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COMPONENTS INFLUENCING CRAVING IN SUBSTANCE USE DISORDERS

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## ABSTRACT

### COMPONENTS INFLUENCING CRAVING IN SUBSTANCE USE DISORDERS

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Previous research has established craving as a significant element in models of Substance Use Disorders (SUD). Craving is a new criterion for SUD in the most recent Diagnostic and Statistical Manual of Mental Illness (DSM-5) and is also considered a predictor of relapse post-treatment. Moreover, research indicates that stress, negative emotional states, and symptoms of Posttraumatic Stress Disorder (PTSD) can influence craving, suggesting that affective states are key to the treatment and relapse risk of individuals with SUD. In fact, recent research suggests that these affective elements may share a common core which influences craving and subsequent relapse. This study introduces a new measure which attempts to isolate that common core, and aims to explore the interplay among stress, negative emotionality, PTSD symptoms, and craving in a clinical sample comprised of adults with SUDs. Findings may aid in conceptualization and treatment (including relapse prevention) for this population.

## CHAPTER 1: INTRODUCTION

Substance use disorders (SUDs) affect approximately 12 percent of the adult population in the United States (Substance Use and Mental Health Services Administration; SAMSHA, 2011). Although multiple frameworks exist to explain the development and maintenance of SUDs, theoretical and empirical perspectives implicate impaired decision making as playing a primary role in SUDs (e.g., Redish, Jensen, & Johnson, 2008). Consequently, it is important to identify factors impairing the decision making process in individuals with SUD (Redish et al., 2008). Frequently such factors are identified and studied in isolation, producing theoretical explanations that only account for single dimensions of SUD. Redish et al. addresses this issue by combining multiple theories of addiction to form a unified framework of impaired decision making processes characteristic of SUD. These impairments in decision making influence the outcome of craving (Redish et al., 2008). The role of affective processes in impaired decision making and subsequent substance craving is a critical element missing from this unified framework (Kiveinemi & Bevins, 2008; Le Moal, 2008). Previous attempts to integrate affective processes into models of addiction and craving found that individual differences in vulnerability to negative emotionality represent a distinct pathway to craving and recommended the development of methods to measure this pattern of individual differences (Verheul, Van Den Brink & Geerlings, 1999). Recent advances in the understanding of genetic influences on craving suggest that this pattern of individual difference in negative emotionality may interact with genetic vulnerability to influence craving across the time in the progression of SUD (e.g. Haughey, Marshall, Schacht, Louis, & Hutchinson, 2008). This study introduces a new measure of vulnerability

toward negative emotionality common to models of SUD and also explores this vulnerability's association with craving and Posttraumatic Stress Disorder (PTSD) symptoms.

A recently developed scale called Dissatisfied, Anxious, Restless, Nervous and Uncomfortable (DARNU; Hoffmann, 2012) focuses on an individual's propensity to experience distress and negative emotional states more severely as a result of both personality and acquired maladaptive emotional structures. Unlike a simple measure of affect, this scale includes items which indicate the potential to experience the stress of normal daily life as severe and to be potentially more vulnerable to negative feelings triggered by routine events in daily life. A pilot study found an association between elevated DARNU scores and problems associated with substance use. DARNU is intended to measure the vulnerability described above. The construct represented by DARNU may be related to craving and relapse, considering that people who are likely to experience stress and negative states as more severe and overwhelming are most likely to experience intense craving and associated elevations in relapse risk (Flannery et al., 1999; Reuter & Netter, 2001; Sinha et al., 2011).

In order to more precisely identify this vulnerability, the proposed study will examine the role it plays in accounting for the effects of trauma symptomatology on craving. Post-traumatic stress disorder and the associated symptomatology is identified as associated with substance use, craving, and risk for relapse in SUD (Brady, Killeen, Saladin, Dansky & Becker, 1994; Gil-Rivas, Prause, & Grella, 2009). The trauma and the subsequent associated symptoms need not rise to diagnostic levels in order to impact these risks (Gerwe, 2001).

Moreover, the association between the experience of a traumatic event and the development of trauma symptomatology appears to be moderated by vulnerability toward negative emotionality (Miller, 2003). That vulnerability – often referred to simply as negative emotionality (Watson & Clark, 1984) – is one component measured by DARNU. This same vulnerability is positively associated with diagnosis of a SUD (Sher, Bartholow, & Wood, 2000). Negative emotions are explicitly identified as impairing decision making in comorbid SUD/PTSD (Sharkansky, Peirce, Meehan, & Mannix, 1999). Considering that the vulnerability measured by DARNU might reasonably be expected to play a role in both the development of PTSD (Miller, 2003) and is a risk factor for SUD (Sher et al., 2000) it is important to investigate the possibility that this is the same underlying vulnerability with the potential to impair decision making.

Previous research has established craving as a significant element in both neurobiological and conceptual models of Substance Use Disorder (SUD) (e.g. Goldstein & Volkow, 2002; Marlatt & George, 1984). Conceptually craving seems likely to be associated with relapse, as it describes the desire to use a substance, which seems to necessarily precede both the maintenance of and return to active substance use. The experience of craving has been linked to both physical changes in the brain (Goldstein & Volkow, 2002) and environmental factors (Drummond, 2000). Stress, negative emotional states, and an increased individual propensity to experience negative affect have been linked to increase craving, which is linked with increased risk for relapse (Flannery, Volpicelli & Pettinati, 1999; McRae-Clark et al., 2011; Nosen et al., 2012; Reuter & Netter, 2001). This association suggests that craving might be a component of



SUD where the affective vulnerability measured by DARNU would be particularly influential.

The present study attempts to isolate an affective vulnerability measured by DARNU. It focuses on the effect of two components- trauma symptomatology and DARNU- on a third component, craving. The review of the literature begins with a discussion of SUD and craving, proceeds to discuss trauma symptomatology, and concludes with a discussion of DARNU.

## CHAPTER 2: LITERATURE REVIEW

### **Substance Use Disorder**

Substance use disorder (SUD) is a serious problem in the United States and around the world (SAMSHA, 2011). The Substance Abuse and Mental Health Services Administration (SAMSHA) estimates that eight percent of the American population met criteria for substance abuse or dependence (2011). The criteria used to make the diagnosis of Substance Use Disorder are found in the American Psychiatric Association's *Diagnostic and Statistical Manual 4th ed., Text Revision (DSM-IV-TR; American Psychiatric Association, 2000)*<sup>1</sup>. A brief review of the criteria underscores the significant personal and social costs of SUD (see Delany, Shields, Willenbring, & Huebner, 2008, for a review). The estimated twelve percent of the population with who meet criteria for diagnoses with SUD display one of two sets of criteria. The first set of criteria describe Substance Abuse Disorder, and must include one or more of the following: legal problems related to substance use; substance use in physically dangerous situations; failure to meet obligations at work or school as a result of substance use; and/or continued substance use despite social or interpersonal problems caused by substance use. The second set of criteria describe Substance Dependence, which is defined as a maladaptive pattern of substance use leading to significant personal distress as indicated by the presence of three or more of the following: tolerance; withdrawal; taking the substance in larger amounts or for longer than was intended; and/or having a persistent desire or unsuccessful efforts to cut down or control substance use (4th ed., text rev.; *DSM-IV-TR; American Psychiatric Association, 2000*). The impact and expense of

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<sup>1</sup> With the release of the DSM-5 these criteria were changed somewhat. The legal problems criterion was removed and craving was added as a criterion (citation).

20.6 million persons in the United States demonstrating these symptoms would be difficult to overstate.

