Published in final edited form as:

J Psychopathol Behav Assess. 2015 June 1; 37(1): 231–246. doi:10.1007/s10862-014-9462-x.

Psychometric Evaluation of the Substance Use Risk Profile Scale (SURPS) in an Inpatient Sample of Substance Users Using Cue-Reactivity Methodology

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Abstract

The current project sought to examine the psychometric properties of a personality based measure (Substance Use Risk Profile Scale; SURPS: introversion-hopelessness, anxiety sensitivity, impulsivity, and sensation seeking) designed to differentially predict substance use preferences and patterns by matching primary personality-based motives for use to the specific effects of various psychoactive substances. Specifically, we sought to validate the SURPS in a clinical sample of substance users using cue reactivity methodology to assess current inclinations to consume a wide range of psychoactive substances. Using confirmatory factor analysis and correlational analyses, the SURPS demonstrated good psychometric properties and construct validity. Further, impulsivity and sensation-seeking were associated with use of multiple substances but could be differentiated by motives for use and susceptibility to the reinforcing effects of stimulants (i.e., impulsivity) and alcohol (i.e. sensation-seeking). In contrast, introversion-hopelessness and anxiety sensitivity demonstrated a pattern of use more focused on reducing negative affect, but were not differentiated based on specific patterns of use. Taken together, results suggests that among those receiving inpatient treatment for substance use disorders, the SURPS is a valid instrument for measuring four distinct personality dimensions that may be sensitive to motivational susceptibilities to specific patterns of alcohol and drug use.

Keywords

Personality; Alcohol Use; Drug Use; SURPS; Craving

Approximately 22.2 million Americans have been diagnosed with a substance use disorder (SUD) during the past year, 2.8 million had both alcohol and illicit SUDs, 4.5 million illicit SUD only, and 14.9 million were diagnosed with an alcohol use disorder only (SAMHSA, 2013). Although SUDs are often viewed in research and clinical settings as unitary

constructs, great heterogeneity exists (Barbor & Caetano, 2007). Individual differences such as age of onset, motivation for use, personality dispositions, comorbidity, and family history can all provide important clinical information that could be used to distinguish individuals with substance use disorders. Partly with this in mind, researchers have sought to identify clinically meaningful individual differences associated with patterns of use, with the aim of improving our understanding of the etiology and treatment of substance use disorders (Babor & Caetano, 2007). One area that has shown promise in this regard are theories highlighting the importance of personality traits in drug abuse vulnerability (e.g., Conrod et al., 2000; Pihl & Petersen, 1995).

Although personality dimensions may be useful in predicting susceptibility to the development of SUDs (e.g., Cloninger, 1987; Conrod et al., 2000; Sher et al., 2005; Lejuez, et al., 2006; Krueger et al., 2007), there have been few self-report measures designed specifically to assess non-overlapping variance among personality dimensions known to be associated with increased substance use. To address this concern, Woicik, Stewart, Pihl, and Conrod (2009) developed the Substance Use Risk Profile Scale (SURPS), a brief self-report measure designed to assess four personality dimensions commonly associated with elevated substance use: Anxiety sensitivity (AS), Introversion/ Hopelessness (IH), Impulsivity (IMP), and Sensation-Seeking (SS). Although the SURPS has demonstrated good psychometric properties in non-clinical samples of undergraduates and adolescents (Woicik et al., 2009; Krank et al., 2011), confidence in the clinical applicability of this instrument depends upon its generalizability to persons diagnosed with substance use disorders and would be bolstered by systematic assessment of current inclinations to use particular psychoactive substances. The primary aim of the current study was to validate the SURPS in an inpatient clinical sample receiving treatment for substance use disorders. In doing so, it applied state-of-the-art assessments of reactivity to drug cues representing a wide range of psychoactive substances to evaluate individuals' responses to drug stimuli (specifically, desire to consume or avoid consuming) as a function of their personality profiles as measured by the SURPS.

Personality and Substance Use: Substance Use Risk Profile Scale (SURPS)

Research has demonstrated that personality factors may differentiate those diagnosed with SUDs in terms of their clinical profile (e.g., Lejuez et al., 2006, Cloninger, 1987), treatment response (e.g., Morgenstern et al., 1998), motivations to use (e.g., Comeau, Stewart, & Loba, 2001), and patterns of subjective, behavioral, and neurophysiological responses to the acute effects of substance abuse (e.g., Brunelle et al., 2004). Such findings are consistent with the notion that underlying personality traits may reflect differences in brain functioning related to motivational systems and susceptibility to seek out drug-reinforcement effects (e.g., Cloninger, 1987). In this connection, a theme of such research has been categorization based on the negative and positive reinforcement properties of alcohol and drugs. For example, anxiety sensitivity and introversion/hopelessness represent personality dimensions consonant with individual susceptibility to the negative reinforcement properties of various substances as a means of coping with negative affect. Specifically, anxiety sensitivity has been associated with an attraction to the tension-reducing effects of alcohol, as well as self-reported motives for alcohol use that reflect a desire to self-medicate and reduce negative affect (Conrod et al., 1998; Stewart & Phil, 1994; see Stewart et al., 1999 for a review). In

addition, research has demonstrated greater use of benzodiazepines and other anxiolytic substances (Bruce et al., 1995; Otto et al., 1992) in those high in anxiety sensitivity compared to those low in anxiety sensitivity, and such individuals are also less likely to report stimulants (e.g., cocaine, amphetamines) as their primary drug of choice (Norton et al., 1997).

In contrast, depression may represent a risk factor for alcoholism (Hartka et al. 1991; Helzer & Pryzbeck, 1988) and opiate abuse (Rounsaville et al., 1991). Further, it has been suggested that those who demonstrate greater interpersonal sensitivity, punishment sensitivity, or both may be more susceptible to drugs with analgesic properties (i.e., prescription opiates) and the analgesic effects of alcohol because of their inhibitory effects of punishment on previously rewarded behavior (Pihl & Peterson, 1995). As such, this inhibitory effect may be particularly desirable for those experiencing symptoms related to depression because of its ability to reduce the “pain” associated with affective states and social isolation. Further, evidence suggests that opiates may function similarly to antidepressants (Bodkin et al., 1995; Nyhuis et al., 2008) and therefore provide insight into the motivational components of opiate use. Thus, there is some research, although limited, suggesting that introversion, hopelessness and depression-proneness may be linked to sensitivity to alcohol and opiate drug use due to a self-medication process that is distinct from those observed in anxiety sensitive individuals and which focuses on reduction of depressive symptoms (Woicik et al., 2008; Conrod et al. 2000; Teesson et al., 2008; Stephens and Curtin, 1995; Merikangas et al., 1996).

With regard to personality dimensions that tap individual susceptibility for the positive reinforcement effects of drugs, impulsivity and sensation seeking are two that have been widely studied. Impulsivity has been linked to alcohol and stimulant drug dependence, greater lifetime risk for antisocial personality disorder, risky and dangerous behaviors, and coping patterns that reflect poor planning and a lack of ability to apply restraint when under stress (Sher, Bartholow, & Wood, 2000; Schuckit, 1998; Ball, 1995; Caspi, Begg, Dickson, Nigel, & Langley, 1995; Cloninger, 1987). This suggests that an impulsive subtype of substance abusers may be characterized by an inability to inhibit approach behavior in situations that have negative consequences when the situation is immediately and positively reinforcing (Conrod et al., 2000).

