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Development of a Measure of Craving Suppression

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DEVELOPMENT OF A MEASURE OF CRAVING SUPPRESSION

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DISSERTATION

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy
in the College of Arts and Sciences at the University of Kentucky

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ABSTRACT OF DISSERTATION

DEVELOPMENT OF A MEASURE OF CRAVING SUPPRESSION

While there is evidence to support the efficacy of mindfulness-based treatment for substance use, the mechanisms through which they lead to therapeutic outcomes have received less attention. A growing body of literature suggests that the ways in which people respond to cravings may be an important mediator of change. Individuals with substance use problems may use them to cope with or avoid negative experiences, which could include the experience of craving itself. Thought suppression in particular has been investigated as a specific form of experiential avoidance, and findings suggest that thought suppression strategies may interfere with attempts to quit using substances.

While mindfulness training should be expected to reduce the tendency to suppress or avoid cravings, evidence to support this expectation is limited, largely because no measures yet exist that assess the suppression of craving. Therefore, the purpose of the present study was to develop a self-report measure of the suppression of craving.

Existing measures of other types of thought suppression and experiential avoidance were examined to identify items that could be adapted for use in the Craving Suppression Scale (CSS). To assist with the item development process, a focus group was also conducted at a local residential treatment facility. Participants were asked to discuss what they do when they are experiencing cravings and what thoughts go through their minds when cravings come up. Their responses were used to guide content development for the CSS items. Items were developed for two sub-scales: suppression of craving and beliefs about craving.

Items were administered to a sample of inpatients in substance use treatment and an online sample of individuals reporting current or previous substance use problems (total N = 208). Factor analysis of the remaining items supported a two-factor structure for the CSS as hypothesized. Relationships were examined between the CSS and other measures of other forms of experiential avoidance/suppression, craving, and emotional distress. The CSS scales correlated well with other measures of suppression but had mixed relationships with other constructs of interest. Evidence for the validity and potential utility of the CSS are discussed along with theoretical and treatment

implications.

Brian Thomas Upton

June 30, 2015

DEVELOPMENT OF A MEASURE OF CRAVING SUPPRESSION

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<u>Chapter One: Introduction</u>

In recent years, mindfulness meditation has attracted increased attention as a clinical intervention for a number of psychological disorders and has also been noted for its applications in the improvement of physical health (Allen, Chambers, & Knight, 2006; Bishop, 2002). Mindfulness has been defined as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994, p. 4). It has also been described as "the non-judgmental observation of the ongoing stream of internal and external stimuli as they arise" (Baer, 2003). While mindfulness has origins in Eastern spiritual traditions such as Buddhism, it has been adapted for use in the Western psychotherapeutic context (Bishop, 2002), where it is conceptualized as a distinct, multi-faceted psychological construct. In mindfulness practice, internal and external phenomena are typically observed and allowed to follow their own course without interference and without acting on them in maladaptive ways (Salmon et al., 2004). Mindfulness practice is therefore related to more autonomous behavioral regulation and emotional well-being (Brown & Ryan, 2003).

Mindfulness-based treatments have recently been gaining increased support for the treatment of substance use disorders. Empirically supported mindfulness-based interventions currently applied to substance use disorders (SUD) include mindfulness-based stress reduction (MBSR), originally developed for patients with chronic physical and mental health problems (Kabat-Zinn, 1982; 1990), dialectical behavioral therapy (DBT) for borderline personality disorder with recent adaptations for substance use (Linehan, 1993; Bornavalova & Daughters, 2007), acceptance and commitment therapy (ACT), a transdiagnostic approach used with many disorders (Hayes, Strosahl, & Wilson,

1999; 2012), and mindfulness-based cognitive therapy (MBCT), designed for the treatment of depressive relapse (Segal, Williams, & Teasdale, 2002) but adapted for several other populations.

While there is evidence to support the efficacy of mindfulness-based treatment for substance use (Hayes, Masuda, Bisset, Luoma, & Guerrero, 2005; Brewer, Elwafi, & Davis, 2012; Zgierska, 2009), the mechanisms through which they lead to therapeutic outcomes have received less attention. However, a growing body of literature suggests that the ways in which people respond to cravings may be an important mediator of change.

