: 61.04%

SDAST: Classification Table

		Predicted Outcome		% Correct
		Non-Problem User	Problem User	
Observed Outcome	Non-Problem User	131	40	76.61%
	Problem User	61	51	45.54%

Overall Correct Classification: 64.31%

3. *Drinking Motives as predictors of alcohol use and its mediation of the relationship between antisociality and alcohol use:*

Analyses of the data of the Drinking Motives Questionnaire revealed a significant relationship between drinking to cope (COP) and SMAST Scores, Pearson $r = .592$, $p < .001$. In contrast, drinking for social reasons was negatively related to problematic drinking. Additionally, PCL-ANT significantly predicted COP, $r = 0.219$, $p < .0001$. Perhaps most interesting, it was found that COP mediated the significant relationship between PCL-ANT and SMAST ($r = 0.171$, $p < .01$) reducing it to $r = 0.052$, n.s. Drinking to enhance positive emotions was unrelated to SMAST scores.

SMAST			
	Effect Size	95% C.I.	Partial r
COP	0.502, $p < .001$	[0.395, 0.609]	0.461
SOC	-0.128, $p < .01$	[-0.217, -0.040]	-0.159
ENH	-0.086, n.s.	[-0.008, 0.179]	0.101

Full Model: $R^2_{adj} = 0.361$, $F(2,315) = 60.90$, $p < .001$

Supplementary logistic regression analyses revealed a similar pattern of results.

4. *Personality Dimensions as predictors of substance use and its mediation/moderation of the relationship between antisociality and substance use:*

Stepwise regression analyses of the MPQ data revealed differing relationships between these personality variables and alcohol use as opposed to drug use. It was found that a personality pattern characterized by general anxiousness (STR) was moderately related to both continuous SMAST and SDAST scores, $r=0.169$, $p<.01$ and $r=0.229$, $p<.001$, respectively. However, for SDAST, this stress dimension was entered into the stepwise regression equation secondary to the positively predictive relationship revealed between the aggression dimension (AGG) and SDAST scores $r=0.236$, $p<.001$.

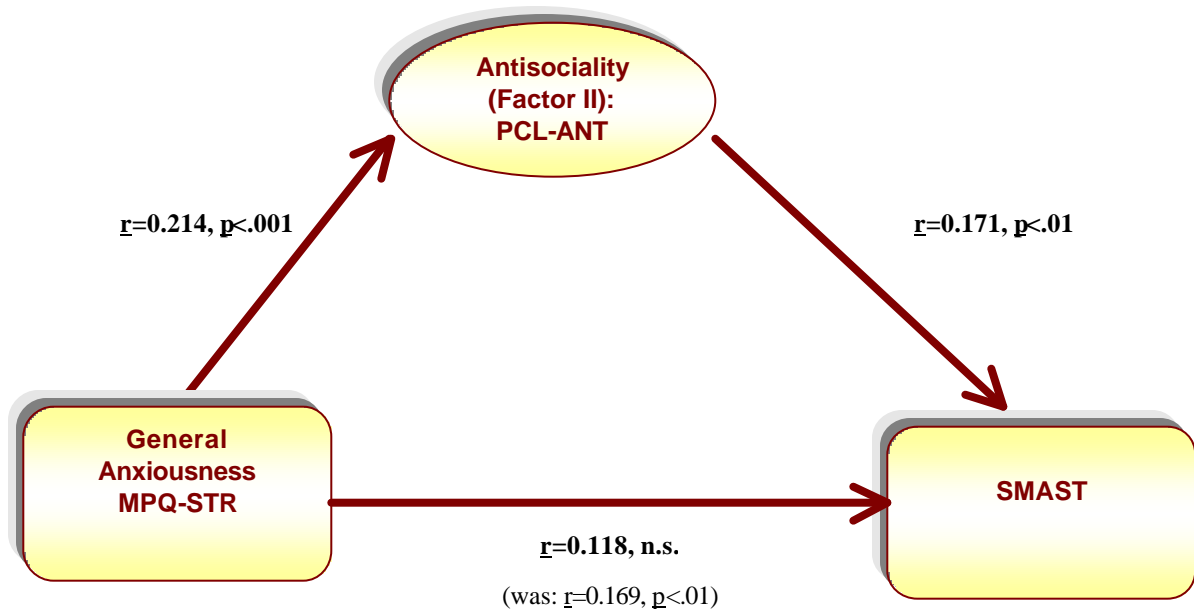
Further analyses revealed that PCL-ANT was positively related to both STR and AGG, $r=0.214$, $p<.001$ and $r=0.389$, $p<.0001$, respectively. PCL-DET was positively related to AGG $r=0.198$, $p<.001$ but not STR. Interestingly, it was found that the above revealed significant relationship between anxiety and alcohol use ($r=0.169$, $p<.01$) was mediated by PCL-ANT, reducing it, albeit slightly, to nonsignificance (partial $r=.118$, n.s.). For SDAST, however, the relationship between this general anxiety dimension and drug use *depended* on the relationship between antisociality and drug use, such that persons with a propensity toward antisocial acting-out behavior who *also* report extremely negative reactions to stress are at an even greater risk for development of problematic drug use. These results did not appear to be an artifact of the presence of overall psychopathy (high PCL-ANT and PCL-DET) in these low-stress, high antisocial prisoners, as PCL-DET was unrelated to STR.