Although there has been some debate as to whether impulsivity and sensation seeking represent a single personality dimension (Zuckerman, 1994), recent evidence suggests separate dimensions with differing developmental trajectories (Steinberg et al., 2008) and patterns of substance use (Conrod, et al., 2000; Woicik, et al., 2009). Like impulsivity, high extraversion and sensation seeking have been associated with elevated drug use. There is also evidence demonstrating that sensation seeking may be associated with alcohol use over and above other drug use (Zuckerman & Kuhlman, 2000; Conrod et al., 2000; Woicik et al., 2009), particularly for its euphoric and intoxicating effects (Cooper et al., 1995; Forsyth & Hundleby, 1987; Comeau et al., 2001). Further, when compared to those high on impulsivity, those high on sensation-seeking may be more susceptible to the reinforcing effects of intoxication (Brunelle et al., 2004). Therefore, sensation seeking may represent a pathway to substance misuse that is independent of the impulsivity, antisocial pathway and

that is more focused on alcohol use and abuse for its positively reinforcing properties in particular.

Until the SURPS, there was no brief assessment instrument designed to capture non-overlapping variance among the four relevant personality dimensions. In a series of studies, Woicik and colleagues (2009) demonstrated both convergent and discriminant relationships between the SURPS subscales and theoretically relevant personality and drug use measures, suggesting that the four constructs assessed represented reliable and valid dimensions of personality linked to substance-related behavior. However, results were somewhat inconsistent for AS. Specifically, AS was associated with coping and conformity motives and problematic use among adolescents, but not related to frequency or quantity of alcohol use or other illicit substances. The authors hypothesized that perhaps significant patterns of avoidance of anxiety-provoking situations and greater abuse of alcohol and drugs to manage such anxiety are only only detectable at later stages of psychopathology (e.g., beyond young adulthood; Woicik, et al., 2009); thus, highlighting the need for investigations in clinical samples.

Cue-Reactivity, Ambivalence Model of Craving, and Substance Use

Cue reactivity has been broadly defined as conditioned responses to environmental stimuli or cues in which repeated drinking or drug use has occurred (e.g., Carter & Tiffany, 1999; Drummond et al., 1995), and involves the interplay among specific brain pathways that regulate both approach and avoidance motivation (Stewart, 1999; Anton, 1999; Robinson & Berridge, 2001; Sayette et al., 2000; Carter & Tiffany, 1999). To capture these competing motivations, Breiner, Stritzke, and Lang (1999) introduced an ambivalence conceptualization of craving (Ambivalence Model of Craving; Stritzke et al., 2007) that called for independent assessment of both approach and avoidance inclinations to use alcohol and drugs. Measurement of both approach and avoidance inclinations as separate dimensions have several clinical and methodological advantages (see Stritzke et al., 2007). More importantly, it has been argued that measuring “craving” exclusively in terms of approach inclination without consideration of a separate, yet concurrent, avoidance inclination may misrepresent a motivational disposition that is a combination of both, thereby significantly diminishing the utility of the information obtained (Breiner et al., 1999). Indeed, studies examining avoidance inclinations using both cue reactivity paradigms and self-report measures have provided support for its incremental validity in predicting substance-related variables in both non-clinical and clinical samples (e.g. Schlauch, Levitt et al., 2013; Schlauch, Breiner et al., 2012; Curtin et al., 2005; Stritzke et al., 2004; Schlauch, Stasiewicz, et al., 2012).

Based on this literature, examination of current inclinations to use substances of abuse requires careful consideration of various neurobiological systems and subsequent activation of multiple response domains, including approach and avoidant inclinations to use. These same systems appear to represent aspects of individual susceptibility for drug seeking behavior that the SURPS is hypothesized to assess via personality dimensions. Thus, the use of cue reactivity methodology to measure current desire to consume substances of abuse as a

function of personality profiles offers a unique opportunity to provide additional validation for the SURPS.

The Present Study

The SURPS has demonstrated good psychometric properties in non-substance abusing undergraduate and adolescent samples. Further, the SURPS has demonstrated clinical utility in a high risk youth sample, such that personality-targeted interventions improve both substance use and psychopathology outcomes (e.g. Conrod et al., 2011; Conrod et al., 2010; Conrod et al., 2008; Castellanos & Conrod, 2006). However, questions remain regarding its validity and clinical utility in substance dependent samples. The present study was designed to validate the SURPS in an inpatient sample and to expand previous findings using a state-of-the-art assessment of reactivity (specifically, approach motivation and avoidance motivation) to drug cues that represent a wide range of psychoactive substances. We predicted that:

1. A four-factor model (AS, IH, IMP, SS) will provide the best fit to the data, with all paths from observed variables to latent variables being significant in the appropriate directions.
2. Those high on IH will demonstrate a pattern of drug use that reflects negative reinforcement processes that are specific to depression and hopelessness. Specifically, we predicted that high IH will be associated with the highest rates of analgesic drug use, report using alcohol and drugs to cope with depression, and demonstrate the highest approach motivation for drugs with analgesic properties (i.e., pain medications).
3. Those high on AS will demonstrate a pattern of drug and alcohol use that reflects self-medication of anxiety symptoms. Specifically, we predicted that high AS will be associated with the highest rates of anxiolytic drug use, report using alcohol and drugs to cope with anxiety, and demonstrate the highest approach motivation for substances with anxiolytic properties (i.e., benzodiazepines).
4. Those high on IMP will demonstrate heavy and unconstrained pattern of drug use focusing on stimulant drugs. Specifically, we predicted that although IMP will demonstrate elevated rates across many substances, they will be associated with the highest rates of stimulant drug use, will demonstrate a pattern of motives associated with both positive and negative reinforcement, and will demonstrate the highest approach motivation for drugs with stimulant properties (i.e., cocaine, crack cocaine).
5. Those high on SS will demonstrate polysubstance use, but more focused on alcohol for the desire to experience the euphoric/stimulating effects of the drug. Specifically, we predicted that high SS will be associated with alcohol use, will report using alcohol to increase positive affect, and will demonstrate the highest approach motivation for alcohol.

Method

Participants

Participants ($N = 175$) were recruited from a 12-bed, short term, inpatient substance abuse treatment program that provides detoxification to individuals experiencing episodes of excessive substance use or withdrawal complications. Admission criteria to this program include a) being diagnosed with a SUD, b) being assessed as cooperative and non-violent, c) current alcohol or substance use at a quantity and frequency sufficient to have developed tolerance and be at risk of withdrawal symptoms when substances are terminated, d) require a minimum of 24 hour medical and nursing services, and e) absence of signs and symptoms requiring acute inpatient hospitalization (e.g., schizophrenia, actively suicidal). The treatment facility accepts both voluntary and involuntary admissions and has an average stay of 3.7 days.