Craving

Craving has been defined as the subjective experience of an urge or desire to use substances (Kozlowski & Wilkinson, 1987). Experiences of craving can include intrusive thoughts (Kavanagh et al., 2009), substance wanting (Robinson & Berridge, 1993), an impulsive drive or motivation (Cox & Klinger, 2002), emotional states (Tiffany & Wray, 2009), a stress response (Sinha & Li, 2007), or a physical sensation (Paulus, 2007). Craving is a known predictor of negative treatment outcomes in SUD treatment (Allen et al., 2008; Breese et al., 2011; Drummond, 2001; Marlatt, 1977; Shadel et al., 2011; Sinha, Catapano & O'Malley, 1999), and the experience of craving has been shown to be a better predictor of substance use than the prior week's usage in some outpatient trials (Flannery et al., 2001). Craving often precedes the initial lapse following cessation attempts, and some studies have shown that increases in the intensity of the experience of craving can predict lapse and relapse risk (Herd, Borland, & Hyland, 2009; Killen & Fortmann, 1997; Piasecki, 2006). Craving has been shown to be a major obstacle to

overcome for substance users attempting to quit (Killen & Fortmann, 1997), and those

reporting high levels of craving have been shown to be more likely to report other

predictors of negative outcomes such as physiological withdrawal symptoms, intrusive or

obsessive thoughts about substance use, and experiences of negative affectivity such as

depression (Westerberg, 2001).

There is some empirical data suggesting that mindfulness training facilitates

reductions in substance use by changing how participants respond to cravings. For

example, Bowen and Marlatt (2009) investigated the effects of mindfulness training on

smoking urges and behavior, using a student sample of smokers who were interested in

changing their smoking but were not currently involved in a cessation program. In a

single session, participants were asked to take a cigarette from a pack, bring it to their

lips, and hold a lighter near it without igniting it. This procedure induced strong urges to

smoke. Participants then were guided in practicing mindfulness of urges without giving

in to them, or were asked to practice their usual strategies (such as trying to distract

themselves) when resisting urges. Over the following week, all participants monitored

their urges to smoke and number of cigarettes smoked. There was no difference between

the mindfulness condition and the control group on urges to smoke over the following

week. However, those in the mindfulness condition smoked significantly fewer

cigarettes over the follow-up period; i.e., they felt urges to smoke but acted on them less

often. The authors interpreted this to suggest that mindfulness training does not reduce

the experience of craving, but instead helps to change the behavioral response to the

experience of craving. This could be due to a decreased need to alleviate the discomfort

associated with abstaining from substance use and may also reflect an increase in intentional behavior as opposed to reactive, automatic behavior.

In a treatment outcome study for smoking cessation, Gifford et al. (2004) found that withdrawal symptoms (including craving) did not differ between participants assigned to a nicotine-replacement therapy condition and those who received a smoking-focused version of ACT, although the ACT condition showed better long-term outcomes than nicotine-replacement therapy. This finding suggests that ACT enabled participants to experience withdrawal symptoms without yielding to them.

Garland, Gaylord, Boettiger, and Howard (2010) compared a mindfulness-based treatment condition and a support group control in a sample of alcohol-dependent adults and also found that mindfulness training did not result in significantly different reductions in the experience of craving. However, those in the mindfulness condition showed greater reductions in perceived stress and thought suppression, quicker physiological recovery from exposure to alcohol cues, and reductions in alcohol attention bias that were significantly correlated with reductions in thought suppression. These effects were not observed for the support group participants, who actually showed an increase in thought suppression. Therefore these findings suggest that mindfulness training may not reduce the experience of craving but instead provides skills for responding to cravings in constructive ways rather than trying to suppress them or habitually or automatically giving in to them.

Finally, Elwafi et al (2013) reported that in a study of mindfulness training for smoking cessation, a strong correlation between craving and smoking (r = .58) was seen at baseline, but that after four weeks of mindfulness training this correlation was

substantially reduced (r = .13). This effect was strongest for participants who engaged in more informal home practice of mindfulness: awareness of daily activities and nonjudgmental observation of urges. Findings suggest that mindfulness practice can decouple the commonly observed strong relationship between craving and smoking.