### **Treatment for SUD**

Treatment methods addressing the problem of SUD are diverse. According to Redish and colleagues, such methods are based on equally diverse theoretical frameworks. In order to make meaningful treatment recommendations it is useful to identify specific vulnerabilities present within the SUD population (Redish et al., 2008). The current study focuses on the particular vulnerability for SUD represented by a tendency to experience frequent and overwhelming negative affect states. Verheul et al. (1999) describe this tendency, emphasize the importance of developing methods to measure it, and distinguish it from simple reports of present affective state. If real progress is to be made in the treatment of SUD then it is important to successfully address long-term relapse potential both while the client is in treatment and after contact with clinical services is decreased or terminated. In order to achieve this goal, treatment providers must develop effective means of assessing specific relapse potential that allows us to choose specific therapeutic interventions which target the appropriate areas to reduce that potential (Redish et al., 2008; Verheul et al., 1999).

### **Substance Craving**

**The importance of craving.** Substance craving is a concept that occurs frequently in both academic literature and popular culture, and several different definitions exist. Historically, craving has been operationalized according to its place in conceptual definitions of SUD. Numerous conceptualizations of craving emerge in the relevant literature, including obsessive-compulsive craving; approach-avoidance craving;

multi-dimensional craving; and intensity-frequency-duration craving (Rosenberg, 2009). While definitions of craving differ, most have a common element. Specifically, craving is frequently defined as an intense desire to use a substance (Pavlick, Hoffman & Rosenberg, 2009; Skinner & Aubin, 2010).

Although the definition of craving as an intense desire to engage in substance use is widely accepted, research into the underpinnings of the concept is ongoing. There is evidence in support of a genetic component for craving (e.g. Agrawal et al., 2013); an attentional component (e.g. Field, Mogg, Mann, Bennet & Bradly, 2013); and an impulsive personality component (e.g. Joos et al., 2013). These articles represent only a sampling of the total literature on craving. In fact, Stephen Tiffany found over 2100 published articles on craving when reviewing the literature for a book chapter entitled “Drug Craving and Affect” (see Tiffany, 2010, for a review). With such an enormous volume of theoretical literature available it is important to focus on developing a clinically useful synthesis of our knowledge. Verheul et al. began one such effort with their tripartite model of craving (1999) which created a taxonomy of craving consisting of reward, relief, and obsessive types. The theoretical efforts of Verheul and colleagues were recently extended by Glockner-Rist, Tagrid, Mann & the Predict Study Research Group who validated a measure capable of distinguishing reward versus relief craving in alcoholics (2013). The present study focuses on an affective vulnerability (measured by DARNU) in relation to craving, and examines also factors that may influence the individual’s ‘need’ to seek relief through substance use. It is important to note, however, that other models of craving exist and they will be discussed next.

**Measures and models of craving.** The *obsessive-compulsive model* of craving proposes that regular substance use leads to a pattern of obsessive thoughts related to substance use. These thoughts cause anxiety, which is in turn resolved by substance use. Using this model craving is measured based on the number of obsessive thoughts and the level of anxiety they produce (Anton, 2000; Rosenberg, 2009). In contrast, the *approach-avoidance model* of craving considers craving as the product of an interaction between a desire to use a substance and conflicting desires to avoid the consequences of use. In this model, craving is the outcome of the conflict, a sort of balancing point between conflicting desires, and craving is measured as the relative magnitude of these opposing desires (Rosenberg, 2009). The third conceptualization, *multi-dimensional craving*, is more of a category than a construct. This category includes attempts to discern the dimensions of craving by measuring various hypothetical components of the craving experience. The desire to use a drug is the classic component which is included in all dimensional formulations. Additional components that have been considered involve motivations for/against use and consequences of use, both direct and indirect (Rosenberg, 2009). This conceptualization is an attempt to integrate previous models of craving by simply combining them. Finally, the *intensity-frequency-duration (IFD)* conceptualization of craving is the most useful for research purposes. This conceptualization does not place craving in a theoretical model, but rather seeks to directly operationalize the experience of craving according to the three factors which compose its name (Flannery et al., 1999; Rosenberg, 2009). Measures based on this conceptualization can be meaningfully incorporated into any model of SUD which includes craving (Kavanagh et al., 2013). The present study seeks to validate a

vulnerability for craving among individuals with SUD, thus the operationalizing craving from the IFD perspective is most appropriate..

**Associations between craving and SUD.** Craving as measured by IFD is significant for the description of substance use disorders (Flannery et al., 1999). As noted, craving is a criteria for the diagnosis of substance use disorder in the DSM-5 (American Psychiatric Association, 2012). Several studies have found that craving predicts both the presence and severity of substance use disorders (SUD's). One study of the role of craving in alcohol use disorder reported craving to be strongly associated with a diagnosis of alcohol use disorder under DSM-5 criteria. The same study found that the presence of craving is most likely to indicate an alcohol use disorder of intermediate severity (Casey, Adamson, Shevlin, & McKinney, 2012). A similar study by Hasin investigated the role of craving in the diagnosis of substance use disorder with other substances in addition to alcohol. At least 25 percent of alcohol, cannabis, cocaine, and heroin users all reported craving within the past 12 months. Craving was associated with a diagnosis of SUD with the specific substances of alcohol, cannabis, cocaine and heroin. Unlike the Casey study, the Hasin study found that craving was most likely to predict a mild level of SUD severity as defined by DSM-5 criteria (Hasin, Fenton, Beseler, Park, & Wall, 2011).

**The role of craving in SUD.** The strong association between craving and SUD suggests that craving plays some functional role in the pathology of SUD. One model proposed by Goldstein and Volkow explains the role of craving in SUD in light of a comprehensive review of recent f-MRI evidence of frontal lobe involvement in the drug use cycle. This model proposes a four stage circular model of drug addiction, which

cycles through intoxication, bingeing, withdrawal, and craving. This model proposes that changes which take place in the prefrontal cortex and anterior cingulate of addicted persons allow craving alone to activate regions of the brain associated with response disinhibition characteristic of the compulsive self-administration of drugs which occurs in SUD. This craving can take place both in the presence of drug related cues as well as during the recall of past drug experiences or the anticipation of future drug experiences. The resultant increase in disinhibition represents a core component of both the initial return to active substance use and the subsequent inability to regulate use (Goldstein & Volkow, 2002).

The involvement of the frontal cortical regions by craving appears to activate the limbic structures associated with addiction and reward. Such activation may cause an elevation in mood linked to the anticipation of drug use. This elevation of mood in anticipation of use is another factor that may lead to the resumption of active using behavior. In individuals with a propensity toward negative mood states, this elevation of mood might be salient and lead to an increase in craving and vulnerability to relapse. This possibility is supported by the association between depression and abnormalities in the prefrontal cortical structures which can lead to impairments in decision making (Elliott, Sahakian, Michael, Paykel, & Dolan, 1998; Mayberg et al., 1999). Such increases in craving and associated relapse risk would be impossible to account for with simple behavioral models of SUD. They might also be associated with a return to active using long after behavioral mechanisms which perpetuate drug use have been extinguished. While theoretical explanations vary for the association between craving and a return to

active using, the strength and practical utility of the association is strongly supported in the literature (Drummond, Litten, Lowman, & Hunt, 2000; Skinner & Auben, 2010).

**Craving and relapse potential.** One method of predicting potential for relapse is measuring alcohol craving (Flannery et al., 1999; Higley et al., 2011; Kavanagh et al., 2013). In these studies, relapse is defined as a break from total abstinence. Both Higley and Flannery found that increased rates of craving corresponded with an increased risk for a return to drinking. The Higley study manipulated stress levels and found that higher levels of stress corresponded to higher levels of craving, although craving emerged as the best predictor of relapse.

Similar results are demonstrated when craving levels for other substances are measured. For example, craving levels in abstinent smokers correspond to increased rates of relapse to smoking (Hartwell et al., 2011; Sweitzer, Denlinger, & Donny, 2013). Likewise, increased craving levels during periods of abstinence for cocaine and heroin addicts are associated with increased rates of eventual relapse to active substance use (Marhe, Waters, van de Wetering, & Franken, 2013; Preston & Epstein, 2011), whereas craving levels in abstinent marijuana dependent individuals correspond to increased rates of eventual relapse to active substance use (McRae-Clark et al., 2011). Regardless of the substance, increased craving during abstinence is associated with a greater risk of relapse.