Participants were predominantly male (68%) and Caucasian (58.1%; 28.8% African American, 4.4% Multi-racial, 3.8% American Indian/Native Alaskan, 5% Other), with a mean age of 41.6 ($SD = 11.2$). Sixty-six percent reported they were admitted voluntarily and approximately 95% reported that they were actively trying to reduce or quit their use of alcohol or drugs. At the time of participation, the average stay on the unit was 2.3 days ($SD = 1.3$). Forty-nine percent of the participants reported using multiple illicit substances (i.e., excluding alcohol and cigarettes) within the past 12 months (38% within the past 30 days) with significant alcohol and drug use problems (80.6% reporting daily smoking, 89.6% indicating multiple problems related to alcohol use; see Table 1 for summary of alcohol and drug use history).

Materials

Equipment—A HP Pavilion dv9000 computer (laptop) and a projection unit were used to project the substance cues and instruction slides onto a white projection screen. Microsoft Powerpoint © software was used to control the timing and presentation of the preparatory slides, substance cues, and rating periods.

Slides—Substance cue slides were presented to represent nine appetitive substance categories: alcoholic beverages ($n = 15$; 6 beer, 6 hard liquor, 3 wine), cigarettes ($n = 6$), marijuana ($n = 6$), cocaine ($n = 12$; 6 crack cocaine, 6 cocaine), prescription medication ($n = 12$; 6 benzodiazepines, 6 opiates), heroin ($n = 6$), food ($n = 6$; 3 “healthy”, e.g., vegetables and fruit, and 3 “unhealthy”, e.g., high fat, high calorie, high refined sugar foods), and non-alcoholic beverages ($n = 6$; 3 non-caffeinated and 3 caffeinated). Within all categories, individual cues varied by setting (e.g., bar, restaurant, home, neutral background) and activity state (e.g., substance sitting untouched on table, held in hand, or actively consumed). Brand names and identifying symbols were excluded to the extent possible. Further, to avoid contamination of reactivity to substance cues with reactions to affective information conveyed by people depicted with the substance, cues were displayed without human involvement whenever possible. When people were depicted along with a substance, facial expressions and body posture were kept neutral. The alcoholic beverage, cigarette, marijuana, crack-cocaine, food, and non-alcoholic beverage images were obtained from the

Normative Appetitive Picture System (NAPS; Stritzke et al., 2004; Schlauch, Breiner, et al., 2012), which has been previously validated for measuring both approach and avoidance inclinations in three independent samples (Schlauch, Breiner et al., 2012; Stritzke et al., 2004; Curtin et al., 2005). The remaining drug images were obtained through internet searches and were selected based on positive ratings by experienced users on initial content validity. In the current study, three sets of 23 images were created and presented in each of six possible presentation orders, counter-balanced across participants. Within each set, images were distributed quasi-randomly so that no cue type was repeated twice in a row and each category was not systematically followed by another particular category.

Substance Cue Reactivity Ratings

“Approach” and “Avoidance” ratings were obtained for each substance cue image presentation. Approach was defined as *wanting to consume* the depicted item, whereas avoidance was defined as *wanting to avoid consuming* the depicted item. Both were rated on a 9-point scale (0= “not at all” to 8= “very much”), and participants were told that the scales should be regarded as independent of one another. When rating each slide, participants were encouraged to base their ratings on their “initial reactions” to the slides rather than an eventual decision to use or abstain. Although the current study was primarily interested in approach inclinations, avoidance inclinations were assessed to improve the reliability of approach ratings by permitting participants to express both their desires to use and desires not to use (see Stritzke et al., 2007). Inter-item reliability of the slides for each drug class was excellent with coefficient alphas ranging from .91 to .97 on the approach rating scales.

Individual Difference Measures

Personality and Symptom Questionnaires—In addition to the Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009), participants completed six questionnaires assessing theoretically relevant personality and symptom domains: the revised UCLA Loneliness Scale (RLS; Russell, Peplau, & Cutrona, 1980), Social Interaction Anxiety Scale (SIAS; Mattick and Clarke, 1998), Depression, Anxiety, and Stress Scale (DASS-21; Henry & Crawford, 2005); Anxiety Sensitivity Inventory (ASI; Taylor, Koch, McNally, & Crockett, 1992); Barratt Impulsiveness Scale (BIS-II; Patton, Stanford & Barratt, 1995), and the Sensation Seeking Scale-V (SSS; Zuckerman, 1994).

The SURPS is a 23-item (4 point Likert scale “1 = Strong Disagree” to “4 = Strongly Agree”) measure designed to assess non-overlapping variance among four personality variables: anxiety sensitivity, introversion/hopelessness, impulsivity, and sensation-seeking. The SURPS has demonstrated good psychometric properties in non-clinical samples, including convergent, discriminant, and predictive validity (Woicik et al., 2009; Krank et al., 2011).

The RLS is a 20-item (4 point Likert scale “1 = never” to “4 = often”) measure that assesses satisfaction (and dissatisfaction) with social relationships consisting of 10 positively worded items and 10 negatively worded items. Internal consistency within the current sample was $\alpha = .83$.

The SIAS is a 20-item measure (5 point Likert scale “0 = never” to “4 = extremely”) designed to assess social anxiety in social situations. Internal consistency within the current sample was $\alpha = .91$.

The DASS-21 is a 21-item (4 point Likert scale “0=did not apply to me at all” to “3=applied to me very much, or most of the time”) designed to assess depression, anxiety and stress over the past week. Internal consistency within the current sample ranged from $\alpha = .86$ to .90.

The ASI is a 16-item questionnaire in which participants indicate on a 5-point Likert scale (“0= very little” to “4=very much”) the degree to which they fear anxiety symptoms. Internal consistency within the current sample was $\alpha = .91$.

The BIS-II is a 30-item (4-point Likert scale “1 = rarely/never” to “4 = almost always/always”) self-report measure comprised of three subscales that measure impulsivity: attention, motor impulsiveness, and non-planning subscales. Internal consistency within the current sample ranged was $\alpha = .82$.

The SSS is a 40-item forced response measure in which participants are instructed to choose from one of two statements comprised of four subscales related to sensation-seeking behaviors; thrill and adventure, experience seeking, disinhibition, and boredom susceptibility. Internal consistency within the current sample was $\alpha = .78$

Substance Use History—Substance use history was assessed using four measures: Short-Michigan Alcohol Screening Test (SMAST; Selzer, Vinokur & Rooijen 1975), Drug Abuse Screening Test (DAST; Skinner 1982), Survey of Alcohol and Drug Use (SADU; Johnston, O'Malley, Bachman, & Schulenberg, 2010), and a Drinking History Questionnaire (DHQ; Cahalan, Cisin, and Crossley, 1969).

The SMAST is a 13-item True/False measure consisting of items related to alcohol abuse and drinking related problems. The SMAST has been deemed reliable and valid for measuring alcohol related problems (e.g., Selzer et al., 1975; Hays, Merz, & Nicholas, 1995), with scores of 2 indicating possible problematic use and 3 or higher problematic use (Selzer et al., 1975). Internal consistency within the current sample was $\alpha = .90$.