A few studies suggest that mindfulness may reduce the frequency of craving in addition to the association between craving and substance use. For example, Bowen et al. (2009) conducted a randomized pilot trial of mindfulness-based relapse prevention in a sample that had recently completed either an inpatient or outpatient substance use treatment. Participants in the mindfulness condition showed greater decreases in both craving and substance use than those in the treatment as usual (TAU) condition. Further analyses (Witkiewitz & Bowen, 2010) showed that for those in TAU, depressive feelings that arose post-treatment predicted intensity of cravings for alcohol and drugs, which in turn predicted substance use over the four-month follow-up period. However, in the mindfulness group, depressive feelings were much less strongly associated with cravings or substance use, suggesting that mindfulness training enabled participants to respond more adaptively to negative affect.

Experiential avoidance

Any behavior that functions to avoid or escape from unwanted internal experiences or the external conditions that elicit them can be construed as experiential avoidance (Hayes, Strosahl, & Wilson, 1999). Experiences that are often avoided or suppressed include thoughts, feelings, somatic sensations, or any other experiences that are either uncomfortable or distressing. Even early research (Wikler, 1948) described substance use as a form of experiential avoidance. Individuals with substance use

problems may use to cope with or avoid negative experiences, which could include the experience of craving itself. Using substances as a form of avoidant coping has been linked to negative treatment outcomes (Vernig & Orsillo, 2009).

Thought suppression in particular has been investigated within substance use disorders as a specific form of experiential avoidance, and findings suggest that thought suppression strategies may interfere with attempts to quit (Haaga & Allison, 1994; Toll, Sobell, Wagner, & Sobell, 2001). For example, in a sample of heavy social drinkers, Palfai et al (1997) found that suppressing the urge to drink when exposed to alcohol cues increased the accessibility of positive alcohol-related expectancies. Similarly, Salkovskis & Reynolds (1994) found that smokers who attempted to suppress thoughts about cigarettes reported more smoking-related intrusions and negative affect than a control group who did not engage in cigarette-related thought suppression. These findings are consistent with a large body of evidence showing that, in general, thought suppression has paradoxical rebound effects in which the suppressed experiences return with greater frequency or intensity (Abramowitz, Tolin, & Street, 2001; Najmi & Wegner, 2008).

Experimental findings also support the idea that suppression of cravings is likely to be counter-productive. Rogojanski, Vettese, and Antony (2010) explored the effectiveness of a brief mindfulness-based strategy versus a suppression strategy for coping with cigarette cravings elicited by exposure to smoking-related cues. Smoking-related cues included opening a pack of cigarettes, placing a cigarette on a table in front of them, placing a cigarette in their mouth, and bringing a lighter to the cigarette without igniting the cigarette. Participants completed measures of self-efficacy regarding their ability to cope with smoking urges, craving, negative affect, depression, and nicotine

dependence before and after exposure and at a 7-day follow-up timepoint. While participants in both groups evinced significantly decreased smoking urges, amount of smoking, and increased self-efficacy at the 7-day follow-up, only those in the mindfulness condition demonstrated significant reductions in depression and negative affect. Those in the mindfulness condition also evinced marginal, nearly significant reductions in nicotine dependence compared to the suppression condition. The authors suggested that mindfulness-based strategies may be useful for coping with smoking urges and reducing smoking behaviors, and may provide some additional benefits not observed when engaging in a suppression-based strategy.

Finally, evidence suggests that acceptance of the experience of craving may be a critical factor in successfully treating substance use disorders such as nicotine dependence. Bricker, Wyszynski, Comstock, and Heffner (2013) conducted a randomized controlled pilot trial of a web-based acceptance and commitment therapy intervention for smoking cessation that encouraged mindful acceptance of cravings to smoke. While the main hypotheses of the study were related to the feasibility of the design of the intervention, the authors established that their ACT-based intervention obtained a point prevalence quit rate at 30 days post-treatment of more than double that of the alternative website, Smokefree.gov, the U.S. national standard for web-based smoking interventions. More frequent and more prolonged access by participants was noted to contribute to these results, and mediational analyses indicated that the difference in quit rates could be explained by greater increases in noticing and not acting on urges to smoke.