Further exploratory analyses revealed that PCL-ANT mediated the significant relationship between aggression and drug use ($r=0.236$, $p<.001$), reducing it to $r=0.069$, n.s and that this aggression mediated the significant relationship between PCL-DET and SDAST ($r=-0.205$, $p<.05$) significantly reducing it to $r=0.075$, n.s.

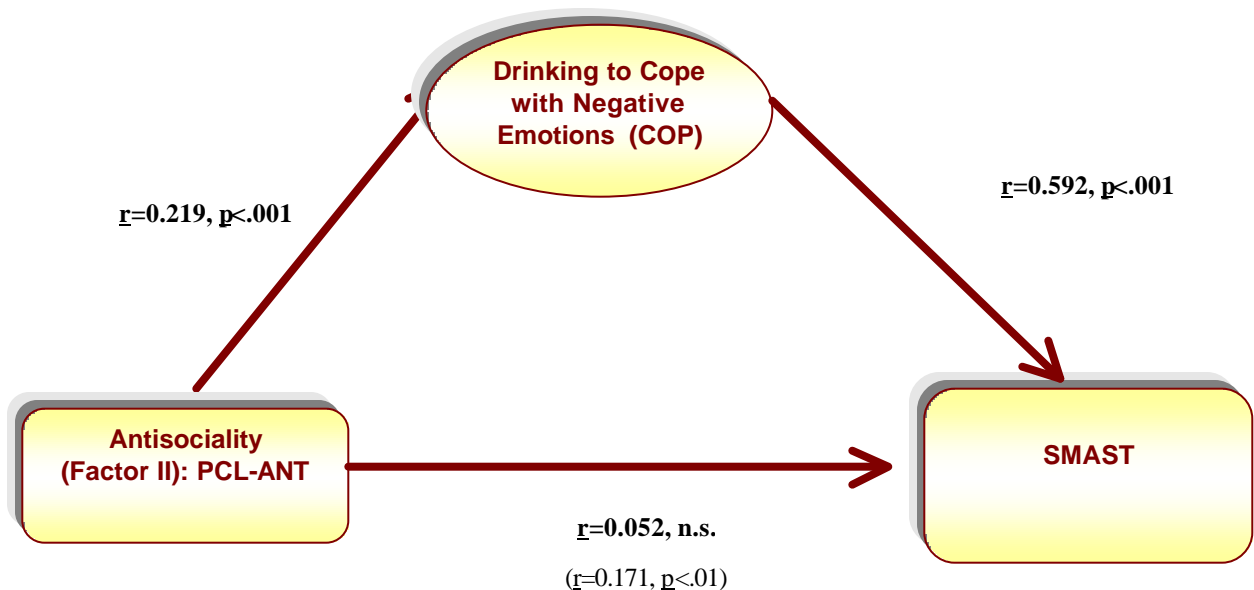
SMAST			
	Effect Size	95% C.I.	r
MPQ-STR (entered: step1)	0.379, $p<.01$	[0.090, 0.668]	0.166
Full Model: $R^2_{adj}=0.024$ $F(1, 234) = 6.66$, $p<.01$			

SDAST				
	Effect Size	95% C.I.	Partial r	ΔR^2
MPQ-AGG (entered: step1)	1.180, $p<.001$	[0.546, 1.814]	0.164	0.055
MPQ-STR (entered: step2)	0.659, $p<.05$	[0.104, 1.121]	0.153	0.022, $p<.05$
Full Model: $R^2_{adj}=0.070$, $F(2, 228) = 9.596$, $p<.001$				

