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Anxiety sensitivity, controllability, and experiential avoidance and their relation to drug of choice and addiction severity in a residential sample of substance-abusing veterans[☆]

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Abstract

The aim of the present study was to evaluate anxiety-related psychological risk factors (e.g., anxiety sensitivity, perceived uncontrollability, emotional avoidance) and their relation to drug of choice and addiction severity in an inpatient residential substance abuse population. Fully detoxified veterans ($N=94$) meeting criteria for Axis I substance abuse disorders were enrolled in a 28-day residential substance abuse treatment program and completed the following measures at intake and discharge: Anxiety Sensitivity Index, Body Sensations Questionnaire (BSQ), Acceptance and Action Questionnaire (AAQ), Beck Depression Inventory (BDI; intake only), and the Anxiety Control Questionnaire (ACQ). Consistent with the expectation, veterans who reported more distress over bodily sensations (anxiety sensitivity, BSQ) and depressive symptoms (BDI) were more likely to avoid experiencing negative affect (AAQ) and perceived themselves as lacking in control (ACQ). Further, extent of avoidance, and to a lesser extent, controllability, discriminated between participants as a function of primary and comorbid diagnostic status, whereas anxiety sensitivity did not. No relation was found between anxiety sensitivity and drug of choice, and relations between assessed psychological factors and domains of addiction severity were mixed. Findings suggest that heightened bodily sensitivity, emotional avoidance, and perceived uncontrollability are common sequelae of patients seeking

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residential substance abuse treatment, but they do not contribute uniquely to drug of choice and measures of addiction severity. Theoretical and treatment implications are discussed with particular emphasis on approaches that may increase coping with untoward bodily cues, decrease avoidance of negative affect, and improve patient's sense of personal control over their responses and the environment.

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1. Introduction

It is generally recognized that substance abuse and withdrawal are associated with a wide range of positive and negative psychophysiological effects that contribute, in part, to appetitive and aversive motivational systems and affective states (Wise, 1988). Moreover, substance abusers generally have a poor tolerance for unpleasant bodily states and negative affect that results from their ongoing abuse of controlled substances and cycles of withdrawal (Araujo, Goldberg, Eyma, & Madhusoodanan, 1996; Lacks & Leonard, 1986). Indeed, relapsed alcoholics often identify negative somatic and emotional states as causal factors in relapse (Carpenter & Hasin, 1999; O'Brien, Ehrman, & Ternes, 1984; Tiffany & Drobes, 1990)—a finding that has been confirmed in laboratory-based studies (e.g., Cooney, Litt, Morse, Bauer, & Gaupp, 1997; Litt, Cooney, & Morse, 2000). For example, Cooney et al. (1997) found that negative affect enhanced the effects of alcohol cue presentation on the elicitation of alcohol urges and prediction of time to relapse. Other studies have also shown that high dispositional self-awareness and the experience of predominantly negative emotional events is associated with increased risk of relapse following a detoxification program (Hull, Young, & Jouriles, 1986). Yet, the precise nature of affective motivational states in persons who abuse controlled substances is not well understood.

Recent efforts to describe the role of interoceptive sensitivity and negative affect in substance abuse populations have adopted several constructs from the anxiety literature such as anxiety sensitivity (Stewart, Samoluk, & MacDonald, 1999). Anxiety sensitivity is generally conceptualized as a tendency to respond fearfully to the occurrence of symptoms of anxiety and is believed to augment the experience of fear and negative affect in a positive spiral (Peterson & Reiss, 1992; Reiss, 1991). Indeed, several studies have shown that anxiety sensitivity, as assessed using the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986), is a salient cognitive risk factor in the etiology and maintenance of anxiety disorders, particularly panic disorder (e.g., Cox, Parker, & Swinson, 1996; Taylor, Koch, McNally & Crockett, 1992). Not only is anxiety sensitivity a prominent feature of several models of anxiety symptomatology (Reiss, 1991, 1997; Zinbarg, Barlow, & Brown, 1997), but it is often associated with other psychological factors such as negative emotionality (Lillienfeld, 1997) and depression (Taylor, Koch, Woody, & McLean, 1996). In all, anxiety sensitivity represents a relatively stable trait-like psychological factor that reliably discriminates clinical and nonclinical manifestations of fear and panic.

Interest in anxiety sensitivity in the context of substance abuse derives from the view that abuse of some controlled substances (e.g., alcohol, benzodiazepines) largely functions to attenuate arousal, fear, negative affect, or even the tendency to catastrophize about arousal sensations. The motivation to abuse controlled substances, particularly those that attenuate arousal and negative affect (e.g., alcohol), may be driven, in part, by fear of anxiety-related symptoms and efforts to avoid or minimize their occurrence and recurrence (McNally, 1996; Stewart et al., 1999). In other words, the removal of the behavioral components of anxiety sensitivity (e.g., fear of one's own fearful responding) negatively reinforces drug consumption. For example, individuals who meet diagnostic criteria for alcohol abuse or dependence typically score significantly higher than average on the Anxiety Sensitivity Index compared to nonclinical norms (e.g., Karp, 1993). Other studies have shown that highly anxiety-sensitive females are at increased risk for becoming dependent on anxiolytic substances (e.g., Conrod, Pihl, Stewart, & Dongier, 2000), and that anxiety sensitivity is predictive of frequency of drug and alcohol abuse (DeHaas, Calamari, & Bair, *in press*).