Potential utility of a measure of the suppression of craving

The research just reviewed provides strong evidence that attempts to suppress cravings are unhelpful. However, given the associations between cravings and substance use, it seems likely that many people who are trying to reduce their use of substances attempt to suppress cravings whenever they arise. They are also likely to hold dysfunctional beliefs about cravings; i.e., that cravings are dangerous and must be avoided, or that it is wrong to feel them. Mindfulness-based treatments are designed to counteract such beliefs by teaching participants to observe their cravings and urges in a nonjudgmental, nonreactive way, with openness, interest, and self-compassion, and without yielding to them. While such training should be expected to reduce the tendency to suppress cravings, evidence to support this expectation is lacking, largely because of a lack of suitable measures. Currently, there are measures of frequency or intensity of craving and measures of thought suppression/experiential avoidance. However, no measures yet exist that assess the suppression of craving.

A measure of craving suppression could be very useful in studying the relationship between responses to cravings and substance misuse. If such a measure were developed, it would be much easier to elucidate the effects of mindfulness-based treatments on craving and the suppression of urges to use substances. Therefore, the purpose of the present study is to develop a self-report measure of the suppression of craving.

Chapter Two: Methods

Study 1: Item development for the Craving Suppression Scale

Initial items for the Craving Suppression Scale (CSS) were developed in two ways. First, existing measures of other types of thought suppression and experiential avoidance were examined to identify items that could be adapted for use in the SCS. For example, the White Bear Suppression Inventory (described in more detail below) includes items such as, "I often do things to distract myself from my thoughts." An item for the CSS was, "I often do things to distract myself from my cravings."

Second, to assist with the item development process, a focus group was conducted at a local residential treatment facility for women with substance misuse disorders. Residents are self-referred, are court-ordered to complete the treatment program, or are released directly to the facility from jail or prison in lieu of imprisonment or as a condition for release. Residents typically reside at one of the three "houses," or treatment facilities, for 4 to 6 months of intensive treatment before they move into subsidized, supervised "independent living" apartments in the community for maintenance treatment prior to completing the full program. While in treatment, all residents receive individual and group psychotherapy, psychoeducation, vocational training, work therapy, and attend mandatory Alcoholics Anonymous or Narcotics Anonymous groups in the community.

Seven women were recruited to participate in the focus group by inquiring about interest before a community dinner at one of the houses. Those who were interested in participating volunteered their time in return for receiving psychoeducation about recent findings about craving and substance use recovery. Those who participated in this group were excluded from further participation in the study to prevent undue influence on their

responses. The focus group met in a side room of the house in the afternoon during the

work week at a time when most of the women at the facility had free time between

attending groups. The focus group lasted approximately one hour. Participants were

asked to discuss what they do when they are experiencing cravings and what thoughts go

through their minds when cravings come up. Their responses were recorded and used to

guide content development for the CSS items. Examples of items developed this way

include: "Craving a substance means I will relapse" and "I always try to put cravings out

of my mind."

Items were developed for two sub-scales: suppression of craving and negative

beliefs about craving. These scales were intended to capture not just the incidence of

suppressing cravings but also to evaluate the degree to which individuals have potentially

maladaptive schemas about cravings, such as believing that cravings are inherently bad,

that cravings will always lead to relapse, or that having cravings indicates a lack of

control over one's behaviors.

A total of 11 preliminary items was developed for the suppression subscale and

15 for the beliefs about craving subscale to be evaluated for inclusion in the CSS, for a

total of 26 initial items. Items were formulated according to the basic principles for item-

writing described by Clark & Watson (1995), such as using clear, simple language with a

low to moderate reading level, avoiding slang, colloquialisms, and dated terms, and

expressing only one central idea per item.