Based on the preponderance of evidence in the available literature, the association between craving and relapse seems clear. Two final points emerging from the craving literature are important for the purposes of the present study. The first is that there is a clear association between negative emotions/distress and elevated levels of craving. This association is featured prominently throughout the craving literature (e.g., Higley, et al.,



2011; Sinha et al., 2011). It is clear from the literature that there is a strong association between distress/negative emotion and craving. In addition, some researchers have made distinctions between types of craving. Cue-elicited craving occurs when a substance dependent individual is exposed to some stimuli associated with a drug through classic conditioning, eliciting craving. This is distinct from substance craving which occurs in the absence of any external stimuli (Drummond, 2000). There is evidence that the same neurological processes underlie both types of craving (Goldstein & Volkow, 2002; Skinner & Aubin, 2010). The present study deals only with craving in the absence of cued stimuli and the association of that type of craving with factors which may determine craving. A deeper understanding of such associations may aid in our understanding of the distinction between cue-elicited craving and other forms of craving, as well as for determining the functional role of craving in SUD (see Drummond et al., 2000 for a review).

### **Posttraumatic Stress Disorder Symptoms**

In addition to the complexity introduced by multiple models attempting to explain addiction, efforts to explain SUD are hampered by the disorder's frequent comorbidity with other psychiatric disorders (Kessler et al., 2005). In fact, approximately 50 percent of individuals who seek treatment for SUD will also have a diagnosis of PTSD (Ouimette, Brown, & Najavits, 1998). The present study seeks to identify a vulnerability to negative affect states that may function to impair decision making in SUD. Negative affect states are identified as a precursor to substance use in the PTSD population both with and without comorbid SUD in the self-medication hypothesis proposed by Khantzian (1985). It is important to determine if our new measure of vulnerability to

negative affect states (i.e., DARNU) also accounts for the association between PTSD affective symptomatology and substance use predicted by Khantizian (1985) in the self-medication model and demonstrated in subsequent studies (e.g. Sharkansky et al., 1999).

Moreover, PTSD is clinically defined as exposure to a stressor and the experience of symptoms related to the stressor from each of three symptom clusters lasting more than one month and causing significant distress or impairment. The definition of a stressor has two parts. First a stressor is the exposure to an incident where an individual is experiencing, witnessing, or otherwise confronting a situation involving actual or threatened death, serious injury, or a threat to the physical integrity of themselves or another. Second, the individual's response to the situation included intense fear, helplessness, or horror. The three symptom clusters are symptoms of intrusive recollection; symptoms of avoidance/numbing; and symptoms of hyper arousal (*DSM-IV-TR*; American Psychiatric Association, 2000). Posttraumatic stress disorder (PTSD) is strongly associated with the presence of SUD (Brady, et al., 1994; Brown, Stout, & Mueller, 1996; Reynolds, et al., 2005).

There is some subjectivity inherent in the definition of PTSD. While it is difficult to quantify, it is conceptually clear that what one individual might perceive as a threat to their physical integrity might be interpreted differently by another. It is similarly evident that situations that provoke fear, helplessness, and horror in one individual might not elicit the same emotions or level of emotions in another. Children represent one population in which this consideration is particularly relevant. Children's ability to evaluate threats and their emotional resources for coping with the threat experience are necessarily more limited than those of an adult (Gerwe, 1999; Gerwe, 2001). Their

responses are also quantitatively different to the degree that they have been given a special designation in DSM criteria (*DSM-IV-TR*; American Psychiatric Association, 2000). Since the diagnosis of PTSD cannot be made without a stressor, this subjectivity may explain why patterns of trauma symptoms insufficient to produce a diagnosis still seem to influence outcomes (Gerwe, 1999; Gerwe, 2001).

As noted, PTSD and trauma symptomatology are clearly associated with SUD and craving. This association is, on one level, clear and direct. The simplest explanations for the association rely on single direction causation, with symptoms of one disorder causing or exacerbating the other. Other theories posit a more complex interaction between the two pathologies. These theories take one of two broad forms. The first is that there is some recursive relationship between the two pathologies, which generates a feedback loop. For example, people who use illegal drugs may have an increased risk of exposure to traumatic experiences as a consequence of the activities necessary to obtain and use such drugs. Exposure to such traumatic experiences may lead to disturbing intrusive thoughts, which are self-medicated with illegal drugs, the finding and using of which leads to potential further trauma exposure (Stewart & Conrod, 2003). The second of the more complex theories postulates some third variable which accounts for increased vulnerability for both pathologies. One such third variable is avoidant coping, which represents an impaired ability to effectively cope with extreme affective states and a tendency to avoid such states by various means. Avoidant coping is a common feature of individuals with trauma symptomatology, and frequently manifests as a tendency to use substances to relieve negative emotional states. Such a tendency is associated with an increased for relapse and greater number and intensity of substance use related problems

(Asberg & Renk, 2012; Brown, Read & Kahler, 2003). The experience of unpleasant affective states is a common element of all these explanations.

The association between PTSD and craving are strong and well documented in the literature (Nosen et al., 2012; Saladin et al., 2003). There is also evidence that PTSD symptoms increase vulnerability to relapse as a function of intrapersonal factors (e.g. depression, anxiety) and situational factors (e.g. ongoing trauma exposure, physiological distress; Gil-Rivas, et al., 2009; Norman, Tate, Anderson, & Brown, 2007; Ouimette, Coolhart, Funderburk, Wade, & Brown, 2007). What is less clear is the mechanism by which this increased vulnerability operates. One proposed explanation is known as the self-medication hypothesis. This theory states that substance's mood altering effects are inappropriately and compulsively utilized to regulate negative affective states and to counteract anhedonia and/or emotional numbing (Khantzian, 1985). This process could take place either with or without the presence of a SUD. However, self-medication is particularly relevant for those with comorbid SUD/PTSD for two reasons: first, persons with PTSD are more likely to experience negative affective states and, second, persons with PTSD are more likely to experience emotional numbing (Khantzian, 1997). This tendency to self-medicate in SUD coupled with the increase in affective symptoms associated with PTSD could explain the increased situational vulnerability to relapse for those with comorbid PTSD-SUD (Sharkansky et al., 1999; Stewart & Conrod, 2003). In recent studies both acute and chronic negative affective states have been associated with an increase in cue-elicited craving and the associated risk of relapse (Fox, Berquist, Hong & Sinha, 2007; Nosen, et al., 2012; Sinha, 2008). Sub-clinical levels of PTSD symptomatology are also associated with increased risk for relapse in SUD (Norman et

al., 2007). The present study seeks to explore the possibility that some common vulnerability, represented by DARNU, might account for this increased risk for craving and relapse in both pure SUD and SUD with comorbid trauma symptomatology.

### **DARNU's Relationship with Trauma, Craving, and SUD**

A recent pilot study (Southard, 2012) identified constructs related to emotional discomfort that might be related to previous traumatic experiences. An item pool was developed based on a review of the literature discussing behavior patterns commonly observed among the SUD population. Additional items were developed by interviewing experienced clinicians and recovering individuals regarding issues which seemed to present obstacles for maintenance of abstinence post-treatment for SUD. These items were then administered to groups of individuals in treatment for SUD and their family members as well as a group of college students. Exploratory factor analysis of the items revealed four stable and interpretable factors. Content analysis of the items corresponding to each factor resulted in a description of the underlying construct. The four constructs identified were Negative Family of Origin Experiences; Compulsive Helping Behavior; a distress factor: Dissatisfaction, Anxious, Restless, Nervous and Uncomfortable (DARNU); and a factor corresponding to a previously validated screen for SUD named UNCOPE. These four factor-derived scales were combined in an instrument named the Core Origins and Relationship Issues questionnaire (CORI). Subsequently a preliminary scale composed of PTSD indicators based on DSM-IV-TR diagnostic criteria was incorporated into the CORI.