Although preliminary, some studies also suggest that differences in anxiety sensitivity are associated with drug choice (i.e., preference for alcohol over stimulants and other controlled substances) among males seeking treatment for substance abuse (Norton et al., 1997). Similar relations between drug of choice and anxiety sensitivity have been reported in nonclinical populations (e.g., Stewart, Karp, Pihl, & Peterson, 1997). For instance, Stewart, Karp et al., (1997) and Stewart, Taylor, and Baker (1997) found that young adults scoring high on the Anxiety Sensitivity Index report drinking more often to cope with negative affect compared to lowly anxiety-sensitive controls (see also Stewart, Zvolensky, & Eifert, 2001); a finding that has been demonstrated in a sample of high AS women who were shown to drink significantly more than low AS women when given access to alcohol in an experimental setting (Stewart & Zeitlin, 1995). Indeed, one of the more robust findings in this literature to date is the consistent relations found between high anxiety sensitivity scores and frequency of alcohol consumption to cope with negative affect (Stewart, Peterson, & Pihl, 1995).

Far less robust are reported relations among substance abuse, drug of choice, anxiety sensitivity, and other individual difference factors (Cox, 1987). One reason for the inconsistency in relating drug of choice with personality domains may be due, in part, to other nonspecific factors that often figure prominently in substance abuse more generally (Stewart et al., 1999). Aside from assessment of interoceptive sensitivity (e.g., anxiety sensitivity), other relevant domains that may contribute to understanding individual difference factors in substance abuse include, but are not limited to (a) functional impairments related to the cycle of addiction (i.e., addiction severity), (b) drug of choice, (c) substance use history, (d) perceptions of control, (e) the tendency to either avoid or accept unpleasant private events (i.e., negative thoughts, feelings, emotional responses), and (f) the more general presence of symptoms of negative affect (e.g., depression, anxiety; see Cox, 1987). Each of these domains taps theoretically and practically relevant predispositions that may offer additional information related to use and abuse of controlled substances. In addition, such information may be relevant to assessment and treatment interventions that target behaviors more broadly related to substance abuse over and above examination of drug choice and behaviors related to use of controlled substances specifically.

The present study of predominantly male veterans enrolled in a 28-day residential substance abuse treatment program attempts to replicate and expand upon the findings of Norton et al. (1997) and those of others in addressing multifaceted psychological risk factors (e.g., anxiety sensitivity, perceived control, nonacceptance/avoidance) that have been implicated in substance abuse and how such factors relate to drug of choice, extent of diagnostic comorbidity, and addiction severity. Specifically, we address (a) the extent to which heightened anxiety sensitivity accounts for drug of choice (i.e., preference for depressants over stimulants), (b) whether psychological risk factors (e.g., bodily fears, perceived controllability, experiential avoidance) correlate with, or interact to affect, drug of choice, (c) how such risk factors are related to functional impairment resulting from a pattern of addiction, and (d) the extent of relation between the assessed psychological risk factors, substance preference, and diagnostic comorbidity. In addition, we examined whether (a) drug of choice varies reliably between persons with a primary substance abuse diagnosis only versus those participants comorbid for at least one other psychological condition, and (b) whether psychological and addiction-related indices differ as a function of diagnostic status and treatment. Such domains, in turn, may be conceptualized more broadly as functionally related to specific motivational factors (e.g., tension reduction, Levenson, Sher, Grossman, Newman, & Newlin, 1980) that constitute a psychological risk for substance abuse.

2. Method

2.1. Participants

Ninety male and four female (age; $M=44.0$; $S.D.=8.40$) veterans who applied for admission to the residential/inpatient substance abuse treatment program at the G.V. (Sonny) Montgomery Veterans Affairs Medical Center, Jackson, MS, participated in this study. Of the sample, 26.6% was Caucasian, 72.3% African American, and 1.1% fell into the Other racial category (e.g., Native American). Approximately one-third (36.2%) of the sample had completed high school, whereas 52.2% had college or advanced educational experiences. All participants were fully detoxified at the time of the intake assessment. Study questionnaires were embedded within a comprehensive intake and posttreatment battery that included cognitive assessment and other measures unrelated to the current study.

Based on discharge psychoactive substance use diagnosis, participants were divided into four mutually exclusive groups: those with an alcohol and/or benzodiazepine diagnosis (Depressants, $n=37$); those with a cocaine and/or amphetamine diagnosis (Stimulants, $n=12$); those with diagnoses in both the Depressant and Stimulant categories (e.g., alcohol and cocaine; Mixed, $n=21$); and an Other category ($n=25$) for participants whose substance use diagnosis did not place them neatly into one of the previous categories (e.g., the present sample contained a small number of persons who reported abusing marijuana only, $n=2$; opiate abuse/dependence, $n=1$; alcohol and opiate abuse only, $n=1$). No significant race [$\chi^2(10)=1.97$, n.s.] or sex [$\chi^2(3)=3.60$, n.s.] differences were detected across drug-of-choice categories.

Using discharge diagnoses, participants were further classified based on the presence or absence of comorbid non-substance use Axis I conditions¹ as belonging to one of four diagnostic groups: alcohol abuse/dependence diagnosis with no psychiatric comorbidity ($n=21$); Axis I psychiatric diagnosis comorbid with alcohol abuse/dependence ($n=16$); comorbid alcohol and drug diagnoses with no Axis I psychiatric comorbidity ($n=21$); and those with one or more Axis I psychiatric diagnoses comorbid with both alcohol and drug diagnoses ($n=18$). Those with drug diagnosis only ($n=18$) were not included in this classification.

2.2. Assessment and procedure

The following measures were completed by each participant during the initial intake process. The Anxiety Sensitivity Index (Reiss et al., 1986) is a 16-item questionnaire designed to assess fear of anxiety-related symptoms. Items are rated on a 0–4 Likert-type scale and yield a total composite scoring ranging from 0 to 64, as well as three factor-analytically derived subscales related to physical, psychological, and social domains of anxiety sensitivity. The total score and subscales have been repeatedly shown to possess good test–retest reliability, internal consistency, and validity (see Maller & Reiss, 1987; Peterson & Heilbronner, 1987).

The Body Sensations Questionnaire (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984) is a widely used, psychometrically sound, 17-item measure of fears associated with autonomic arousal (e.g., heart palpitations, dizziness). More recent research (Lillienfeld, 1997) have provided estimates of internal consistency around 0.85.