Evaluation of content validity

Content validity of the initial set of items was evaluated by another focus group at

the same treatment facility with a different set of participants. Participants were told that

the items were meant to describe either the suppression of craving or beliefs one may have about craving, using similar descriptions as before. Suppression was described as "what you do when you have an experience (ex. urge, thought, emotion, physical feeling, etc.) and you try to get rid of it or avoid it." Beliefs about craving was described as "the ideas you have about cravings and what cravings mean to you" and by giving examples such as "cravings are bad", "if you have a craving, you're failing in recovery," or "cravings put you in danger of relapse."

Feedback about the items was solicited from the group regarding factors such as meaning of the items (ie. content validity), clarity, and reading level. Feedback was solicited using questions such as "Do you think that this item reflects craving based on your understanding of it," or "Is this item clear," or "Do you think this item is repetitive?" Based on the feedback, a total of 3 items were eliminated from the beliefs about craving subscale and 4 total items were revised, leaving 23 items for further analysis. An example of an item that was eliminated is "Craving a substance defeats my willpower," which was deemed unclear by the focus group. An example of an item that was revised is "When cravings come up, I try to put it out of my mind." This became "When I find myself dwelling on using, I try to put it out of my mind" because the phrase "when cravings come up" was used at the beginning of four items and was deemed repetitive.

Study 2: Factor structure, relationships with other constructs, and incremental validity

Participants and procedure

Psychometric properties of the CSS were examined in two samples. The first

sample was recruited from the substance use treatment facility described earlier. Investigators arranged a meeting at this facility to present the study to potential participants, who were offered a chance to win a gift card to Walmart valued at $25 in exchange for their participation. A total of 41 women at this facility were recruited for the study. Their average age was 31 (range = 20 to 52). Of these, 29 were Caucasian, 5 African American, and 1 reported "other" race. A total of 6 participants did not provide data for race. Regarding educational achievement, 6 had completed a high school diploma/GED, 15 an associate's degree or some college, 12 had obtained a bachelor's degree, and 1 had a graduate degree. A total of 7 participants did not report educational information.

The second sample was a community sample obtained through Mechanical Turk (mTurk). Mechanical Turk is a website operated by Amazon for which requesting individuals or businesses can elicit participation from a pool of individuals who have signed up to take surveys or work on online projects for monetary compensation. The data quality and reliability have been found to be at least equivalent to those gathered with more traditional methods (Buhrmester, Kwang, and Gosling, 2011). Participants were informed that they are being asked to participate in a study that involves completion of questionnaires relating to personality traits, attitudes, and engagement in risky behaviors. They were asked to participate in the study only if they had a history of or current substance misuse problems, and they were compensated by being paid $1.50. A total of 200 participants was recruited through mTurk, although 44 were excluded for the study as described below. The remaining 166 participants' average age was 35.09 (range = 19 to 69). There were 72 female and 91 male participants, with one participant

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reporting "other" gender. There were 120 Caucasian participants, 10 African American, 7 Hispanic, 22 Asian, and 2 of "other" race. Regarding educational achievement, 14 had completed a high school diploma/GED, 73 an associate's degree or some college, 55 had obtained a bachelor's degree, and 20 had a graduate degree.

Differences between the two samples were evaluated by independent samples t-test and chi-squared analyses. These results are presented in Table 2.1 and are discussed in the limitations section below.

Measures: Suppression and experiential avoidance

The White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) is a 15-item questionnaire that is designed to measure thought suppression. Participants are asked to rate items on a five-point Likert scale (ranging from "strongly disagree," rated 1, to "strongly agree," rated 5). The WBSI has demonstrated high internal consistency (α = .87 - .89) and test-retest reliability (r = .92). It was expected that both CSS scales would correlate positively with the WBSI.