The DAST is a 28-item True/False self-report instrument designed to tap various consequences related to drug abuse. Prior research has demonstrated the DAST to have strong reliability and validity as an index of substance use disorders (Skinner, 1982). Internal consistency within the current sample was $\alpha = .94$.

The SADU is a self-report measure taken from the Monitoring the Future Survey that contains questions regarding history and frequency of use across a broad range of drugs. Specifically, participants report on the number of occasions for which they used a variety of substances in their lifetime, during the past 12 months, and during the past 30 days.

The DHQ is a 10-item instrument based on the work of Cahalan, Cisin, and Crossley (1969) which assesses the quantity and frequency of current and past alcohol consumption, as well as subjective experiences and beliefs regarding the individual's own use of alcohol.

Drinking and Drug Motive Questionnaires—The modified Drinking Motives Questionnaire-Revised (modified DMQ-R; Grant et al., 2007) was used to assess alcohol use motives. The modified DMQ-R is a 28-item (4 point Likert scale “1 = almost never/never” to “4 = almost always/always”) instrument that measures five distinct motivations to use alcohol: to enhance social experiences, to cope with anxiety, to cope with depression, enhancement of positive emotions, and in response to peer pressure to use alcohol. The measure retains the original social, enhancement, and conformity scales of the DMQ-R (Cooper et al., 1992), but separates the coping (i.e., to relieve negative affect) motive to be anxiety or depression specific. To assess motives for illicit drug use, the modified DMQ-R items were adapted to reflect other drugs use. Internal consistency for both measures were excellent and ranged from $\alpha = .86$ to $.96$.

Procedure

Participants were recruited from an inpatient detoxification substance abuse program. Potential participants were told that the purpose of the study was to examine people's responses to pictures associated with common habits and that the study would require them to complete two tasks over one three-hour session: a) an image rating task (~60 minutes), and b) a self-report questionnaire task (~60–120 minutes). Each session could have up to 12 participants, though most sessions involved fewer than four participants.

Consenting participants completed the SURPS at baseline prior to the cue-reactivity task. Next, participants were given a pencil and binder that included three sections for the cue reactivity task, one for each set of 23 images. Instructions for rating the images on the two dimensions of approach and avoidance were provided followed by two practice trials. Each rating began with a 4-sec preparatory slide to focus attention. This was followed by presentation of a substance cue for 6-sec and then a 30-sec rating period. Based on findings from pilot studies of the present protocol and previous studies using similar procedures, it was expected that participants would generally finish their ratings within 15–20 seconds, leaving a rest period of about 10–15 seconds before the next preparatory slide signaled the conclusion of the current rating period. Participants were given a 5-min break between each set of pictures. Following the cue-reactivity task, participants were asked to complete additional questionnaires. All study protocols were approved by the university Institutional Review Board, as well as the ethics board at the treatment facility and the State Department of Children and Families Human Protections Review Committee.

Data Analytic Strategy

Confirmatory factor analysis (CFA), regression, and correlational analyses were used to examine the factor structure of the SURPS and its relations to personality and symptom inventories, drug use frequency, approach motivation for each drug class (cocaine, analgesics, anxiolytics, and alcohol), and motivations for use. Prior to analysis, all variables were examined for outliers and non-normality. When distributions continued to demonstrate

a trend towards non-normality after reigning in outliers (median + or – 2 interquartile ranges), parameters were estimated using maximum likelihood estimation with robust standard errors (MLR estimator option in MPLUS 7.0; Muthen & Muthen, 2012). Missing data were handled using full-information maximum likelihood.

Results

Factor Structure of the SURPS

To examine the factor structure of the SURPS, confirmatory factor analyses were conducted using MPLUS 7.11 (ML estimation; Muthen & Muthen, 2013). First we examined the original four-factor model proposed by Woicik et al., 2009. Results indicated a poor to adequate fitting model. Specifically, the chi-square for this model was significant ($\chi^2(224) = 418.92, p < .01$). The ratio of the model chi-square to the degrees of freedom was less than a two to one ($\chi^2/df = 1.87$), suggesting a good degree of fit. The SRMR was .08, also suggested adequate fit. The TLI and CFI were less than the recommended .90 to .95, (.75 and .78 respectively). Finally, RMSEA was .07, suggesting an adequate fit, but was significantly greater than that of the preferred value of .05 as indicated by the test of close fit ($p < .01$; 90 % CI .06 to .08).

Given the poor to adequate fit, modification indices were examined for areas of strain within the model. Consistent with findings from two studies (i.e., Woicik et al., 2009; Krank et al., 2011), modification indices indicated misspecified error covariances for IH items (three pairings: item 4 with item 1; item 1 with item 20, and item 7 with item 23). Since error covariance may result from systematic error either due to response characteristics or aspects among items themselves (i.e., content of the item; Brown, 2006), the error terms were permitted to covary. It is likely that these relationships were due to the similar wording used in these items and/or the fact that all items required scores to be inverted to calculate the total IH score. In addition, item 17 (“I am a failure”) yielded modification indices suggesting the item could cross load on AS and IMP. Finally, and consistent with previous findings (Woicik et al., 2009; Krank et al., 2011), modification indices suggested the model could be improved by the re-specification of item 16 (“I am interested in experience for its own sake, even if it is illegal”) from SS to IMP. As such, it was reasoned that items 17 and 16 did not discriminate among the factors adequately and were subsequently dropped from the model.

Results from the newly specified model indicated an excellent fitting model (see Table 2 for summary of factor loadings). Specifically, the chi-square for this model was non-significant ($\chi^2_{(180)} = 204.05, p = .11$) and the ratio of the model chi-square to the degrees of freedom was less than two to one ($\chi^2/df = 1.13$). The SRMR was .06, and the TLI and CFI were both .96. Finally, the RMSEA was .03 and was not significantly greater than that of the preferred value of .05 as indicated by the test of close fit ($p = .99$; 90% CI ranging from .000 to .045). Further, all paths in the model were significant in the predicted directions, and correlations among the factors were all well below .80 to .85 (factor correlations ranged from $-.01$ to $.41$), which is often used as the criterion to define poor discriminate validity among the factors (Brown, 2006). Finally, consistent with our hypothesis, analyses suggested that an alternative two-factor model including the broader dimensions of neuroticism and disinhibition ($\chi^2(185) = 382.98, p < .001$; $\chi^2/df = 2.07$; SRMR = .10; TLI

= .66, CFI = .70, RMSEA = .08) was a poorer fit than the four-factor model ($\chi^2(5) = 178.93$, $p < .001$).

Internal Consistencies and Relationship to other Personality and Symptom Inventories

Composite scores were computed for each of the subscales of the SURPS based on the findings from the best fitting model. Mean scores, standard deviations, and correlations among the subscales are reported in Table 2. Further, coefficient alphas for IH, AS, IMP, and SS were deemed acceptable for scales with fewer items (i.e., 5 items per subscale; see Table 3).

To test the convergent and discriminant validity of the SURPS, correlational analyses were conducted examining the relationship between the SURPS subscales and other theoretically relevant personality and symptom measures. Both zero-order and partial correlations (controlling for other SURPS scales) are presented in Table 4. Overall, results from the analyses demonstrated both convergent and discriminate validity such that the SURPS subscales correlated with other symptom and personality measures in the expected ways (i.e., significant and non-significant correlations when expected).