The Anxiety Control Questionnaire (ACQ; Rapee, Craske, Brown, & Barlow, 1996) consists of 30 items designed to assess perceived control over anxiety-related events, including two factor-analytically derived subscales assessing perceived control over one's responses and control over the environment, respectively. The ACQ has adequate psychometric properties, test–retest reliability, and good internal consistency (e.g., $\alpha=0.89$; Rapee et al., 1996; see also Lillienfeld, 1997).

The Acceptance and Action Questionnaire (AAQ; Hayes, 1996) consists of 16 items measuring experiential avoidance and psychological acceptance. Evaluations of the psychometric properties of the AAQ indicate strong construct validity and adequate internal consistency ($\alpha=0.70$; Hayes et al., 1996).

The Beck Depression Inventory (BDI; Beck & Steer, 1987) is a well-established 21-item measure designed to assess cognitive, affective, and physiological symptoms associated with depression, including factor-analytically derived subscales assessing cognitive–affective and

¹ Psychiatric diagnostic status was determined by clinical interview and chart review. Of the sample, 55.8% failed to meet criteria for a comorbid Axis I or Axis II psychiatric diagnosis. Of the remaining sample, 26.3% suffered from a depressive disorder, 7.4% an anxiety disorder, 1.1% both an anxiety and a depressive disorder, and 8.4% a psychotic disorder. Approximately 1.1% met criteria for an Axis II personality disorder. The small sample sizes within each diagnostic group precluded analyses of assessed measures of interest by specific diagnostic group.

somatic–performance indices of depression. Carlson (1998) reports stable internal consistency (0.79–0.90 across six samples), adequate test–retest reliability (e.g., between 0.60 and 0.90 in nonpsychiatric samples), and good construct validity.

The Addiction Severity Index (McLellan et al., 1992) is a widely used and psychometrically sound semistructured interview designed to assess problems across medical, legal, psychiatric, employment/support, alcohol, drug, and family/social domains. Empirically derived composite scores represent self-reported problem severity within the last 30 days. Crossvalidation studies indicate that internal consistency ratings across domains range between 0.62 and 0.87 during clinical interviews and between 0.58 and 0.91 when self-administered (Rosen, Henson, Finney, & Moos, 2000).

A similar battery of questionnaires, excluding the BDI and Addiction Severity Index, was administered 2–5 days prior to scheduled completion of an intensive residentially based substance abuse rehabilitation program. Treatment comprised a 21-day cycle of core groups and programming that included cognitive–behavioral skill building groups covering (a) anger management and communication skills, (b) problem solving and relapse prevention, and (c) self management. Patients also participated in process-oriented groups, individual therapy, and 12-step educational and in-house AA/NA meetings. Participants with a significant comorbid psychiatric diagnosis also routinely attended groups focusing on the relation between psychiatric and substance use problems.

3. Results

Mean anxiety sensitivity scores ($M=33.0$; $S.D.=13.8$) for the present sample were over one standard deviation above those for nonclinical men and women (17.8 and 18.8, respectively; Peterson & Reiss, 1992) and were within clinical ranges for anxious individuals (22.4 for anxious college students, 36.4 for patients diagnosed with panic disorder, and 38.4 for patients diagnosed with PTSD; Peterson & Reiss, 1992).

Consistent with Norton et al.'s (1997) approach, participants were divided in high, moderate, and low anxiety sensitivity groups based on their respective deviations from sample mean. This arrangement was then used to evaluate whether drug of choice and addiction severity vary reliably as a function of thresholds of the anxiety sensitivity construct. The high anxiety sensitivity group consisted of 16 participants whose scores were approximately one standard deviation or greater above the mean, whereas the low anxiety sensitivity group comprised 17 participants whose scores were one standard deviation or more below the mean. The moderately anxiety-sensitive group consisted of 61 participants whose scores fell between 19.2 and 46.8.

3.1. Relation between anxiety sensitivity, drug of choice, and addiction severity

A chi-square analysis was conducted to determine if the proportion of patients in the highly anxiety-sensitive group differed from the low and medium groups in the primary choice of substance (i.e., depressants only; stimulants only; mixed, i.e., depressants and stimulants; and

Table 1
Proportion of patients using controlled substances as a function of anxiety sensitivity

	Low (%)	Medium (%)	High (%)
Depressants	9.6	22.3	7.4
Stimulants	3.2	6.4	3.2
Mixed	1.1	18.1	3.2
Other	4.3	18.1	3.2

$N=94$. Chi-square analyses were also repeated comparing only subjects preferring depressants and stimulants as a function of ASI group in a manner consistent with Norton et al. (1997); however, the results were not significant.

other). As can be seen in Table 1, there was no significant differences among the anxiety sensitivity groups in their preference for controlled substances [$\chi^2(6)=5.86$, n.s.], nor was there any difference when the analysis was repeated with females ($n=4$) removed [$\chi^2(6)=6.51$, n.s.].

A MANOVA was used to determine whether anxiety sensitivity groups (i.e., low, medium, and high) differed as a function of Addiction Severity Index composite scores, including years of substance abuse. The main effect was tested using the multivariate criterion of Wilk's lambda (Λ) and eta-squared (η^2) was adopted as an index of effect size. The overall multivariate effect was significant [Wilk's $\Lambda=0.62$, $F(16,162)=2.78$, $P<.001$, $\eta^2=0.21$]. As can be seen in Table 2, there were significant differences among the groups in terms of psychiatric complications, with the high anxiety sensitivity group reporting significantly more psychiatric complications related to substance abuse compared with the moderate and low anxiety sensitivity groups (Tukey-HSD, $P<.05$). No other effects were significant (see Table 2).