The three constructs other than the SUD screen appear to describe patterns of behavior and affective tendencies. The Negative Origin Experiences scale includes items

describing classic trauma (e.g., physical and sexual abuse), as well as items related to experiences in early family life inducing fear and instability (e.g., feeling unloved and unwanted as a child; discouraged from expressing feeling as a child; unpredictable rules). Such items describe events which could act as stressors in the diagnostic model of PTSD (Gerwe, 1999). Other items which load on this factor resemble symptoms from the diagnostic model of PTSD (e.g. being discouraged from expressing feelings). It seems this construct represents a constellation of experiences and cognitive and behavioral responses to those experiences which resemble sub-clinical levels of trauma and associated symptomatology.

The second factor-based scale measures a construct labeled Compulsive Helping Behaviors. The potential association between this scale and trauma symptomatology is less clear. The items on the scale describe a pattern of inappropriately prioritizing the needs of others above one's own needs in order to avoid people becoming displeased or upset. This pattern of behavior might be characterized as avoidance symptoms on the part of someone who had experienced the expressed negative emotion of a significant attachment figure as a traumatic event (Gerwe, 2001).

The third factor-based scale, DARNU, represents a construct which is the most conceptually complex. It was designed to measure a pattern of negative affect of particular relevance to the SUD population. DARNU is the scale most clearly associated with trauma and craving. This scale measures a tendency to experience symptoms of anxiety, emotional discomfort, restlessness, difficulty with extremes of affective state, and depression. These tendencies are both possible manifestations of trauma symptomatology such as hyper-arousal (anxiety) and avoidance (emotional discomfort),

and numbing (difficulty with extremes of affective state) as well as potential secondary outcomes of living with such symptoms (depression, restlessness). This pattern of secondary outcomes resembles scales formed from similar analysis of item pools related to pathological traits and states, most notably the MMPI-2-RF RCd scale. The Demoralization scale measures a construct which, while possessed of an affective quality, is not primarily a measure of affect (Ben-Porath, 2012). Demoralization, rather than a measure of affect, is both an outcome of and a contributor to negative affect states. Often characterized as “patienthood” demoralization can be conceived as the result of experiencing recurring negative affect states without the perceived ability to avoid or cope with these states (Ben-Porath, 2012). Feelings associated with persons with high levels of this construct include being discouraged and overwhelmed (Ben-Porath, 2012). The primary distinction between DARNU and the RCd is that DARNU measures feelings pertaining to external relationships, while RCd focus more on intrapersonal characteristics. While the parallels between DARNU and demoralization are conceptually clear, a second pilot study was conducted to empirically verify their association prior to the completion of the present study. This pilot studied verified the association between DARNU and demoralization, and mapped DARNU across the 41 scales of the MMPI-2-RF in, establishing a pattern of divergent and convergent construct validity for DARNU (Baley, 2014).

DARNU also measures a personality trait often labeled negative emotionality. Negative emotionality is a pattern of individual experience characterized by a tendency to encounter frequent negative affect states (Watson & Clark, 1984). Zuckerman states this personality trait has emerged in “every model of personality based on questionnaire

measurement” (Zuckerman, 1999; p. 68). Negative emotionality is associated with an increased vulnerability to PTSD symptomatology (Miller, 2003) and functions as a mediator between PTSD and outcomes related to substance use/misuse (Miller, Vogt, Mozley, Kaloupek & Keane, 2006). While the parallels between DARNU and other measures of negative emotionality are clear, the second pilot study mentioned above will empirically verify their association.

The fourth factor based scale is a previously validated measure of problems related to substance use called the UNCOPE. This measure includes items which relate to various dimensions of substance use. It is a screen for SUD and, as such, cannot provide a diagnosis (Campbell, Hoffmann, Hoffmann & Gillaspay, 2005; Hoffmann, Hunt, Rhodes, & Riley; Urofsky, Seiber, & Hoffmann, 2007; Zywiak, Hunt, Rhodes, & Riley, 2003). It is used in this study to document problematic features of possible SUD.

When patterns of association between the four constructs were investigated in the pilot study significant correlations are found between DARNU and the other three constructs (Hoffmann, 2008). No other significant correlations were found. This is what we would expect giving the associations documented above between trauma symptomatology and SUD (Miller et al., 2006). The traumatic experiences and associated symptoms described by the Negative Origin Experiences scale and the Compulsive Helping Behaviors scale correlate with an increase in intrapersonal symptoms such as depression and anxiety- which in turn correlates with an increased risk for SUD- but the two scales do not directly correlate with SUD. This pattern of correlation suggests that, in addition to demoralization and negative emotionality,



DARNU may measure some amount of the emotional impact of maladaptive behavioral patterns arising from the interaction of personality and environment.

### **Statement of the Problem**

In the U.S. and globally, SUD's and their associated problems come at a significant emotional and financial cost. Craving (broadly defined) appears robustly linked to the risk of relapse among individuals with SUD, and has been selected for inclusion in the new DSM-5 criteria for SUD. When examined in isolation, trauma symptoms are associated with craving (Nosen et al., 2012; Saladin et al., 2003). Further, negative emotionality is associated with trauma symptomatology (Miller, 2003). Finally, both acute and chronic negative affective states are associated with craving (Fox et al., 2007; Nosen, et al., 2012; Sinha, 2008). Less is known about the interplay among the aforementioned predictors of craving, and the extent to which affective elements may share a common core which influences craving. DARNU is a measure of a unified construct representing aspects of negative emotionality, demoralization, and emotional/behavioral "baggage" of particular relevance to the SUD population. As an individual's DARNU score increases so does that individual's tendency to experience both acute and chronic negative affective states. Therefore, elevations on DARNU should be associated with both trauma symptomatology (Miller, 2003) and craving (Sinha, 2008). The present study seeks to validate DARNU as a measure of a particular vulnerability toward negative affect states in SUD by exploring its associations with craving, problems associated with SUD, and the degree to which the association between trauma symptomatology and craving is accounted for by the tendency to experience both

acute and chronic negative affective states as measured by DARNU. Findings may aid in conceptualization and treatment (including relapse prevention) for this population.

### **Hypotheses**

Based on the previous literature, the following hypotheses are proposed:

H1: Compulsive Helping Behaviors will demonstrate bivariate correlation of 0.25 or greater with DARNU.

H2: Negative Origin Experiences will demonstrate bivariate correlation of 0.25 or greater with DARNU.

H3: DARNU will demonstrate bivariate correlation of 0.25 or greater with craving.

H4: Trauma symptomatology will demonstrate bivariate correlation of 0.25 or greater with craving.

H5: Once DARNU is controlled for the association between trauma symptomatology and craving will not be significant, indicating full mediation.

H6: When all predictors of craving are entered into a multiple regression DARNU will emerge as the best predictor for craving and the primary component of a regression model for craving.

## CHAPTER 3: METHODS

### Participants

There were three groups of participants for this study. One group was drawn from a long-term substance abuse treatment facility for males (N=48). A second group was drawn from half-way houses specializing in substance abuse treatment for males and females (n=59, 11.9% female). A third group was drawn from a twenty eight day substance abuse treatment program (n=58, 46% female). The overall sample consisted of 165 individuals (79% male) in treatment for SUD. Ages ranged from 18 to 67 years, with a mean age of 32 years 9 months for the sample. The overall sample was primarily Caucasian (91.7%). Unfortunately the size of the sample in each of the smaller sub-groups was insufficient to conduct an analysis of gender differences within the group with sufficient statistical power to be meaningful. The groups were deliberately drawn from extremely different types of treatment in order to effectively obtain the broadest possible sample of individuals diagnosed with SUD. Differences between the groups on study variables were demonstrated. On average, individuals at the long-term treatment center higher on a screen for SUD (UNCOPE) and reported higher levels of avoidance coping. See Appendix 3 for the relevant ANOVA table and limitations for further discussion. Please see Table 1 for descriptive statistics and sample demographics.