THE EFFECTS OF MPQ-STR AND ANTISOCIALITY ON SUBSTANCE USE

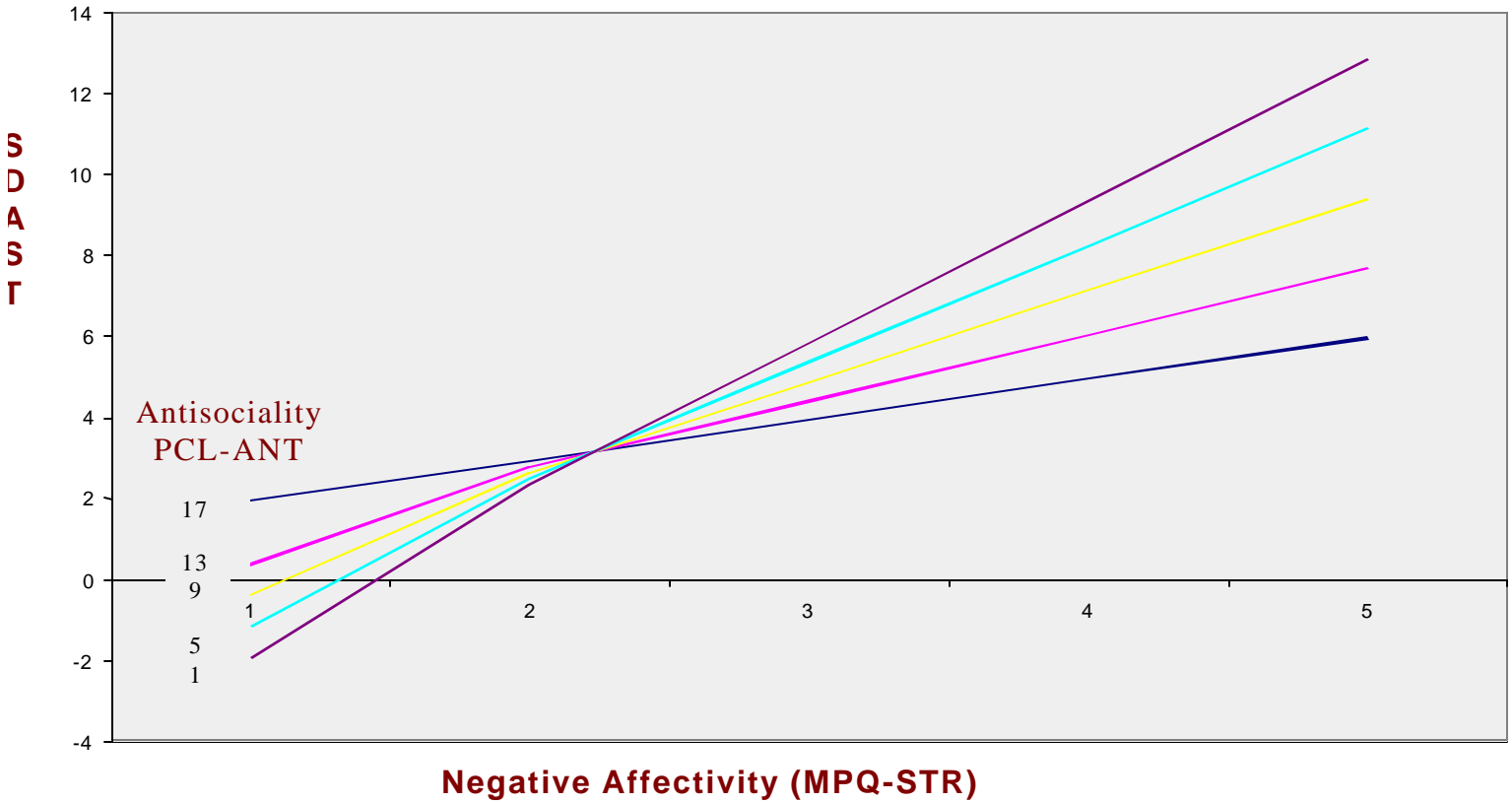


Hierarchical regression analyses revealed that PCL-ANT mediated the significant relationship between MPQ-STR and SMAST, significantly reducing it to non-significance.