Table 2
Means and standard deviations of addiction severity scores as a function of anxiety sensitivity

	Low	Moderate	High	Entire sample	$F(2,88)$
Years of use/abuse	24.5 (8.2)	26.3 (8.1)	25.9 (8.2)	25.9 (8.1)	0.33
<i>Addiction Severity Index</i>					
Medical Problems	0.31 (0.38)	0.35 (0.41)	0.58 (0.39)	0.38 (0.41)	2.38
Employment Problems	0.69 (0.31)	0.65 (0.29)	0.81 (0.22)	0.68 (0.29)	1.72
Alcohol Problems	0.47 (0.27)	0.53 (0.29)	0.47 (0.31)	0.51 (0.29)	0.39
Drug Problems	0.11 (0.14)	0.19 (0.14)	0.15 (0.15)	0.17 (0.14)	2.34
Legal Problems	0.15 (0.22)	0.13 (0.19)	0.07 (0.13)	0.12 (0.14)	1.01
Family Problems	0.17 (0.20)	0.32 (0.25)	0.26 (0.26)	0.28 (0.25)	2.63
Psychiatric Problems	0.26 ^a (0.22)	0.38 ^a (0.25)	0.66 ^b (0.33)	0.41 (0.27)	11.69**

Standard deviations appear in parentheses. Means with different superscripts differ (Tukey-HSD, $P<.05$). Years of use/abuse was derived from clinical intake interview and chart review.

** $P<.05$.

3.2. Relation between drug of choice and assessed psychological factors at intake

A second MANOVA was conducted to test whether anxiety sensitivity and other psychological factors assessed at intake (i.e., BSQ, AAQ, ACQ, BDI) vary reliably as a function of participants primary drug preference (i.e., Depressants Only, Stimulants Only, Mixed Depressants and Stimulants, and Other). No effects were significant [Wilk's $\Lambda = 0.94$, $F(15,212.96) = 0.42$, $P > .05$], suggesting that drug of choice is not a reliable means of discriminating substance abusers across the assessed psychological individual difference factors. The absence of any significant relation between anxiety sensitivity and drug of choice also held when the three anxiety sensitivity subscales were evaluated separately [physical: $F(3,90) = 0.10$, n.s.; psychological: $F(3,90) = 0.19$, n.s.; and social concerns: $F(3,90) = 2.09$, n.s.].

3.3. Relations among psychological factors and addiction indices at intake

Partial correlation analyses were performed among the aforementioned psychological factors and addiction-related indices (Addiction Severity Composite Scores) assessed at intake to further address the relation, if any, between psychological risk factors and substance abuse. Partial correlations were computed while controlling for drug of choice. As illustrated in Table 3, high anxiety sensitivity was strongly and positively correlated with a tendency toward experiential avoidance (AAQ), depression (BDI), fears of bodily sensations associated with panic (BSQ), and negatively correlated with general perceptions of controllability over anxiety-related events (ACQ). High anxiety sensitivity scores were also correlated with positive endorsement of medical and psychiatric complications related to substance abuse. The general pattern of relations among the assessed psychological factors at intake are consistent with what one would expect; namely, that increased report of anxious or depressive symptoms and concerns (i.e., anxiety sensitivity, bodily fears, and depressive complaints) are all positively related, but also associated with greater tendencies to avoid (AAQ) and greater perceived uncontrollability (ACQ). As with anxiety sensitivity, such psychological factors also appear to show the most consistent relation with medical and psychiatric complications reported by this substance abusing sample.

Though none of the assessed psychological factors correlated significantly with years of substance abuse, including Addiction Severity Index composite scores reflecting alcohol and drug problems within the 30 days prior to admission, the anxiety sensitivity subscale scores showed some relation with Addiction Severity Indices. As illustrated in Table 4, the physical concerns subscale was positively and significantly correlated with psychiatric composite scores. Similarly, the psychological concerns subscale was positively correlated with medical and psychiatric composite scores, but negatively correlated with legal composite scores. Social concerns were negatively correlated with alcohol composite scores and positively and significantly correlated with family/social composite scores. Thus, it appears that particular subscale domains of anxiety sensitivity, but not the Anxiety Sensitivity Index total score, uniquely contribute to specific domains of addiction severity (see Stewart, Taylor, et al., 1997).

Table 3
 Partial correlations among psychological factors and addiction severity indices while controlling for drug of choice

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Psychological measures</i>														
1. Anxiety Sensitivity Index	.31**	.71***	-.48***	-.49***	-.41***	.41***	.23 *	.08	-.00	.19	-.20	.12	.44***	.06
2. AAQ		.24 *	-.50***	-.57***	-.36***	.57***	.37***	.13	.09	-.17	.06	.20	.25 *	-.00
3. BSQ			-.26 *	-.29 *	-.19	.24 *	.14	-.16	-.09	.12	-.13	.00	.29**	-.00
4. ACQ				.92***	.92***	-.70***	-.41***	-.25 *	-.15	-.08	.12	-.23**	-.52***	-.17
5. ACQ(RE)					.72***	-.75***	-.43***	-.20	-.13	-.00	.06	-.27	-.53***	-.15
6. ACQ(ENV)						-.55***	-.34 *	-.25 *	-.15	-.15	.17	-.17	-.44***	-.16
7. BDI							.42***	.17	.12	-.00	-.15	.27 *	.42***	.10
<i>Addition Severity Index</i>														
8. Medical								.27 *	-.13	-.11	-.07	.09	.25 *	.06
9. Employment									.15	.07	.04	.02	.15	.11
10. Alcohol										.20	-.13	-.15	.06	.03
11. Drug											-.16	.07	.20	.04
12. Legal												.16	-.00	-.33**
13. Family													.34**	-.03
14. Psychiatric														.19

N=82 due to missing or incomplete data for some participants. AAQ=Acceptance and Action Questionnaire; BSQ=Body Sensations Questionnaire; ACQ=Anxiety Control Questionnaire; ACQ(RE)=ACQ Control Over Reactions Subscale; ACQ(ENV)=ACQ Perceived Control Over Environmental Events Subscale; BDI=Beck Depression Inventory; Item 15=Years of Substance Abuse as derived from Intake Interview and Chart Review.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 4

Partial correlations of the anxiety sensitivity subscales with addiction severity indices while controlling for drug of choice

	Medical	Employment	Alcohol	Drug	Legal	Family	Psychiatric
Physical Concerns	.16	.09	.01	.16	-.12	.07	.34***
Psychological Concerns	.28**	.13	.15	.17	-.26 *	.14	.49***
Social Concerns	.02	-.15	-.24 *	-.03	-.02	.26 *	.15

$N=82$ due to missing or incomplete data for some participants. Means and standard deviations for the Anxiety Sensitivity Index subscales are as follows: Physical Concerns ($M=18.12$, $S.D.=8.77$); Psychological Concerns ($M=8.66$; $S.D.=5.73$); Social Concerns ($M=5.85$; $S.D.=1.77$).