The Brief Experiential Avoidance Questionnaire (BEAQ; Gamez et al., 2014) is an abbreviated (15-item) version of the Multidimensional Experiential Avoidance Questionnaire (Gamez et al., 2011). It includes content from each of its parent scale's subscales, which include: Distress Aversion, Behavioral Avoidance, Distraction/Suppression, Repression/Denial, Distress Endurance, and Procrastination. Items are summed to provide a total score only. The BEAQ has demonstrated a clear single-factor structure with good internal consistency (α = .86). It has been shown to substantially correlate with other measures of avoidance, and was broadly associated with psychopathology and quality of life after controlling for neuroticism. It was hypothesized

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Table 2.1

Demographic characteristics of residential and MTurk samples

	Residential	MTurk	t or chi^2	p
Age in years (M, SD)	31 (*7.06*)	35 (*11.28*)	1.90	.005
% female (*n*)	100 (*41*)	44 (*100*)	37.67	.000
Race			16.95	.031
% Caucasian	70.7 (*29*)	72.7 (*120*)		
% African American	12.2 (*5*)	6.06 (*10*)		
% Hispanic	0 (*0*)	4.24 (*7*)		
% Asian	0 (*0*)	13.3 (*22*)		
% Other	2.43 (*1*)	1.21 (*2*)		
Education			85.63	.000
% high school graduate	36.6 (*15*)	8.5 (*14*)		
% some college	29.3 (*12*)	44.2 (*73*)		
% with Bachelor's degree	2.4 (*1*)	33.3 (*55*)		
% graduate degree	0 (*0*)	12.1 (*20*)		

that the CSS scales would be positively associated with the BEAQ.

The Thought Control Questionnaire (TCQ; Wells & Davies, 1994) is a 30-item measure that assesses strategies for controlling unwanted thoughts. These strategies are grouped into five subscales: distraction (doing or thinking of something else), social control (discussing the issue with others), worrying about other concerns, self-punishment for thinking the thought, and reappraisal (re-interpreting or challenging the thought). Participants are asked to rate how often they employ each of the thirty strategies on a four-point Likert scale from 1 = never to 4 = always. Individual sub-scales have been shown to have acceptable internal reliability ($\alpha = .70$ average), and test-retest reliability ($r = .74$ average for subscales, $r = .83$ for the total score). It was expected that the CSS scales would correlate positively with distraction, social control, worry, and punishment. They were hypothesized to be negatively associated with reappraisal.

The Acceptance and Action Questionnaire for Substance Abuse (AAQ-SA; Luoma, Drake, Kohloenberg, & Hayes, 2011) is a version of the AAQ-2 with modified content to reflect a narrow focus on substance abuse. The AAQ-2 is a measure of psychological flexibility, defined as the ability to fully contact the present moment and the thoughts and feelings it contains without needless defense, and, depending upon what the situation affords, persisting or changing in behavior in the pursuit of goals and values (Hayes et al., 2006). The AAQ-SA was developed to focus upon psychological flexibility as it relates to substance misuse by modifying the original item content. It contains two subscales: defused acceptance and values commitment. Both subscales showed good internal consistency ($\alpha = .84$ and $\alpha = .82$, respectively). The AAQ-SA was

scored so that high score were indicative of greater values commitment and defused acceptance. It was hypothesized that the SCS scales would be negatively associated with defused acceptance, but was not hypothesized to be associated with values commitment.

Measures: Other constructs

The Penn Alcohol Craving Scale (PACS) is a five-item instrument for assessing craving. The frequency, intensity, and duration of thoughts about drinking are assessed alongside the ability to resist drinking. It was modified to include craving of alcohol, nicotine, and illicit substances. The internal consistency of the modified version of the PACS was $r = .87$ in a previous study (Witkiewitz & Bowen, 2010). The PACS was hypothesized to be positively associated with craving suppression and with beliefs about craving.

The Alcohol Smoking and Substance Involvement Screening Test (Ali et al., 2002; ASSIST) is a measure of substance use and related problems. It provides information about the substances that individuals have used throughout their lifetime, during the past 3 months, problems related to substance use, risk of current and future harm, level of dependence, and intravenous drug use. Its total score has been shown to have good internal consistency ($\alpha = .89$), and it has been shown to have significant correlations with the Addiction Severity Index (r = .76 - .88), one of the leading measures of substance dependence. It does not, however, have the same problems with reliability. It assesses severity of problems related to the use of alcohol, cannabis, nicotine, opiates, and an "other" drug category. It was hypothesized that the ASSIST drug categories would be positively correlated with both CSS scales.