Relationship between the SURPS, Alcohol /Drug related Problems, and Frequency of Use

Regression analyses were conducted examining the relationship between the SURPS and severity of alcohol/drug problems as measured by alcohol quantity per occasion, the SMAST, and the DAST. Results indicated that only IH ($\beta = .203$, $p = .011$) and AS ($\beta = .204$, $p = .014$) were significantly related to number of drinks/occasion. In addition, IH ($\beta = .236$, $p < .001$) and AS ($\beta = .163$, $p = .032$) were associated with number of alcohol related problems as measured by the SMAST. Finally, only IMP was significantly associated ($\beta = .359$, $p < .001$) with drug related problems as measured by the DAST.

To examine the hypotheses that the SURPS subscales would differentially predict use, a multivariate regression analysis was conducted with frequency of use for each substance (alcohol, tobacco, marijuana, stimulants, opiates, benzodiazepines) regressed onto the four personality dimensions controlling for age, gender, and race (see Table 5 for summary of results). Results indicated that IH was positively associated with alcohol use frequency, but not frequency of opiate use. Further, and contrary to our prediction, AS was not significantly related to alcohol use frequency or benzodiazepine use frequency. However, AS was related to both frequency of cigarette and stimulant use, such that those high AS reported greater cigarette use and lower rates of stimulant use. Finally, and consistent with predictions, results indicated that IMP was positively related to frequency of stimulant use, as well as frequency of marijuana and opiate use, whereas SS was significantly associated with alcohol use, as well as frequency of opiate and benzodiazepine use.

SURPS and Approach Reactivity for Psychoactive Substances

To examine the hypotheses that the SURP subscales would differentially predict approach reactivity to drug cues, separate models were conducted for each substance class in which approach reactivity was regressed onto the four personality dimensions controlling for frequency of use during the past 30 days and related problems (see Table 6 for summary of

results). Consistent with our hypothesis, results indicated that IH was positively associated with approach motivation for opiates. However, IH was also significantly associated with approach reactivity for, cocaine, benzodiazepine and cigarette cues such that those high IH also reported greater approach motivation. Contrary to our prediction, AS was not significantly related to approach motivation for benzodiazepine cues, or any other psychoactive substance.

Results from the analysis revealed that IMP was significantly related to approach motivation for cocaine, such that those who are high on IMP report greater approach motivation. IMP was also significantly associated with approach motivation for benzodiazepine and cigarette cues. Results indicated that SS was significantly associated with approach reactivity for alcohol, such that those high on SS reported higher approach motivation. Finally, SS was also related to approach motivation for marijuana.

SURPS and Drinking and Drug Use Motives

Results from multivariate regressions (i.e., five motives regressed on the four personality dimensions; see Table 7 for summary of results) indicated that both IH and AS were associated with drinking to cope with depression and anxiety. Further, contrary to our prediction, IH also significantly predicted enhancement and social drinking motives, and AS predicted enhancement drinking motives. Contrary to our prediction, IMP did not significantly predict drinking motives while controlling for other personality dimensions. However, consistent with our prediction, IMP was significantly related to all drug use motives. With regard to SS, results indicated significant associations with drinking to enhance one's experience. In addition, SS was also positively related to social motives.

Discussion

Results suggest that among those receiving treatment for substance use disorders, the Substance Use Risk Profile Scale (SURPS) is a valid instrument for measuring four distinct personality dimensions that may be sensitive to motivational susceptibilities to specific patterns of alcohol and drug use. The SURPS demonstrated good structural properties, as well as convergent and discriminant validity. It should be noted, however, that several modifications were made to the model. These changes do not appear to change the conceptualization of the latent factors of interest, particularly given that two of the three changes are replications of original findings found in a non-clinical undergraduate sample. Nevertheless, these changes should be taken with some caution until replicated in independent clinical samples.

More importantly, the SURPS appears to be related to patterns of use that reflect differing susceptibilities to the motivational and reinforcement effects of various substances. Consistent with our hypothesis, IMP was significantly related to drug use severity (i.e., DAST), was associated with stimulant and opiate use after controlling for other personality dimensions, and demonstrated a non-specific pattern of motives for illicit drug use. IMP also demonstrated significant correlations with several drinking motives; however, such relationships became non-significant after controlling for other SURPS subscales. One particularly novel and theoretically consistent finding, IMP demonstrated an unconstrained

pattern of approach motivation for various substance use cues, including cocaine, benzodiazepines, and cigarettes, while controlling for frequency of use, associated problems, and other SURPS subscales. This suggests that when presented with substance use cues that offer immediate rewards (i.e., positive and negative reinforcement from substance use), those high on IMP may have difficulty inhibiting approach behavior. Indeed, those high on IMP may experience greater problems associated with their drug use due to deficits in their ability to monitor risk and conflict (Woicik et al., 2009), and therefore fail to alter one's behavior in the face of negative consequences.

Beyond frequent and severe substance abuse patterns, IMP may be specifically associated with stimulant use. IMP was the only personality variable to predict both frequency of stimulant use and approach motivation for cocaine. This finding is consistent with previous SURPS research among undergraduate (Woicik, et al., 2009) and adult samples (Brunelle et al., 2004), as well as recent animal and clinical models of impulsive substance use (e.g., Belin, Mar, & Dalley, 2008; Dalley et al., 2007). Thus, impulsivity appears to be associated with problematic substance use with a particular susceptibility to the reinforcing effects of stimulants.

In contrast to IMP, SS was associated with alcohol and prescription drug use (both opiates and benzodiazepines). Analysis of drinking motives suggested that SS is related to a positive reinforcement pathway to drinking, such that those high on SS drink to enhance positive affect and social situations. Further, and consistent with our prediction and previous research (e.g., Conrod et al., 2000; Brunelle et al., 2004; Woicik et al., 2009; Zuckerman & Kuhlman, 2000), SS was the only personality dimension to significantly predict both alcohol use and approach motivation for alcohol cues, suggesting that those high on SS may be particularly susceptible to the reinforcing effects of alcohol when compared to other substances of abuse. Indeed, there is evidence that when compared to high SURPS-IMP, high SURPS-SS responders demonstrate higher reward sensitivity as indexed by heart rate response following alcohol consumption (Brunelle et al., 2004).

Despite significant associations between SS and several substances other than alcohol, SS did not significantly predict illicit drug use motives. This is somewhat surprising given that SS is posited to represent a positive reinforcement pathway to use. However, it has been argued that motives may represent proximal causes that mediate the relationship between personality and substance use problems (e.g., Kuntsche, Knibbe, Gmel, & Engels, 2006; Stewart & Devine, 2000; Stewart, Loughlin, & Rhyno, 2001). For example, both coping and enhancement drinking motives have been found to mediate the relationship between personality and drinking problems (e.g., Kuntsche, von Fischer, & Gmel, 2008; Tragesser, Sher, Trull, & Park, 2007). Thus, non-significant findings between SS and other drug use motives may be due to fewer problems associated with substances other than alcohol. Indeed, there is evidence to suggest that SS may be specifically related to alcohol use disorders only when compared to the other personality dimensions (Conrod et al., 2000), and that impulsivity, not sensation-seeking, is associated with greater dependence among substance abusers (Verdejo-Garcia, Bechara, Recknor, & Perez-Garcia, 2007). This is also consistent with results from the current study suggesting that SS was not significantly associated with severity of drug use problems (i.e., DAST). Taken together, the current

results suggest that the SURPS appears to reliably distinguish between patterns of substances use related to IMP and SS.