* $P < .05$.

** $P < .01$.

*** $P < .001$.

A forward stepwise multiple regression was conducted to determine which of the assessed psychological factors predicts a global index of Addiction Severity. The global index of addiction severity was defined as the mean of the Addiction Severity Index Composite scores, and the independent variables in the model included the Anxiety Sensitivity Index, BSQ, AAQ, ACQ, and BDI total scores as assessed during intake. Probability criteria for model inclusion and exclusion were .05 and .1, respectively. Of the independent measures in the model, the only one that remained as a significant predictor of addiction severity was the ACQ total score [$F(1,82)=35.38$, $P < .001$; $\beta = -0.0031$, $S.E. = 0.001$; overall $r^2=.30$].

3.4. Moderating effects of psychological factors on the relation between anxiety sensitivity and drug of choice

The extant literature evaluating the relation between anxiety sensitivity, drug of choice, and associated features of substance abuse has, for the most part, involved unidimensional models. Yet, it may be the case that such relations are moderated, in part, by other psychological risk factors such as uncontrollability and experiential avoidance. For example, it is conceivable that high anxiety sensitivity predicts drug of choice only in the context of high avoidance and greater perceived uncontrollability. The following analyses were designed to test this moderational proposition by evaluating whether a combination of psychological factors significantly predict drug preference (e.g., depressants only, stimulants only, depressants and stimulants) relative to a nonspecific pattern of substance use (e.g., polysubstance use). Specifically, two multinomial logistic regression analyses were conducted to determine whether ACQ or AAQ interact with Anxiety Sensitivity Index scores to affect drug of choice. Anxiety Sensitivity Index scores, ACQ scores, and their interaction (e.g., the crossproduct of each score per participant) were entered into the first regression model, whereas Anxiety Sensitivity Index scores, the AAQ, and their interaction were entered into the second regression model. Because all three predictors correlate with each other, all measures were mean centered to minimize effects of multicollinearity (Jaccard, 2001; Jaccard, Turrisi, & Wan, 1990).

Table 5

Beta coefficients and standard error terms of mean-centered psychological factors and their interaction terms for assessing moderating effects in predicting drug preference

	Depressants only		Stimulants only		Stimulants and depressants combined	
	β	S.E.	β	S.E.	β	S.E.
<i>ACQ as moderator</i>						
Anxiety Sensitivity Index	0.001	0.023	−0.009	0.031	0.003	0.026
ACQ	0.001	0.015	−0.004	0.020	−0.010	0.016
Anxiety Sensitivity Index × ACQ	0.0002	0.001	−0.007	0.001	0.0002	0.001
<i>AAQ as moderator</i>						
Anxiety Sensitivity Index	0.0001	0.020	−0.006	0.020	0.001	0.020
AAQ	−0.004	0.020	0.024	0.030	0.016	0.028
Anxiety Sensitivity Index × AAQ	0.0007	0.002	−0.0006	0.002	0.001	0.002

β : Beta coefficient for a particular predictor variable or interaction term for a given drug preference. S.E.: Standard error for each beta coefficient. ACQ=Anxiety Control Questionnaire; AAQ=Acceptance and Action Questionnaire. No coefficients were significant.

Table 5 summarizes the beta coefficients and standard error terms for the focal independent variable, moderator variables, and interaction terms for preferences toward depressants, stimulants, or a combination of both relative to polysubstance use. No factor or interaction term significantly predicted the outcome variable, suggesting the relation between anxiety sensitivity and drug preference is not moderated by avoidance or perceived controllability in the current sample.

3.5. Relation between diagnostic status, psychological factors, and outcome

A chi-square analysis was performed comparing drug of choice (i.e., alcohol only, stimulants only, both alcohol and stimulants, and mixed polysubstance preference) as a function of a more general classification of diagnostic status (i.e., primary substance abuse only, $n=53$, vs. substance abuse comorbid with another Axis I psychological condition, $n=42$). No differences were observed in the participant's preference for controlled substances as a function of diagnostic status [$\chi^2(3)=0.19$, n.s.].

Two separate MANOVAs, with repeated measures corresponding to time (intake vs. discharge), were used to evaluate differences on (a) psychological factors and (b) Addiction Severity Index composite scores as a function of a more refined classification of diagnostic status (i.e., alcohol only, alcohol comorbid with another psychological condition, polysubstance only, and polysubstance comorbid with another Axis I diagnosis). Because the Addiction Severity Index was only available at intake, it was considered separately in the analyses. The main effect and interactions were tested using the multivariate criterion of Wilk's lambda (Λ) and eta-squared (η^2) was adopted as an index of effect size. The following effects on the psychological measures were significant: Group × Measure, Wilk's $\Lambda=0.76$, $F(9,148.61)=1.97$, $P<.05$, $\eta^2=0.087$; Time × Measure, Wilk's $\Lambda=0.62$, $F(3,61)=12.60$,

Table 6

Means and standard deviations of pre- and postpsychological and addiction-related indices as a function of diagnostic status