**Table 1. Demographics**

GENDER	Frequency	Percent
Female	35	21
Male	132	79
Total	167	100

## AGE

Age Group	Percent
25 and under	43.6
25 to 40	31.6
40 to 67	24.8

## EDUCATION

Education	Percent
No HS Diploma	8.9
HS Diploma	22.2
Some College	36.2
Bachelors or higher	32.6

## Ethnic Distribution

	Frequency	Percent
African-American	7	4.2
Native American	3	1.8
White	144	86.2
Bi-Racial	3	1.8
Do not disclose	10	6
Total	167	100

**Measures**

The Core Origin and Relationship Issue (CORI) scales were developed to measure problems associated with difficulty in maintaining abstinence for individuals with SUD. The CORI is a 79-item self-report questionnaire assessing four factor derived scales: negative early life experiences; compulsive helping behavior; Dissatisfied, Anxious, Restless, Nervous, and Uncomfortable (DARNU); and the UNCOPE, a screen for SUD (Campbell, Hoffmann, Hoffmann & Gillaspay, 2005; Hoffmann, Hunt, Rhodes, & Riley; Urofsky, Seiber, & Hoffmann, 2007; Zywiak, Hunt, Rhodes, & Riley, 2003).

The CORI has demonstrated reliability in both clinical and non-clinical populations (Hoffmann, 2012). The full CORI instrument, including all items and with original psychometric details of the constituent scales is included in Appendix 1. For this study only the four scales above were utilized. They demonstrated the following Cronbach alpha: DARNU- .87; UNCOPE- .92; Compulsive Helping-.81; and Negative Origin Experiences- .84. It is important to note that DARNU is a scale that measures an as yet unnamed construct. Therefore the scale name is at present used to refer to the scale and, by extension to the construct it measures.

A trauma scale was adapted from the DSM-IV-TR diagnostic criteria for Post-Traumatic Stress Disorder for this study. This scale is composed of 17 items based directly on DSM-IV-TR criteria. These items are the criteria for a PTSD diagnosis phrased as questions. Items are rated on a Likert-type scale from 1 to 4. Such items have high face validity and were incorporated into the revision of the CORI questionnaire that will be used for this study. The range of possible scores on this measure is from 17-68. Cronbach alpha for this scale in this study was .91. See Appendix 1 for the Trauma Scale items.

A subscale of the COPE inventory specific to substance use was used. This subscale measures a type of avoidant coping specific to the use of substances to avoid or reduce affective distress (Carver, Scheier, & Weintraub, 1989). It includes five items on a Likert scale ranked from 1 to 4, with a range of possible scores from 5 to 20. See appendix 1 for items examples and the full scale. Cronbach alpha for this scale was .81.

The Penn Alcohol Craving Scale (PACS) will be used to assess craving in this study. One modification will be made to the scale: the wording will be changed to

include both alcohol and drugs. The full version of this one factor scale contains ten items, and can be found in Appendix 2. The PACS has high internal consistency, construct validity, and discriminant validity. The PACS is also a reliable predictor of relapse (Flannery, 1999). The combined form of the PACS (cPACS) may be reasonably expected to exhibit similar psychometric properties. A combined craving score was generated from the PACS and cPACS. This combined score will measure the severity and frequency of the desire to consume intoxicants, which is defined as craving. In this study the PACS had a Cronbach alpha of .87 and the cPACS had a Chronabch's alpha of .89.

### **Procedure**

Eligible participants who consented completed a demographic form and a paper-and-pencil survey consisting of the measures described previously. The three measures – CORI, Trauma, and PACS – were combined onto a single sheet form. The forms were then administered by qualified personnel at each of the four sites. The forms were returned and anonymous data entered into SPSS for analysis.

### **Analyses**

The hypotheses proposed above in the section “Statement of the Problem” were evaluated as follows:

First, H1 through H4 were evaluated by testing for significant bivariate correlation. Our sample size of 167 generated power of 0.95 at an alpha of 0.05 for correlations of 0.25 or higher.

H5 was evaluated by entering DARNU and trauma scores into a linear multiple regression as predictors with craving as the outcome variable. Our sample size of 167

allowed us to test correlations with two predictors to the 0.1 level for significance with a power of 0.95 and an alpha of 0.05. Using stepwise regression we will test to see if adding trauma symptomatology into the model significantly improves the ability of DARNU to predict craving. Depending on the outcome of this analysis it may be appropriate to conduct a mediation analysis (Baron & Kenny, 1986) to determine if DARNU fully accounts for the association between trauma symptomatology and craving.

H6 was evaluated by entering predictors of craving sequentially into a multiple regression. Using stepwise regression we will test to determine combination of predictors which best account for variations in craving levels.

## CHAPTER 4: RESULTS

**Table 2.** Correlations with DARNU

Negative Origin Experiences	.375**
Compulsive Helping Behavior	.364**

Note. \*\* $p < .01$

Compulsive Helping Behaviors demonstrated a significant bivariate correlation with DARNU,  $r(165) = .375$ ,  $p < 0.001$ , consistent with our first hypothesis. Negative Origin Experiences demonstrated a significant bivariate correlation with DARNU,  $r(165) = .364$ ,  $p < 0.001$  consistent with our second hypothesis.

**Table 3.** Correlations with Combined Craving

Negative Early Life Experiences	.179*
Compulsive Helping	.061
UNCOPE	.235**
JOLT	.236**
DARNU	.413**
Avoidance Coping	.322**
PTSD Symptomatology	.386**

Note. \*  $p < .05$  \*\* $p < .01$

DARNU demonstrated a significant bivariate correlation with craving,  $r(167) = .413$ ,  $p < 0.001$ , consistent with hypothesis three. Trauma symptomatology demonstrated a significant bivariate correlation with craving,  $r(165) = .386$ ,  $p < 0.001$ , consistent with hypothesis four.

DARNU mediates the relationship between PTSD symptomatology and craving, consistent with hypothesis 5. Hypothesis 5 required multiple steps to generate information sufficient for complete evaluation. The first step was to perform a series of regression analyses to determine if base level criteria for mediation were met. Three



regression equations should be calculated to test for regression: a regression of DARNU (mediator) onto PTSD (original independent variable); a regression of craving (original dependent variable) onto PTSD; and a regression of craving onto both DARNU and PTSD (Baron & Kenny, 1986):

**Table 4.** Predictive model of DARNU

Predictor Variable	Beta	t	R <sup>2</sup> =.635
Trauma Symptomatology	.797	16.977***	

Note. \*\*\*p<.001

**Table 5.** Predictive model of Total Craving

Predictor Variable	Beta	t	R <sup>2</sup> =.149
Trauma Symptomatology	.386	5.38***	

Note. \*\*\*p<.001

**Table 6.** Predictive model of Total Craving Comprehensive

Predictor Variables	Beta	t	R <sup>2</sup> =.179
DARNU	.288	2.459*	
Trauma Symptomatology	.156	1.334	

Note. \*p<.05

Four conditions must be met to establish the possibility of mediation. The independent variable (PTSD) must affect the mediator (DARNU). The independent variable must affect the dependent variable (craving). The mediator must affect the dependent variable when entered into a multiple regression with the dependent variable. Finally, when the dependent variable is regressed onto both the independent variable along with the mediator the influence of the dependent variable on the independent variable must be reduced or eliminated (Baron & Kenny, 1986). In this case all four of the conditions for mediation were met, suggesting the possibility that DARNU mediates

the association between PTSD and craving. As recommended by Baron and Kenny in their 1986 article the appropriate version of Sobel's test was then performed to evaluate the effect of the mediated path. This test was significant,  $Z=2.4296$ , standard error =  $0.11174948$ ,  $P=0.01511346$  (Sobel, 1982). Preacher and Hayes recommend the use of the bootstrapping method to establish mediation as this nonparametric method corrects for potential power problems and atypical distributions that cannot be eliminated by the previous two methods of establishing mediation (2008). The Preacher and Hayes method resulted in a significant finding for a mediation effect, 95% CI  $0.0647-0.5078$  in 1000 resamples, where confidence intervals not including 0 are significant.