Although there was some support for these negative reinforcement pathways to substance use, IH and AS were not associated with distinct patterns of use. There is an extensive literature examining the role of negative affect in substance use behaviors, with a growing recognition that anxiety and depression may represent two distinct pathways to use (e.g., Grant et al., 2007; Grant, Stewart, & Mohr, 2009; Conrod et al., 2000; Woicik et al., 2009; Merikangas, Stevens & Fenton, 1996). Results indicated that IH significantly predicted alcohol use, but not opiate use. Further, although IH significantly predicted drinking to cope with depression, it was also significantly associated with all other drinking motivations except conformity, suggesting that IH may not be related to any one particular self-report motive for alcohol use. IH was also associated with approach motivation for opiate, cocaine, cigarette and benzodiazepine cues, suggesting that IH may not represent a specific pathway to substances with analgesic effects, but instead associated with substance use more broadly.

There are several possible explanations for this pattern of results. First, numerous studies have found high rates of comorbidity between depression and substance abuse (e.g., Kessler et al., 1996), particularly among those seeking treatment (e.g., Rounsaville et al., 1991). It is possible that the IH subscale is measuring current depression within a clinical sample with severe substance use problems, rather than trait-like personality dimensions representing risk for substance use. Further, given the correlational nature of the current study, the temporal relationship between IH and substance use is unknown. While the SURPS is posited to assess personality traits that put an individual at risk for substance use, depression may also be a consequence of withdrawal. Indeed, evidence suggests that otherwise stable personality traits, particularly neuroticism may change significantly during the course of substance abuse recovery (e.g., Ball, Rounsaville, Tennen, & Kranzler, 2001).

Interestingly, the results for IH were strikingly similar to those for IMP, such that IH demonstrated a somewhat unconstrained pattern of use and non-specific motives for such use. Although the two dimensions were significantly correlated, the magnitude of the correlation along with findings from the factor analysis suggests that the two dimensions are indeed measuring separate constructs. There is, however, an emerging line of research beginning to examine the relationship between impulsivity and depression (e.g., Swann et al., 2008), with some evidence suggesting that impulsivity may predict future depression (e.g., Grano et al., 2007). It is also possible that the similarity in patterns of substance use for IH and IMP may best be accounted for by psychological disorders that are related to both traits (e.g., Bipolar Disorder, Borderline Personality Disorder), or the comorbidity often seen among psychiatric disorders related to substance use (e.g., antisocial personality disorder and major depression). Unfortunately, the current data did not allow us to explore this possibility. Nevertheless, whether IH represents a specific risk factor for substance use or is a maintaining factor for problematic use, the results continue to provide support for the importance of personality traits related to depression in substance use.

Finally, AS was significantly related to cigarette and stimulant use (inversely), quantity per drinking occasion, and alcohol problems, but not benzodiazepine use. Further, AS was

associated with drinking coping motives (both coping for anxiety and depression). Within a highly dependent sample of substance abusers such findings may not be all that surprising, as AS is not only a prominent feature in several models of anxiety symptomatology, it has also been associated with other psychological factors such as negative emotionality and depression (Taylor, Koch, Woody, & Mclean, 1996). However, AS was not associated with approach motivation for any of the psychoactive substances. Although results provided some support for a negative reinforcement pathway to substance abuse focused on reduction of negative affect more broadly (not specific to just anxiety symptoms), AS did not demonstrate a specific pathway to benzodiazepine abuse.

Findings for AS were similar to those of Woicik and colleagues (2009), such that AS did not predict frequency of use for alcohol or illicit substances, but rather drinking motives and problematic alcohol use. Although somewhat counterintuitive, there is evidence that anxiety is often inversely related to alcohol consumption (e.g., Morris, Stewart, & Ham, 2005) even though it is positively related to problematic alcohol use (e.g., Stewart, Morris, Mellings, & Komar, 2006). Woicik and colleagues (2009) hypothesized that the lack of association between AS and frequency of substance use in undergraduates and adolescents may have been due to the age of the samples, such that avoidance of anxiety-provoking symptoms and greater substance use may only be detectable in older samples, however, the results from the current study do not appear to support such a conclusion. Such inconsistencies have led some researchers to suggest that additional factors may play a role in the relationship between AS and substance use (e.g., Forsyth, Parker, & Finlay, 2003; Stewart et al., 1999). For example, there is evidence to suggest that traits related to anxiety (e.g., trait anxiety, BIS) significantly predict craving for alcohol under conditions that elicit negative affect only, and that cravings are motivated to reduce such affect (Kambouropoulos & Staiger, 2004). Further, AS has been associated with self-reports of drinking in negative situations, but not positive situations (e.g., DeHaas, Calamari, Blair, & Martin, 2001). This may account for the lack of associations between AS and approach motivation for various psychoactive substances and/or alcohol and drug use, such that the tasks completed in the current study were not designed to elicit negative affect or probe the type of situations in which use occurs. Thus, AS may predict substance use outcomes indirectly through mediating variables such as situational context. Future investigations should examine the ways in which AS may influence other factors related to substance use. Taken together, findings provide some support that IH and AS may represent negative reinforcement pathways to use, however, more research is needed to fully understand their clinical utility.

Limitations and Future Directions

Overall, the SURPS is a valid instrument that measures four distinct personality variables and may be sensitive to motivational susceptibilities to specific patterns of alcohol and drug use within an inpatient clinical sample. However, there are several limitations to the current study that should be noted. Most importantly, the current study relied heavily on correlational methods that limit the ability to draw conclusions about the predictive validity of the SURPS. This is particularly important given the inconsistency of some of the results across adolescent, undergraduate, and clinical samples. It will be important for future research to examine the predictive validity of the SURPS through the use of longitudinal

methods, especially as the personality dimensions measured by the SURPS are posited to represent risk for the development of substance use problems. In this connection, future research should explore how personality profiles change over the course of the development of substance use problems. Indeed, there is some evidence to suggest that neuroticism and coping motives may change during young adulthood resulting in “maturing out” of problem drinking (Littlefield, Sher, & Wood, 2010). Further, such investigations would seem to be particularly important for the personality dimensions of IH and AS, as these dimensions could very well represent consequences of problematic use rather than specific risk factors.