	Diagnostic group			
	Alcohol only	Alcohol/ psychological	Polysubstance only	Polysubstance/ psychological
<i>Anxiety sensitivity</i>				
Intake	29.22 (15.77)	35.46 (16.47)	34.65 (12.80)	34.25 (10.79)
Discharge	30.67 (16.97)	33.92 (14.19)	29.25 (14.06)	34.00 (15.94)
<i>AAQ</i>				
Intake	74.05* (7.97)	79.92* (12.65)	81.20* (13.12)	76.87 (13.03)
Discharge	64.94* (7.02)	72.38* (9.75)	71.60* (9.92)	75.06 (10.85)
<i>BSQ</i>				
Intake	2.44 (0.95)	2.75 (0.93)	2.67 (1.11)	2.51 (0.97)
Discharge	2.69 (1.10)	2.83 (1.08)	2.50 (0.92)	2.43 (0.88)
<i>ACQ</i>				
Intake	85.89 (16.80)	64.69 (24.28)	73.45* (19.81)	66.94 (22.50)
Discharge	90.33 (22.55)	67.53 (20.97)	85.95* (16.19)	66.50 (23.09)
<i>Addiction Severity Index</i>				
Medical	0.30 (0.38)	0.60 ^a (0.44)	0.19 ^b (0.36)	0.52 (0.39)
Employment	0.61 (0.35)	0.81 (0.23)	0.64 (0.23)	0.75 (0.28)
Alcohol	0.47 (0.27)	0.56 (0.22)	0.67 (0.28)	0.52 (0.30)
Drug	0.03 ^a (0.08)	0.02 ^a (0.06)	0.28 ^b (0.10)	0.24 (0.12)
Legal	0.10 (0.19)	0.19 (0.23)	0.13 (0.18)	0.10 (0.16)
Family	0.16 ^a (0.20)	0.30 (0.30)	0.30 (0.19)	0.40 ^b (0.22)
Psychiatric	0.29 ^a (0.24)	0.56 ^b (0.21)	0.36 (0.25)	0.45 (0.29)

Standard deviations appear in parentheses. Means with different superscripts differ (Tukey-HSD, $P < .05$).

* Significant within group differences pre to post assessment.

$P < .001$, $\eta^2 = 0.383$; and a three-way Group \times Time \times Measure interaction, Wilk's $\Lambda = 0.76$, $F(9,148.61) = 1.99$, $P < .044$, $\eta^2 = 0.088$ (see Table 6).

A series of paired-samples t tests were conducted to follow-up the significant three-way interaction within each level of diagnostic group. A Bonferroni alpha adjustment procedure was used to control for artificial inflation of familywise error rate that can occur with multiple comparisons ($0.05/4 = P < .012$). Group means and standard deviations for all factors at intake and discharge are shown on Table 6. For the alcohol only group, patients reported significant decreases in avoidance from pre- to posttreatment [$t(18) = 4.96$, $P < .01$]. A similar pattern of reduced avoidance pre- to posttreatment (i.e., AAQ) was observed for the comorbid alcohol (i.e., alcohol diagnosis comorbid with one or more psychiatric diagnoses) and polysubstance abuse only group [$t(15) = 4.17$, $P < .01$ and $t(20) = 4.09$, $P < .01$, respectively]. The polysubstance abuse only group reported significantly more perceived control at

discharge compared to intake [$t(20) = -4.77, P < .01$], whereas the other groups did not. No other effects were significant.

The second MANOVA evaluating differences between diagnostic groups on the Addiction Severity Index composite scores was significant [Wilk's $\Lambda = 0.24, F(21,181.45) = 5.60, P < .001, \eta^2 = 0.38$]. Univariate ANOVAs on each composite score were evaluated as a function of diagnostic group. Significant univariate effects were observed for the following composite scores: Medical, $F(3,69) = 4.27, P < .008, \eta^2 = 0.16$; Drug, $F(3,69) = 39.70, P < .001, \eta^2 = 0.63$; Family, $F(3,69) = 3.49, P < .02, \eta^2 = 0.13$; and Psychiatric, $F(3,69) = 4.07, P < .01, \eta^2 = 0.15$. Tukey-HSD procedure was used to evaluate extent of differences between groups on the addition-related indices. As can be seen in Table 6, the comorbid alcohol group reported significantly more recent medical problems ($M = 0.60, S.D. = 0.44$) relative to the polysubstance abuse group ($M = 0.19, S.D. = 0.36$). As expected, recent drug problems were reported as more severe in both polysubstance abuse groups relative to the alcohol groups (Tukey-HSD, $P < .05$). Participants with a primary polysubstance abuse diagnosis comorbid with another Axis I psychiatric condition also reported significantly more recent family problems ($M = 0.40, S.D. = 0.22$) relative to patients in the alcohol only group ($M = 0.16, S.D. = 0.20$). Finally, recent psychiatric problems were reported as more severe in the comorbid alcohol group ($M = 0.56, S.D. = 0.21$) relative to the alcohol only group ($M = 0.29, S.D. = 0.24$). No other effects were significant (Tukey-HSD, $P < .05$). (See Table 6.)

4. Discussion

The central aim of the present study was to replicate and extend the findings of Norton et al. (1997) and others showing a relation between anxiety sensitivity, drug of choice, and abuse of controlled substances in a large sample of inpatients with substance abuse problems. Contrary to expectation, we were unable to show any reliable relation between anxiety sensitivity and drug of choice, nor support for the view that highly anxiety-sensitive individuals use alcohol or other controlled substances to dampen unwanted feelings of arousal (Karp, 1993; Norton et al., 1997; Stewart et al., 1995). The lack of relation between anxiety sensitivity and drug of choice also held when considering the potential moderating influence of avoidance and perceived uncontrollability. Moreover, drug of choice showed no reliable relation with the other assessed individual difference factors commonly associated with negative affect and anxious responding more generally (e.g., bodily fears, experiential avoidance, depression, uncontrollability). This negative finding is somewhat surprising given that highly anxiety-sensitive patients in the present sample were more likely to report psychiatric complications on the Addiction Severity Index, including a tendency to report symptoms associated with negative emotional responding more generally.