Hypothesis 6 was tested by entering all predictors for craving into a regression model and including them in a final model if they contributed significantly to the overall model.

**Table 7.** Significant Predictors of Total Craving

Predictor Variables	Beta	t	$R^2=.192$
DARNU	.336	4.221***	
Avoidance Coping	.164	2.063*	

Note. \*\*\* $p<.001$  \* $p<.05$

## CHAPTER 5: DISCUSSION

The role of craving as an important component in the maintenance of substance use problems and the risk of relapse has been established in the literature. Less is known about the variables that may influence craving. The present study isolated an affective vulnerability for craving measured by DARNU. We considered the effect of two components- trauma symptomatology and DARNU- on a third component, craving. Two factors which contribute to elevations in DARNU, compulsive helping and negative family of origin experiences, were also considered. Our data analysis suggests that compulsive helping behaviors and negative family of origin experiences are among the factors that can increase the affective vulnerability measured by DARNU. Symptomatology associated with PTSD is another factor that significantly increases the affective vulnerability measured by DARNU. These increases in affective vulnerability predicted increases in participants' craving scores. Increased craving scores, in turn, predict relapse (Flannery, 1999).

Isolating the vulnerability measured by DARNU was a two-stage process. The first stage occurred prior to this study with the development of the original scale (Southard, Hoffmann, & Presnell, 2012). This study places the scale in a partial model of SUD, representing the second stage. Based on our conceptualization of the construct we expected a particular pattern of associations. Elevations on DARNU were associated with both trauma symptomatology and craving. This is consistent with the pattern of association we would expect from the literature (e.g. Miller, 2003; Sinha, 2008) for the construct DARNU is intended to measure. DARNU is also intended to measure emotional/behavioral baggage of particular relevance to the SUD population. Elevations

on DARNU were associated with elevations on scales measuring compulsive helping and family of origin issues. Both of these are examples of emotional/behavioral baggage relevant that may be a relevant concern for the treatment of SUD. The pattern of associations exhibited between DARNU scores and relevant scale scores suggest the scale functions as a measure of the presence and activation of a particular vulnerability toward negative affect states in SUD that functions to increase individual craving.

Findings suggest that the affective vulnerability measured by the DARNU mediates the relationship between PTSD symptomatology and craving. Miller et al. (2006) report a similar pattern of mediation for a construct they term negative emotionality with SUD-associated problematic outcomes. Content analysis of DARNU items combined with previous findings leaves little doubt that DARNU has some overlap with a construct they termed negative emotionality. The present study adds to the Miller study by examining the impact of the construct represented by DARNU on craving. Increases in the affective vulnerability measured by DARNU account for the influence of PTSD symptomatology on craving. Miller's work suggests that levels of a latent construct similar to DARNU are predictive of the development of PTSD symptomatology following a trauma (2003). It is reasonable to conclude that DARNU represents a common risk factor for the development and maintenance of both PTSD symptomatology and SUD (via craving).

When all predictors for craving were entered stepwise into a multiple regression only DARNU and avoidance coping emerged as significant predictors of craving. This is consistent with the theoretical context of the two constructs. Functionally the affective vulnerability measured by DARNU may trigger the avoidance coping mechanism, which

leads to craving as an ideation to avoid unpleasant affective states. It is important to note that, although they are both significant predictors, DARNU accounts for a much larger portion of the variance in craving than avoidance coping. This suggests that stabilization of the individual's affective vulnerability may be the most useful treatment target, as stabilizing that vulnerability would also reduce or eliminate avoidance coping. If individuals can be helped to stabilize and/or tolerate their own negative emotions avoidance coping mechanisms may never be triggered, cravings may be reduced or eliminated, and treatment outcomes improved.

As noted in the introduction, recent advances in the understanding of genetic influences on craving suggest that various substances and combinations of substances may differentially activate latent genetic vulnerabilities thereby influencing a variety of outcomes, including craving. Such genetically mediated outcomes to substance use may in turn propagate backward through our model, increasing craving and vulnerability toward negative emotionality. Further study will be required to define substance activated epigenetic effects and determine the degree to which these effects interact with the elements of our model. An initial step in this process will be to evaluate the elements of our model with higher resolution substance specific measures. Furthermore, alcohol has a distinct pattern of genetic influences on craving (Agrawal et al., 2013). Our measures differentiate between alcohol and other substances, but do not focus on the many other substances in the second category which may have very different effects on both craving and negative emotionality.

In addition, our findings relied on a cross-sectional design, retrospective self-reports, and a non-cue elicited measure of craving. Therefore, these findings may not

generalize to cue-elicited cravings or changes in the influence of vulnerabilities (DARNU) as a function of time. Likewise, we did not control for duration of abstinence, type of treatment, or the extent to which participants had dealt with their past trauma. Finally, the sample was limited in terms of ethnic and racial diversity (92% Caucasian) and included primarily individuals who could afford treatment. This may limit the generalizability of findings to more diverse populations (i.e., samples that include a larger number of minorities) or to samples drawn from low-income or marginalized populations. Additionally, we did find some differences between groups levels of SUD severity and avoidance coping. Although this is not surprising and is consistent with the literature reviewed, our study did not have enough participants to fully explore these differences statistically. In lieu of these limitations, findings must be interpreted with caution.

Given the influence of the affective vulnerability (DARNU) and avoidance coping on craving in this clinical sample of individuals with SUD, treatments that target substance use in the context of trauma and coping (e.g., Seeking Safety, Najavits et al., xxxx) may warrant further examination.

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## Appendix 1

**Initial CORI Psychometrics and Individual Scales**

(Previous study)

## CORI Scales

These scales were derived from factor analyses of more than 600 anonymous questionnaires completed by clients in addiction treatment programs, their family members, and college students. Items with factor loadings greater than .05 were selected as the initial item pool for each factor. A few additional items were considered for inclusion in the scales if they met two criteria: the content of the item rationally corresponded to the general content of the scale and the internal consistency of the scale was maintained or enhanced with the addition of the item. An “R” before a given item means it is scored in the opposite direction as other items in the scale.

## Negative Origin Experiences

(Origin Scale; Cronbach's Alpha = .83)

1. (R) As a child, I felt loved and wanted by my parents
3. Rules were not consistent in my family when I was a child
9. In my family, a parent or parent figure tended to be unpredictable in what was OK
10. (R) I was encouraged to express my feelings as I was growing up
11. As I was growing up, I felt I had to take care of problems in my family
12. As a child, I had to look out for others
13. At least one of my parents did not respect me
34. At some point in my life, I was physically abused
35. At some point in my life, I have been forced or coerced to do something sexual that I did not want to do
36. At some point in my life, I have been ridiculed or humiliated for a long period of time

## Compulsive Helper

(Helper Scale; Cronbach's Alpha = .80)

41. I often give up on what I want for the sake of another person
47. I am good at picking up cues about how others feel
49. I can anticipate the needs of others
52. I feel very bad when someone close to me does something that is self-defeating
53. I try to do what is best for others
54. I sometimes find myself involved in trying to help someone else
55. I get frustrated when someone does not act appropriately
61. I try to please people
65. Occasionally I spend time helping others when I should be tending to things I need to do
67. I have difficulty saying “no” when someone asks a favor
70. I sometimes feel guilty when I do something just for me

Substance Use Disorder  
(UNCOPE Scale; Cronbach's Alpha = .91)

25. In the past year, have spent more time drinking or using drugs than I intended to.
26. I have neglected some of my usual responsibilities because of drinking or using drugs.
27. I have felt the need to cut down on my drinking or drug use.
28. Someone has objected to my alcohol or drug use.
29. On occasion, I have found myself thinking a lot about drinking or using drugs.
30. Occasionally, I have used alcohol or drugs to relieve emotional discomforts, such as sadness, anger, or boredom.