The PANAS 20 (PANAS; Watson, Clark, & Tellegen, 1988) is a 20 item measure

consisting of two 10-item scales of positive and negative affect. The scales consist of a number of words that describe different feelings and emotions. Participants are asked to read each item and then indicate the extent they have felt this way in the last week on a 5 point Likert scale from "very slightly or not at all" to "extremely." Each subscale demonstrated good internal consistency (α = .90 for positive affect and α = .87 for negative affect). It was hypothesized that the CSS scales would correlate negatively with the positive affect scale and positively with the negative affect scale.

The Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995) is a 42 item measure of stress, anxiety, and depression. Participants are asked to rate statements on a 4 point Likert scale from "did not apply to me at all" to "applied to me very much, or most of the time." Each subscale of the DASS has demonstrated good internal consistency (stress α = .89, depression α = .91, anxiety α = .81). It is hypothesized that the CSS scales would correlate positively with each subscale of the DASS.

The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a 39-item self-report questionnaire designed to assess five facets of mindfulness: observing, describing, acting with awareness, nonjudging of inner experiences, and nonreactivity to inner experiences. It was created through factor-analysis of five pre-existing measures of mindfulness. Participants are asked to rate the degree to which each statement applies to them on a 5-point Likert-style scale (1=Never or very rarely true, 5=Almost always or always true). The CSS scales were hypothesized to be negatively correlated with the FFMQ scales.

Chapter Three: Results

Data screening

The data were analyzed using SPSS 21.0. For the mTurk sample, validity questions were included at the end of the battery of measures to evaluate whether or not the responders were attending appropriately to item content and not randomly responding. Questions included prompts such as "I read the instructions at the top of each section," "I paid attention to the questions as I answered the surveys," and "I answered the questions as accurately as I could." They responded by clicking boxes labeled "Not at all, Some of the time, Most of the time, and All of the time." Participants who indicated that they did not respond at least "Most of the time" to two of the three validity questions were excluded from analyses. Results from the mTurk sample also included the total amount of time that each respondent took to complete the battery. Those who spent less than 20 minutes total on the battery were excluded from the study (approximately 5.5 seconds per item). These procedures resulted in the exclusion of 44 participants from the mTurk sample; therefore, data from 166 participants were used for analyses. Combined with the 41 participants from the residential sample, a total of 207 participants were included in the analysis. This sample size is consistent with the recommendations of Clark & Watson (1995) for scale development. This sample size provided 9 participants per item, which falls at the generous end of the 5-10 range that is commonly recommended for exploratory factor analysis (Floyd & Widaman, 1995).

Item-level analyses and internal consistency

Prior to conducting factor analysis, preliminary analyses at the item-level were conducted. Items were screened for excessive skew and variability in responses. No CSS

items demonstrated excessive skew (i.e. a skew value greater than three times its standard error), so no items were excluded based upon this criterion.

Item-total and inter-item correlations were also examined. Four items on the beliefs about craving subscale had corrected item-total correlations below .30 and/or inter-item correlations less than .30. These items were excluded from further analysis, No items were removed from the suppression subscale based on item-total or inter-item correlations. No items on either scale had very high corrected item-total correlations that indicated redundant content (i.e. >.80). The coefficient alpha for the remaining items was .78 for the beliefs about craving subscale (8 items) and .90 for suppression (11 items). The coefficient alpha for the total scale of 19 items was .85.

Exploratory factor analysis

Responses to the 19 remaining items were then subjected to an exploratory factor analysis using principal axis factoring with an oblique rotation to allow any possible factors to correlate. A two-factor solution emerged with eigenvalues greater than 1. Examination of the scree plot also revealed a two-factor solution to the data. One item from the beliefs about craving subscale with factor loadings below .40 on both factors was eliminated along with another item from the beliefs subscale with significant cross-loading. Additionally, one item "The best way to stay clean is to eliminate triggers for drugs/alcohol" loaded unexpectedly on the suppression subscale rather than the beliefs subscale and was included in the suppression subscale for subsequent analyses. This solution resulted in 17 total items, 12 for the suppression subscale and 5 for the beliefs about craving subscale. Factor loadings for remaining items are presented in Table 3.1. The final two-factor solution accounted for 52.12% of the variance. The reliability of the