Finally, the current study was not designed to examine how personality may influence substance use behaviors indirectly. An infrequently visited aspect of substance use (or any behavior) that may provide insight into the current findings is the role of proximal and distal influences of such behaviors. Substance use is an equifinal outcome in which personality variables only represent a small influence. Indeed, examination of the variance explained by personality variables in many of the outcome measures tends to support such a conclusion. It is also possible that certain personality variables may vary in the proximity to actual behavior. For example, impulsivity, as a personality construct, may be more closely related in the behavioral chain to actual behavior (i.e., picking up a drink) than say, introversion/hopelessness or anxiety sensitivity, which may operate more indirectly through emotional processes and depend on situational contexts. As such, examination of personality variables that exert indirect effects may be more difficult to detect and thus result in nonsignificant findings or small effect sizes. With this limitation in mind, one of the major goals of the current study was to examine reactivity to pictorial cues representing a wide range of psychoactive substances, under the assumption that such reactivity may be more closely related to personality in the behavioral chain to use. Although results of the current study appear to provide some support for this notion (significant relationships despite non-significance with use), such motivation may also vary depending on situational contexts (Kambouropoulos & Staiger, 2004). Unfortunately such analyses were beyond the scope of the current study. As such, future research should attempt to model these variables in order to examine both the indirect and direct effects of personality on variables related to substance use.

In summary, the SURPS may prove to be useful tool when investigating the mechanisms underlying individual differences in drug responses within clinical samples. Furthermore, its brevity not only holds benefits to clinical research, but also clinicians as it may be sensitive to the underlying motivational processes associated with substance use. Such processes could then be the target of treatment interventions and prevention efforts. Indeed, the clinical utility of the SURPS has already begun to show promise in the development of brief interventions for adolescents (e.g., Conrod et al., 2011). Thus, continued research exploring the clinical utility of the SURPS will be an exciting area for researchers that may provide guidance for new approaches to the prevention and treatment of substance use disorders.

Acknowledgments

This research was supported in part by grants T32AA007583 and K23AA021768 awarded from the National Institute on Alcohol Abuse and Alcoholism.

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Table 1**Alcohol and Drug Use History**

	% of Sample Using			
	Never	Lifetime	Last 12 Months	Last 30 Days
Marijuana	14.0	86.0	50.9	36.0
Opiate (any)	44.7	55.3	36.9	26.1
Heroin	84.1	15.9	6.2	3.1
Pain medications	46.3	53.7	36.9	25.6
Benzodiazepines	50.0	50.0	34.0	27.2
Stimulant (any)	23.8	76.2	49.4	37.9
Cocaine	36.0	64.0	33.3	23.3
Crack Cocaine	46.3	53.7	36.2	27.5
Amphetamine	59.0	41.0	11.5	9.6

	M	SD	Median
<u>Alcohol Use</u>			
Occasions/Week	6.73	7.09	4.50
Quantity/Occasion	7.25	4.11	8.00
<u>Cigarette Use</u>			
# Cigarettes/day	17.27	13.32	20.00
<u>Substance Use Problems</u>			
SMAST	7.75	4.20	9.00
DAST	12.64	8.34	14.00

Note: SMAST = Short Michigan Alcohol Screening Test; DAST = Drug Abuse Screening Test

Table 2

Summary of results for final four-factor model

	Estimate	SE	p-value	β
<u>Introversion/Hopelessness</u>				
1. I am content	.385	.095	<.001	.395
4. I am happy	.621	.079	<.001	.659
7. I have faith that my future holds great promise	.594	.096	<.001	.549
13. I feel proud of my accomplishments	.432	.090	<.001	.415
20. I feel pleasant	.577	.075	<.001	.645
23. I am very enthusiastic about my future	.643	.086	<.001	.639
<u>Anxiety Sensitivity</u>				
8. It's frightening to feel dizzy or faint	.481	.087	<.001	.466
10. It frightens me when I feel my heart beat change	.794	.087	<.001	.734
14. I get scared when I'm too nervous	.465	.079	<.001	.494
18. I get scared when I experience unusual body sensations	.665	.082	<.001	.658
21. It scares me when I'm unable to focus on a task	.369	.083	<.001	.381
<u>Impulsivity</u>				
2. I often don't think things through before I speak	.485	.091	<.001	.455
5. I often involve myself in situations I later regret	.443	.078	<.001	.486
11. I usually act without stopping to think	.700	.083	<.001	.705
15. Generally, I am an impulsive person	.610	.084	<.001	.604
22. I feel I have to be manipulative to get what I want	.395	.088	<.001	.398
<u>Sensation Seeking</u>				
3. I would like to skydive	.744	.118	<.001	.567
6. I enjoy new and exciting experiences even if they are unconventional	.455	.082	<.001	.502
9. I like doing things that frighten me a little	.555	.089	<.001	.569
12. I would like to learn how to drive a motorcycle	.612	.120	<.001	.462
19. I would enjoy hiking long distances in wild and uninhabited territory	.645	.110	<.001	.524

Note: Estimate = unstandardized estimates; SE = standard errors; β = standardized estimates.

Table 3

Means, Standard Deviations, and Correlations among the SURP subscales

	1	2	3	4	<i>M</i>	<i>SD</i>	α
1. I/H	--				2.27	.67	.76
2. AS	.11	--			2.77	.67	.68
3. IMP	.27***	.28***	--		2.68	.64	.65
4. SS	.01	.04	.18*	--	2.46	.75	.65

I/H=Introversion/Hopelessness, AS=Anxiety Sensitivity, IMP=Impulsivity, SS=Sensation-Seeking

 $p < .001$,**
 $p < .01$,*
 $p < .05$,

Table 4

Zero-order (and Partial Correlations) between the SURPS and Other Personality and Symptom Measures

	RLS	SIAS	DASS-DEP	DASS-ANX	ASI	IMP-ATT	IMP-M	IMP-NP	SSS
I/H	.46 ^{***} (.41 ^{***})	.31 ^{***} (.25 [*])	.55 ^{***} (.50 ^{***})	.43 ^{***} (.37 ^{***})	.34 ^{***} (.27 [*])	.36 ^{***} (.27 [*])	.23 [*] (.14)	.32 ^{***} (.26 [*])	.07 (.08)
AS	.20 [†] (.12)	.27 [*] (.22 [†])	.36 ^{***} (.31 ^{***})	.50 ^{***} (.46 ^{***})	.61 ^{***} (.59 ^{***})	.14 (.03)	-.08 (-.24 [*])	.03 (-.17)	-.12 (-.16)
IMP	.29 [*] (.17)	.21 [*] (.08)	.33 ^{***} (.17)	.38 ^{***} (.22 [†])	.35 ^{***} (.20 [†])	.47 ^{***} (.38 ^{***})	.50 ^{***} (.49 ^{***})	.40 ^{***} (.38 ^{***})	.14 (.05)
SS	.01 (.01)	.09 (.10)	.04 (.06)	.08 (.11)	.10 (.14)	.20 [†] (.20 [†])	.13 (.11)	-.05 (-.09)	.63 ^{***} (.63 ^{***})

Note: Bolded text indicates highest correlations among measures. I/H=Introversion/Hopelessness, AS=Anxiety Sensitivity, IMP=Impulsivity, SS=Sensation-Seeking, RLS=Revised-UCLA Loneliness Scale; SIAS= Social Interaction Anxiety Scale; DASS=Depression Anxiety and Stress Scale; BIS ATT= Barratt Impulsiveness Scale – Attentional; BIS M= Barratt Impulsiveness Scale – Motor; BIS NP Barratt Impulsiveness Scale; SSS= Sensation Seeking Scale.