Demoralization: Dissatisfied, Anxious Restless, Nervous, and Uncomfortable  
(DARNU; Cronbach's Alpha = .90)

16. (R) I feel very positive about myself
17. I am an anxious person
24. I have trouble expressing my feelings
40. (R) I have a strong sense of self-worth
46. I am frequently sad or depressed
57. I have difficulty in receiving compliments or praise
60. I find it difficult to make decisions of importance
63. (R) I am comfortable with who I am
64. I find it difficult to accept a complement
66. I am concerned about what other people say about me
71. (R) I am comfortable with who I am most of the time
72. I frequently find myself feeling emotionally uncomfortable about something
74. I usually have less fun than most people
75. Sometimes when I get embarrassed I feel bad for days
76. I often feel discontented
77. I tend to be a nervous person
78. I often think that I should be feeling better about myself
79. I am a generally restless person

Other factors were found, but scales derived from them did not have sufficient length or internal consistency to facilitate detailed analyses of their properties. Therefore they were not included in this project.

### Potential PTSD Items

The following items are based on the DSM-IV-TR criteria for Post Traumatic Stress Disorder, but they have not been subjected to empirical verification as included in the CORI-2. Some of the PTSD indications also include items compatible with depression or other affective and anxiety disorders.

- 20. I repeatedly have disturbing memories or dreams of a traumatic event in my life.
- 33. I have frequent mood changes throughout the day.
- 37. I dislike being alone.
- 38. I feel very upset when something reminds me of a specific past event in my life.
- 39. I try to avoid thoughts, activities, or people who remind me of a past event.
- 42. I feel cut off or distant from other people.
- 43. I feel emotionally numb or am unable to have loving feelings.
- 44. I have lost interest in things I used to enjoy.
- 45. I have trouble falling or staying asleep.
- 48. I occasionally feel irritable or have angry outbursts.
- 50. I tend to be watchful and on guard much of the time.
- 51. I am jumpy or easily startled.
- 58. I sometimes feel as though a traumatic event in my past is happening again.
- 59. I have difficulty concentrating.
- 62. I feel as though I have no future or that it will be cut short.
- 73. I have physical reactions, like sweating or my heart pounding, when something reminds me of a particular past event.

CORI Form

**C O R I - 2 : Core Origin and Relationship Issues Questionnaire - 2**

Gender: \_\_\_\_\_ Female \_\_\_\_\_ Male Age: \_\_\_\_\_  
 Years of education: \_\_\_\_\_

Ethnic Background (check one): \_\_\_\_\_ (1) Asian \_\_\_\_\_ (2)  
 African-American \_\_\_\_\_ (3) Hispanic / Latino  
 \_\_\_\_\_ (4) Native American \_\_\_\_\_ (5) White/Caucasian  
 \_\_\_\_\_ (6) Biracial / Other

**Circle your responses using the following scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree**

- 1 2 3 4 1. As a child, I felt loved and wanted by my parents.
- 1 2 3 4 2. One of my parents was ridged and stubborn.
- 1 2 3 4 3. Rules were not consistent in my family when I was a child.
- 1 2 3 4 4. One of my parents was very detail oriented.
- 1 2 3 4 5. At least one of my parents disliked spending money.
- 1 2 3 4 6. As I was growing up, someone in my family regularly used drugs to get high.
- 1 2 3 4 7. I had a parent who demanded that things be done in a certain way.
- 1 2 3 4 8. At least one of my parents was a very hard worker.
- 1 2 3 4 9. In my family, a parent or parent figure tended to be unpredictable in what was OK.
- 1 2 3 4 10. I was encouraged to express my feelings as I was growing up.
- 1 2 3 4 11. As I was growing up, I felt I had to take care of problems in my family.
- 1 2 3 4 12. As a child, I had to look out for others.
- 1 2 3 4 13. At least one of my parents did not respect me.
- 1 2 3 4 14. It is not my intention to take care of other people's needs unless they ask for help.
- 1 2 3 4 15. I let others make their own decisions even if I think they are wrong.
- 1 2 3 4 16. I generally feel very positive about myself.
- 1 2 3 4 17. I am an anxious person.
- 1 2 3 4 18. If someone wants to get drunk, that is his or her business.
- 1 2 3 4 19. I have tried to help someone who did not want help.
- 1 2 3 4 20. I repeatedly have disturbing memories or dreams of a traumatic event in my life.
- 1 2 3 4 21. I seem to attract people with problems.

- 1 2 3 4 22. Someone I am close to drinks too much.
- 1 2 3 4 23. Someone I am close to uses drugs to excess.
- 1 2 3 4 24. I have trouble expressing my feelings.
- 1 2 3 4 25. In the past year, have spent more time drinking or using drugs than I intended to.
- 1 2 3 4 26. I have neglected some of my usual responsibilities because of drinking or using drugs in.
- 1 2 3 4 27. I have felt the need to cut down on my drinking/drug use.
- 1 2 3 4 28. Someone has objected to my alcohol or drug use.
- 1 2 3 4 29. On occasion, I have found myself thinking a lot about drinking or using drugs.
- 1 2 3 4 30. Occasionally, I have used alcohol or drugs to relieve emotional discomforts, such as sadness, anger, or boredom.
- 1 2 3 4 31. I have been in a relationship with someone who had an alcohol or drug problem.
- 1 2 3 4 32. If a friend drinks too much, I really can't do much about it.
- 1 2 3 4 33. I have frequent mood changes throughout the day.
- 1 2 3 4 34. At some point in my life, I was physically abused.
- 1 2 3 4 35. At some point in my life, I have been forced or coerced to do something sexual that I did not want to do.
- 1 2 3 4 36. At some point in my life, I have been ridiculed or humiliated for a long period of time.
- 1 2 3 4 37. I dislike being alone.
- 1 2 3 4 38. I feel very upset when something reminds me of a specific past event in my life.
- 1 2 3 4 39. I try to avoid thoughts, activities, or people who remind me of a past event.
- 1 2 3 4 40. I have a strong sense of self-worth.
- 1 2 3 4 41. I often give up on what I want for the sake of another person.
- 1 2 3 4 42. I feel cut off or distant from other people.
- 1 2 3 4 43. I feel emotionally numb or am unable to have loving feelings.
- 1 2 3 4 44. I have lost interest in things I used to enjoy.
- 1 2 3 4 45. I have trouble falling or staying asleep.
- 1 2 3 4 46. I am frequently sad or depressed.
- 1 2 3 4 47. I am good at picking up cues about how others feel.
- 1 2 3 4 48. I occasionally feel irritable or have angry outbursts.