A second related aim of this study was to provide additional information about commonly assessed psychological and experiential components of negative affect and anxious responding and their relation with abuse of controlled substances. As expected, patients reporting more anxiety sensitivity and bodily fears were also more likely to report feeling depressed, and reported a general lack of perceived control and greater use of emotional avoidance

strategies. Though preliminary, the present data showing no relation between individual difference factors and drug of choice suggests that the drug specificity hypothesis, linking certain substances with levels of psychological distress, may not be the most useful strategy to use in understanding the sequelae of substance abuse and treatment. Indeed, it may be more useful to identify the specific patterns of psychological and behavioral dimensions that may serve to establish and maintain substance abuse in susceptible individuals.

We should point out that the absence of relation between anxiety sensitivity and drug of choice in the present sample is inconsistent with other previous investigations (DeHaas and Calamari, *in press*; Norton et al., 1997; Stewart, Karp, et al., 1997; Stewart et al., 1995; Stewart, Taylor et al., 1997). Admittedly, we have no ready explanation for why we were unable to show any reliable relation between anxiety sensitivity and drug of choice. It may be the case that our predominantly male Veteran sample differs in some unknown idiosyncratic way from the samples used in previous reports. Alternatively, the present classification of drug of choice might be considered as less precise as compared to classification methods used previously by others. For instance, Norton et al. assessed addiction severity and drug of choice using the Brief Michigan Alcohol Screening Test, the Drug Abuse Screening Test, and a separate measure of drug preference, whereas in the present study, such information was derived from clinical intake, psychiatric interview, chart review, and responses on the Addiction Severity Index. In either case, one could argue that the relation between anxiety sensitivity and drug of choice, if truly robust, should hold across samples and study populations, particularly in inpatient clinical settings where polysubstance abuse and psychiatric comorbidity are often the rule, not the exception.

The present findings cast some doubt on the utility of examining individual difference factors solely in relation to drug preference and are consistent with the view that other psychological and experiential individual difference factors may account for considerably more of the variance in understanding and ameliorating cycles of substance abuse and dependence. For example, two sets of psychological factors motivating excessive drinking have been extensively investigated to distinguish subtypes of alcohol abusers across numerous contexts (e.g., Carpenter & Hasin, 2001; Cloninger et al., 1988; Johnson, & Cropsey, 2000). One type (Type I) is associated with greater psychological and physical concerns, earlier developmental onset, and worse prognosis, whereas the second type (Type II) is associated with less psychological and physical concerns, more engagement in socially appropriate drinking, more sensation seeking, and fewer alcohol-related problems. Conrod et al. (2000) described subtypes of substance abusers based on the presence of distinct, underlying psychological factors (e.g., anxiety sensitivity, extroversion, introversion). Highly anxiety-sensitive and introverted women, for example, relied on excessive alcohol consumption for its anxiolytic effects, whereas those more extroverted individuals abused alcohol to diminish inhibition and foster sensation-seeking behaviors. What this study suggests is that the relation between anxiety sensitivity and drug of choice may be moderated by other psychological risk factors and behavioral predispositions that may operate alone or in combination in producing and maintaining a cycle of substance abuse and addiction. Such risk factors, in turn, may play some functional role in contributing to the tendency for persons suffering from addictions to engage in abuse of controlled substances as a means to avoid,

eliminate, reduce, or control otherwise unpleasant private events such as thoughts, emotions, and physiological arousal. Indeed, one would predict that Type I alcohol abusers would score significantly higher on the Anxiety Sensitivity Index relative to Type II alcohol abusers. Unfortunately, we were unable to address this relation in the present sample due to an insufficient sample of persons meeting Axis II criteria consistent with Type I and II distinctions (e.g., antisocial personality disorder).

The present findings support the view that repeated use of controlled substances is related to general emotional distress, negative affect, emotional avoidance, and a perceived inability to control one's life (see also [Anisman & Merali, 1999](#)). Thus, treatment strategies that attempt to increase patients' sense of control over their own responses and the environment, and those that decrease attempts to avoid unpleasant emotions may increase the efficacy of substance abuse treatments. It is interesting, in this regard, to note that Step 1 of Alcoholics Anonymous (AA) emphasizes a recognition that the substance user's life "... has become unmanageable" ([Brown, 1993](#); [DiClemente, 1993](#)). For AA, "unmanageability" is a global construct that applies across multiple domains of functioning and is seen as the result of substance use rather than the cause. The sense of impaired control identified in this study is a more narrow lack of control over specific emotional and physiological experiences that may further exacerbate the tendency to abuse controlled substances. Previous studies have shown, for example, that alcoholics with comorbid social anxiety tend to report intentionally drinking in order to assuage social fears ([Smail, Stockwell, Canter, & Hodgson, 1984](#); [Stockwell, Smail, Hodgson, & Canter, 1984](#)). This finding necessitates a closer consideration of concepts such as "acceptance" and "avoidance."