Hierarchical regression analyses revealed that COP mediated the significant relationship between PCL-ANT and SMAST, significantly reducing it to non-significance

The effects of negative affectivity and antisociality on drug use



CONCLUSIONS

Specific Aim #1

- PCL-R Total Score as Predictors of Substance Use: Overall psychopathy, as indexed by PCL-R total scores, significantly predicted drug-related (i.e., SDAST), but not alcohol-related problems (i.e., SMAST).
- PCL-R Factor Scores (PCL-ANT, PCL-DET) as Predictors of Substance Use: Examination of the two PCL-R factor scores as predictors of substance-related problems revealed that only factor 2 (i.e., PCL-ANT), representing antisocial behavior, was positively related to both alcohol- and drug-related problems. In contrast, Factor 1 (i.e., PCL-DET), representing emotional detachment was negatively related to both types of problems. These findings are consistent with those of Smith and Newman (1990) which suggested that, at least among incarcerated criminals, only the antisocial component, but not the core personality component of psychopathy, is positively related to substance use disorders.

Specific Aim #2

- Paternal History of Problematic Drinking as a Predictor of Substance Use: Having a father with a history of alcohol problems was positively related to both SMAST and SDAST scores. These results suggest that individuals with problem-drinking fathers are at an increased risk for development of alcohol and/or drug related problems. These findings are also consistent with findings among non-institutionalized individuals. That is, in the general population, risk for alcohol-related problems is 3 to 5 times greater in children of alcoholics than in children of non-alcoholics (Cloninger, 1987). Yet the present study revealed slightly lower odds (i.e., 2.5 times as likely) among prisoners. One potential explanation for these results may be that, within an incarcerated population, individuals without problem-drinking fathers may have additional risk factors for alcohol-related problems, which may increase the likelihood that they too will have alcohol-related problems.

Specific Aim #3

- Drinking Motives as Predictors of Alcohol Use: The endorsement of a "drinking to cope with negative emotions" motivation for drinking was related to an increased risk for alcohol-related problems, whereas drinking for social reasons reduced this risk.

Specific Aim #4

- Personality Variables as Predictors of Substance Use: General anxiousness (MPQ-STR) was positively related to both alcohol (SMAST) and drug use (SDAST), suggesting that increased negative reactions to stress is associated with an increased risk for problematic substance use. Additionally, a personality pattern characterized by aggression and hostility (MPQ-AGG) is associated with the development of problematic drug, but not alcohol, use.

Specific Aim #5

- Paternal History of Problem Drinking as a Mediator/Moderator: Paternal history of problem drinking did not significantly mediate or moderate the relationship between antisociality and alcohol use, suggesting that presence/absence of paternal drinking problems does not explain this relationship, nor depend on it.
- Drinking Motives as Mediators/Moderators: Contrary to the usual characterization of criminals as sensation seekers whose substance use problems stem from an inclination to pursue stimulation through indulgence, we found that drinking for coping reasons significantly mediated the relationship between PCL-ANT and SMAST. Thus, like Cloninger's Type I alcoholics, the substance use of many of the antisocials in this sample appears to have been driven by a desire for a "quick fix" in the face of distress.
- Personality Variables as Mediators/Moderators:

- *MPQ-STR and SMAST*: Simple antisociality (PCL-ANT) significantly mediated the relationship between MPQ-STR and SMAST. This result, coupled with the above-mentioned finding that drinking for coping reasons significantly mediated the relationship between antisociality and problematic drinking, suggests that as stress reactivity or general anxiousness increases in antisocial individuals, they are increasingly likely to use alcohol to cope with negative emotional states and may consequently be at increased risk for alcohol-related problems.
- *MPQ-STR and SDAST*: Results suggest that those prisoners with a propensity toward antisocial behavior (i.e. high PCL-ANT), who also reported extremely negative reactions to stress (MPQ-STR) showed especially high risk for problematic drug use. This moderator effect of personal distress may also serve to protect highly antisocial individuals whose concurrent anxiety is low from the development of problematic drug use. Interestingly, this moderation cannot be attributed to overall level of psychopathy (i.e. the combination of high PCL-ANT and PCL-DET). Rather, in this prison sample, there appeared to be two distinct groups of antisocials: a generally anxious, high-stress reactive group whose risk for substance use problems is high, and a low stress reactive group who do not present with much problematic substance use.

FUTURE DIRECTIONS

Further examination of potential mediators/moderators of the relationship between antisociality and substance use disorders may be aid in further refining our current understanding of this relationship.

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