p < .001,

*
p < .01,

†
p < .05,

Table 5

Relationships between the SURPS and of alcohol and drug use (multivariate regression)

	Estimate	SE	p-value	β
<u>Alcohol Use (Occasions/Week)</u>				
Age	.134	.051	.008	.218
Gender	-.227	.295	.441	-.064
Race	-.309	1.192	.795	-.027
I/H	2.296	.810	.005	.224
AS	.667	.840	.427	.064
IMP	.463	.954	.627	.042
SS	1.520	.769	.048	.161
<u>Cigarette Use (past 30 days)</u>				
Age	.022	.013	.095	.134
Gender	.100	.073	.173	.105
Race	-.018	.309	.954	-.006
I/H	-.087	.223	.696	-.032
AS	.465	.216	.031	.165
IMP	.172	.264	.516	.058
SS	.287	.208	.168	.113
<u>Marijuana Use^a</u>				
Age	-.049	.017	.004	-.244
Gender	-.018	.087	.833	-.016
Race	.287	.366	.433	.077
I/H	-.039	.291	.893	-.012
AS	.017	.278	.951	.005
IMP	.792	.267	.003	.222
SS	.287	.366	.785	.089
<u>Stimulant Use^a</u>				
Age	-.024	.018	.182	-.113
Gender	.256	.107	.016	.207
Race	1.000	.431	.020	.252
I/H	.104	.271	.700	.030
AS	-.705	.298	.018	-.193
IMP	.787	.294	.007	.206
SS	.275	.246	.265	-.068
<u>Benzodiazepine Use^a</u>				
Age	-.033	.014	.019	-.178
Gender	-.150	.102	.141	-.139
Race	-1.048	.315	.001	-.302
I/H	.104	.271	.700	.033
AS	-.131	.256	.610	-.0471

	Estimate	SE	<i>p</i> -value	β
IMP	.280	.284	.325	.084
SS	.761	.215	<.001	.264
<u>Opiate Use</u> ^a				
Age	-.041	.016	.009	-.196
Gender	-.116	.121	.337	-.097
Race	-1.285	.336	<.001	-.334
I/H	-.014	.280	.959	-.004
AS	.040	.239	.867	.011
IMP	.602	.259	.020	.163
SS	.827	.231	<.001	.259

Note: Bolded text indicates significant results. I/H=Introversion/Hopelessness, AS=Anxiety Sensitivity, IMP=Impulsivity, SS=Sensation-Seeking, Estimate = unstandardized estimates, SE = standard errors, β = standardized estimates.

^aNumber of occasions past 12 months.

Table 6

Relationships between the SURPS and approach reactivity

Model	Estimate	SE	p-value	β
<u>1. Alcohol Approach</u>				
Frequency of Use (per week)	.076	.028	.008	.215
SMAST	.184	.043	<.001	.306
I/H	.291	.283	.303	.080
AS	.212	.244	.386	.057
IMP	.338	.269	.208	.087
SS	.486	.230	.034	.145
<u>2. Cigarettes Approach</u>				
Frequency of Use ^a	1.083	.061	<.001	.705
I/H	.474	.223	.034	.113
AS	-.024	.247	.924	-.005
IMP	.452	.229	.049	.100
SS	.189	.208	.362	.049
<u>3. Marijuana Approach</u>				
Frequency of Use ^a	.767	.093	<.001	.590
DAST	.032	.021	.131	.098
I/H	.142	.202	.482	.036
AS	-.194	.234	.407	-.048
IMP	-.061	.274	.825	-.014
SS	.617	.200	.002	.170
<u>4. Cocaine Approach</u>				
Frequency of Use ^a	.460	.084	<.001	.459
DAST	.009	.020	.645	.035
I/H	.608	.204	.003	.195
AS	-.032	.232	.889	-.010
IMP	.648	.220	.003	.194
SS	.256	.170	.132	.089
<u>5. Benzodiazepine Approach</u>				
Frequency of Use ^a	.609	.098	<.001	.449
DAST	.042	.022	.050	.140
I/H	.747	.242	.002	.202
AS	-.136	.260	.601	-.036
IMP	.519	.243	.033	.131
SS	.318	.209	.128	.124
<u>6. Opiate Approach</u>				
Frequency of Use ^a	.622	.092	<.001	.490
DAST	.052	.024	.029	.166

Model	Estimate	SE	<i>p</i> -value	β
I/H	.641	.263	.015	.167
AS	-.154	.239	.518	-.039
IMP	.371	.262	.157	.091
SS	.087	.220	.694	.025

Note: Bolded text indicates significant results. I/H=Introversion/Hopelessness, AS=Anxiety Sensitivity, IMP=Impulsivity, SS=Sensation-Seeking, SMAST=Short Michigan Alcohol Screening Test, DAST=Drug Abuse Screening Test, Estimate = unstandardized estimates; SE = standard errors; β = standardized estimates.

^a Number of occasions past 30 days

Table 7

Relationships Between the SURP Subscales and Drinking and Drug Use Motives

	Drinking Motives				Drug Use Motives*			
	Estimate	SE	p-value	β	Estimate	SE	p-value	β
Cope w/ Anxiety								
I/H	.489	.098	<.001	.337	.155	.131	.236	.103
AS	.341	.107	.001	.229	.045	.142	.754	.027
IMP	.131	.125	.295	.085	.648	.125	<.001	.391
SS	.047	.089	.595	.035	.212	.122	.081	.146
Cope w/ Depression								
I/H	.462	.110	<.001	.300	.182	.139	.192	.115
AS	.447	.120	<.001	.283	.033	.150	.825	.020
IMP	.138	.137	.315	.084	.684	.129	<.001	.394
SS	.007	.099	.947	.005	.227	.126	.071	.149
Enhancement								
I/H	.356	.108	<.001	.260	.120	.129	.354	.076
AS	.231	.116	<.047	.165	-.130	.139	.348	-.077
IMP	.087	.119	.462	.060	.748	.128	<.001	.434
SS	.165	.081	.042	.131	.202	.122	.098	.134
Social								
I/H	.643	.268	.016	.375	.052	.097	.593	.045
AS	-.038	.175	.826	-.022	-.080	.112	.475	-.064
IMP	-.116	.165	.483	-.063	.470	.101	<.001	.371
SS	.202	.097	.039	.128	.122	.095	.198	.110
Conformity								
I/H	.148	.084	.078	.134	.094	.088	.286	.116
AS	.039	.099	.695	.034	-.191	.099	.053	-.219
IMP	.115	.089	.197	.098	.230	.079	.004	.258
SS	-.016	.080	.837	-.016	.072	.059	.224	.092

Note: Bolded text indicates significant results. I/H=Introversion/Hopelessness, AS=Anxiety Sensitivity, IMP=Impulsivity, SS=Sensation-Seeking, Estimate = unstandardized estimates; SE = standard errors; β = standardized estimates.

* Analysis based upon those reported ever using an illicit substance ($n = 144$)