- 1 2 3 4 49. I can anticipate the needs of others.
- 1 2 3 4 50. I tend to be watchful and on guard much of the time.
- 1 2 3 4 51. I am jumpy or easily startled.
- 1 2 3 4 52. I feel very bad when someone close to me does something that is self-defeating.
- 1 2 3 4 53. I try to do what is best for others.
- 1 2 3 4 54. I sometimes find myself involved in trying to help someone else.
- 1 2 3 4 55. I get frustrated when someone does not act appropriately.
- 1 2 3 4 56. Everyone is responsible for his or her own feelings.
- 1 2 3 4 57. I have difficulty in receiving compliments or praise.
- 1 2 3 4 58. I sometimes feel as though a traumatic event in my past is happening again.
- 1 2 3 4 59. I have difficulty concentrating.
- 1 2 3 4 60. I find it difficult to make decisions of importance.
- 1 2 3 4 61. I try to please people.
- 1 2 3 4 62. I feel as though I have no future or that it will be cut short.
- 1 2 3 4 63. I am comfortable with who I am.
- 1 2 3 4 64. I find it difficult to accept a complement.
- 1 2 3 4 65. Occasionally I spend time helping others when I should be tending to things I need to do.
- 1 2 3 4 66. I am concerned about what other people say about me.
- 1 2 3 4 67. I have difficulty saying “no” when someone asks a favor.
- 1 2 3 4 68. You cannot help someone who does not want your help.
- 1 2 3 4 69. I often vividly remember parts of a past experience.
- 1 2 3 4 70. I sometimes feel guilty when I do something just for me.
- 1 2 3 4 71. I am comfortable with who I am most of the time.
- 1 2 3 4 72. I frequently find myself feeling emotionally uncomfortable about something.
- 1 2 3 4 73. I have physical reactions, like sweating or my heart pounding, when something reminds me of a particular past event.
- 1 2 3 4 74. I usually have less fun than most people.
- 1 2 3 4 75. Sometimes when I get embarrassed I feel bad for days.
- 1 2 3 4 76. I often feel discontented.
- 1 2 3 4 77. I tend to be a nervous person.
- 1 2 3 4 78. I often think that I should be feeling better about myself.
- 1 2 3 4 79. I am a generally restless person.

## Appendix 2

**Penn Alcohol/Drug Craving Scale (PADC)**


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**Instructions:** Please read each item carefully and **circle** the number that best describes your alcohol craving during the past week.

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- |  |  |
|--|--|
| <p>1. During the past week how often have you thought about or about how good a drink would make you feel?</p> <p><b>0</b>.....0 times during the past week</p> <p><b>1</b>.....1 to 2 times during the past week</p> <p><b>2</b>.....3 to 4 times during the past week</p> <p><b>3</b>.....5 to 10 times during the past week<br/>or<br/>1 to 2 times per day</p> <p><b>4</b>.....11 to 20 times during the past week<br/>or 2 to 3 times per day</p> <p><b>5</b>.....20 to 40 times during the past week<br/>or 3 to 6 times per day</p> <p><b>6</b>.....more than 40 times during the past week or more than 6 times per day</p> <p>2. At its most severe point, how strong was your craving to drink during the past week?</p> <p><b>0</b>.....None at all</p> <p><b>1</b>.....Slight, that is a very mild urge</p> <p><b>2</b>.....Mild urge</p> <p><b>3</b>.....Moderate urge</p> <p><b>4</b>.....Strong urge, but easily controlled</p> <p><b>5</b>.....Strong urge and difficult to control</p> <p><b>6</b>.....Strong urge and would have drunk alcohol if it were available</p> <p>3. During the past week how much time have you spent thinking about drinking or about how good a drink would make you feel ?</p> <p><b>0</b>.....None at all</p> <p><b>1</b>.....Less than 20 minutes</p> <p><b>2</b>.....21-45 minutes</p> | <p><b>3</b>.....46-90 minutes</p> <p><b>4</b>.....90 minutes-3 hours</p> <p><b>5</b>.....Between 3 to 6 hours</p> <p><b>6</b>.....More than 6 hours</p> <p>4. During the past week how difficult would it have been to resist taking a drink if you had known a bottle was in your house?</p> <p><b>0</b>.....Not difficult at all</p> <p><b>1</b>.....Very mildly difficult</p> <p><b>2</b>.....Mildly difficult</p> <p><b>3</b>.....Moderately difficult</p> <p><b>4</b>.....Very difficult</p> <p><b>5</b>.....Extremely difficult</p> <p><b>6</b>.....Would not be able to resist</p> <p>5. Keeping in mind your responses to the previous questions, please rate your overall average alcohol craving (that is, thoughts about drinking) for the past week.</p> <p><b>0</b>.....Never had the urge to drink</p> <p><b>1</b>.....Rarely had the urge to drink</p> <p><b>2</b>.....Occasionally had the urge to drink</p> <p><b>3</b>.....Sometimes had the urge to drink</p> <p><b>4</b>.....Often had the urge to drink</p> <p><b>5</b>.....Had the urge to drink most of the time</p> <p><b>6</b>.....Had the urge to drink nearly all of the time</p> <p>Please indicate your craving for drugs on the next page.</p> |
|--|--|



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**Instructions:** Please read each item carefully and **circle** the number that best describes your drug craving during the past week.

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1. During the past week how often have you thought about using a drug or about how good a drugging would make you feel?
  - 0.....0 times during the past week
  - 1.....1 to 2 times during the past week
  - 2.....3 to 4 times during the past week
  - 3.....5 to 10 times during the past week  
or  
1 to 2 times per day
  - 4.....11 to 20 times during the past week  
or 2 to 3 times per day
  - 5.....20 to 40 times during the past week  
or 3 to 6 times per day
  - 6.....more than 40 times during the past week or more than 6 times per day
  
2. At its most severe point, how strong was your craving to use a drug during the past week?
  - 0.....None at all
  - 1.....Slight, that is a very mild urge
  - 2.....Mild urge
  - 3.....Moderate urge
  - 4.....Strong urge, but easily controlled
  - 5.....Strong urge and difficult to control
  - 6.....Strong urge and would have drunk alcohol if it were available
  
3. During the past week how much time have you spent thinking about using a drug or about how good a drug would make you feel ?
  - 0.....None at all
  - 1.....Less than 20 minutes
  - 2.....21-45 minutes
  - 3.....46-90 minutes
  - 4.....90 minutes-3 hours
  - 5.....Between 3 to 6 hours
  - 6.....More than 6 hours
  
4. During the past week how difficult would it have been to resist using a drug if you had known the drug was in your house?
  - 0.....Not difficult at all
  - 1.....Very mildly difficult
  - 2.....Mildly difficult
  - 3.....Moderately difficult
  - 4.....Very difficult
  - 5.....Extremely difficult
  - 6.....Would not be able to resist
  
5. Keeping in mind your responses to the previous questions, please rate your overall average drug craving (that is, thoughts about using) for the past week.
  - 0.....Never had the urge to use a drug
  - 1.....Rarely had the urge to use a drug
  - 2.....Occasionally had the urge to use a drug
  - 3.....Sometimes had the urge to use a drug
  - 4.....Often had the urge to use a drug
  - 5.....Had the urge to use a drug most of the time
  - 6.....Had the urge to use a drug nearly all of the time

## Appendix 3

**ANOVA for Between Group Differences**

Total Craving	1014.476	2	507.238	3.47	0.034
	24007.177	164	146.385		
	25021.653	166			
Family of Origin	26.283	2	13.142	0.48	0.618
	4469.873	164	27.255		
	4496.156	166			
Compulsive Helping	158.349	2	79.175	2.24	0.11
	5802.752	164	35.383		
	5961.102	166			
UNCOPEL	116.357	2	58.179	4.37	0.014
	2181.307	164	13.301		
	2297.665	166			
JOLT	39.138	2	19.569	2.54	0.082
	1265.688	164	7.718		
	1304.826	166			
DARNU	382.657	2	191.329	1.61	0.203
	19468.6	164	118.711		
	19851.257	166			
Avoidance Coping	161.846	2	80.923	5.94	0.003
	2233.902	164	13.621		
	2395.749	166			
	167.157	2	83.578	0.77	0.465
	17802.699	164	108.553		
	17969.856	166			