Though acceptance is often nontechnically defined as a willingness to experience events fully and without defense, its technical definition refers to a willingness to make contact with the automatic and direct stimulus functions of events without acting to control, reduce, eliminate, or otherwise reduce the frequency, occurrence, or impact of such events ([Hayes, 1994](#)). From a posture of nonacceptance, or the unwillingness to experience unwanted private events (i.e., unwanted thoughts, emotions), it makes perfect sense to talk about constructs such as anxiety sensitivity as a risk factor of abuse of controlled substances. Here, substance abuse provides a convenient and rapid means to mitigate, or otherwise reduce and avoid, unpleasant negative affect, including physical symptoms and associated negative thoughts. Now consider the relation between anxiety sensitivity and substance abuse in the context of acceptance, where a person is willing to experience unwanted private events without acting to avoid or reduce them (e.g., via use of controlled substances). Though speculative, use of controlled substances in this context—as motivated by anxiety sensitivity—appears counter-intuitive and even nonsensical. Why, for instance, would someone use alcohol to mitigate anxiety-related symptoms if they were perfectly willing to experience such symptoms and behave effectively despite them. The point here is that nonacceptance (i.e., avoidance) may, in fact, represent a superordinate class of behaviors that holds anxiety sensitivity and substance abuse behaviors together. Address the tendency to avoid, and the behaviors involved in anxiety sensitivity become nonsensical as a motivator of substance abuse. Address the tendency to avoid (i.e., nonacceptance), and the use of controlled substances as a means to dampen aversively motivated states breaks down, including perhaps other behavioral

predispositions such as anxiety sensitivity. To date, we know of no studies that have systematically addressed such issues; though we do know that this work is underway.

It is important as well as interesting to note that “acceptance” is a core concept in the AA framework for recovery, being seen as an antithetical antidote to “denial.” AA advises that once an individual has truly accepted their substance use disorder, they should “go to any lengths” to regain manageability or control over their lives. AA means this in a behavioral sense, advising engagement in a wide repertoire of recovery-supportive behaviors. Thus, while the AA frame of reference is often seen as at odds with empirical therapies, AA’s view of acceptance and avoidance is quite compatible with the scientific view, which promotes intentional “nonavoidance” or exposure to unpleasant but nondangerous thoughts, emotions, and physiological arousal. Similarly, use of cue exposure in substance abuse treatment explicitly counteracts avoidance. We believe that this somewhat unexpected compatibility between self-help and science can be used effectively to promote understanding of both the role of anxiety sensitivity as a risk factor in substance use disorders and the rationale for validated exposure treatments.

Along with previous research, the present findings have clear implications for broader conceptualizations of substance abuse. Several theories incorporate similar psychological factors (e.g., avoidance coping, [Cooper, Russell, & George, 1988](#); tension reduction, see [Levenson et al., 1980](#) for review) into more-overarching motivational models of alcohol and substance abuse and dependence. For example, [Cox and Klinger \(1988\)](#) outlined a motivational model of alcohol use, wherein the decision to drink relies on the mediating effects of expected effects of alcohol use (e.g., decreased inhibition, alleviation of suffering), historical factors (e.g., biochemical reactivity, tolerance, personality, positive reinforcement for drinking) and current factors (e.g., situational factors, presence and/or absence of positive and negative incentives). The authors propose the decision not to drink depends on the relative amounts of positive and negative nonchemical incentives in the individual’s life, implying emotive and motivational drives toward alcohol use subside as the number of these positive incentives increase. Within this context, the present findings suggest such models require further refinement to isolate variables that significantly predict alcohol abuse. Though previous research have indicated a more robust relation between anxiety-related psychological factors and drug of choice, more information is necessary to elucidate (a) what risk factors potentiate drug preference and use, and (b) what moderating variables influence drug preference and use severity for at-risk individuals.

Indeed, such information can potentially lead to enhanced discrimination of effective treatment strategies across various levels of substance abuse severity by identifying salient variables for intervention. Though the present study found an absence of relation between constructs such as anxiety sensitivity and drug of choice, larger-scale investigation is warranted for unearthing the mediating and moderating emotion-based variables which determine drug of choice and to identify risk and protective factors which lead to substance use as a means to alleviate discomfort, anxiety, and/or fear. For example, further research is necessary to determine which conditions allow perceived controllability over adverse events to moderate the relation between anxiety sensitivity and drug preference, assuming such a relation exists and is detectable. Investigations of this nature could potentially unearth a

network of motivation schemes, self-regulatory mechanisms, and self-rules that influence the decision to self-medicate, leading ultimately to pathway models of substance abuse that may offer clinicians probabilistic information to guide their interventions.

Finally, we wish to point out several caveats regarding the present study. First, the present sample was not of sufficient size to allow any comparison among alcohol users based on Axis II psychiatric diagnosis. For example, because Type II drinkers seek to lower inhibitions and engage in more thrill-seeking activities, the likelihood of their overlapping with diagnoses of antisocial personality disorder is greater compared to Type I drinkers. In the present sample, all psychiatric diagnoses were based on status at discharge, and we were unable to identify any patients with an Axis II diagnosis of antisocial personality disorder. Further research is warranted to assess the relations among personality disorder diagnosis, alcoholic nosology, and motivations for use of controlled substances. This is particularly important as the relation between anxiety sensitivity and alcohol would not be expected in Type II users, but would be expected with Type I users who show more somatic concerns.

Second, it is important to note that the procedure used to establish patient diagnoses was not derived from a rigorous and standardized assessment as is typical of more controlled randomized clinical trials. Rather, diagnoses were assigned independent of this study by an experienced psychiatrist using patient history, chart records, and an unstructured interview embodied within the history and physical exam. Though substance use diagnoses are neither transient nor subtle in this patient population, the present findings based on the diagnostic procedures used herein are more applicable to procedures employed in similar hospital settings, where extensive structured diagnostic interview procedures, including reliability and validity checks, are often not feasible, cost effective, or practical.

Third, during the period of data collection, the Addiction Severity Index was administered by several different clinicians. Though all clinicians received group training by doctoral staff (including the second author) qualified in Addiction Severity Index administration and scoring, including regular supervision and review for scoring errors, we have no interrater reliability data for this measure. Thus, we urge some caution before making generalizations of the present findings based on our diagnostic and addiction severity interview procedures. More generally, we see this study as limited by its preliminary exploratory nature. The issues raised can only truly be addressed through scientifically rigorous experimental procedures that include a longitudinal component. Such research, in turn, would likely yield information about the phenomenology of substance abuse and clarify mechanisms of action from which therapists can derive the most efficacious and effective treatments on a client-to-client basis.

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