Table 3.1

Item Content and Factor Structure of the Craving Suppression Scale (CSS) (n = 186)

Item	Factor Loadings	
	1	2
Suppression subscale		
1. I always try to put cravings out of my mind.	.628	-.037
2. Sometimes I keep busy just to keep cravings out of my mind.	.559	.076
3. I often do things to distract myself from craving.	.591	.027
4. I often try to avoid triggers.	.698	-.017
5. When cravings come up, I try my best to stop thinking about them.	.781	.047
6. The best way to stay clean is to eliminate triggers for drugs/alcohol.	.485	.166
7. When cravings come up, I try to fill my head with something else.	.775	-.037
8. I usually try to distract myself when I have cravings.	.791	-.034
9. When I experience craving, I try to come up with other things to do.	.739	-.096
10. I work hard to get rid of triggers that cause cravings.	.743	-.025
11. When I find myself dwelling on using, I try to put it out of my mind.	.756	-.079
12. When I find myself obsessing about drugs/alcohol, I tell myself to stop thinking about it.	.528	.003
Beliefs about craving subscale		
13. Craving drugs/alcohol is a sign of weakness.	.032	.675
14. Craving a substance means I will relapse.	-.032	.652
15. Thinking about using substances means I am weak.	.073	.841
16. Using substances is the only way to cope with the feeling of craving.	-.194	.464
17. It is bad to have cravings.	.169	.596
Percentage of variance accounted for	52.12%	

first factor, named suppression, was .90 with 12 items and the reliability of the second factor, named beliefs about craving, was .79 with 5 items. The correlation between the two factors was nonsignificant ($r = .09$, $p = .23$). Means and SDs for the two subscales are shown in Table 3.2.

Correlations between the CSS suppression subscale and other measures

Several authors have argued that combining uncorrelated subscales to create a total score may obscure relationships with other variables (Smith, McCarthy, & Zapolski, 2009). For this reason, remaining analyses of the CSS are presented for the two subscales separately. Correlations between the CSS subscales and each of the measures listed above were computed. Due to the large number of analyses conducted, only those with $p < .01$ were considered to be significant, although statistics with $p < .05$ were also flagged to look at statistical trends. Due to the demographic differences between the two samples noted earlier, correlations were computed both for the full sample and for the residential and mTurk samples separately.

Measures of experiential avoidance. As predicted, for the combined sample (Table 3.3), the CSS suppression subscale was significantly positively correlated with other well-validated measures of suppression and experiential avoidance, including the WBSI, BEAQ, and the TCQ distract subscale. Contrary to hypotheses, the CSS suppression subscale was not associated with the other TCQ subscales. In the residential and mTurk samples considered separately, the pattern of findings was largely the same. Although the correlations for the residential sample are not significant, probably due in part to the smaller sample size (n = 41), according to Fisher's test of the significance of the difference between independent correlations (Howell, 1982), correlations for the

Table 3.2

Means and SDs for the suppression subscale and the beliefs about cravings subscale of

the CSS across samples

CSS subscale	Full sample		Residential		mTurk	
	M	(SD)	M	(SD)	M	(SD)
Suppression	67.54	(11.09)	69.78	(9.32)	66.83	(11.43)
Beliefs about cravings	19.81	(7.32)	13.56	(6.23)	21.35	(6.62)*

Note: CSS = Craving Suppression Scale.

*Difference between the residential and mTurk samples is significant at p < .01

Table 3.3

Relationships between the CSS suppression subscale and other constructs

	Full Sample n = 207	Residential n = 41	mTurk n = 166
Experiential avoidance			
WBSI	**.426***	.301	**.459***
BEAQ	**.305***	.291	**.301***
TCQ distract	**.346***	.189	**.383***
TCQ punish	-.020	.225†	-.089†
TCQ reappraisal	.067	.220	.018
TCQ worry	-.031	.202	-.090
TCQ social control	-.040	-.231	-.057
Symptoms & affect			
PACS	.112	.248	.080
DASS stress	-.103	-.100	-.113
DASS depression	-.027	-.081	-.010
DASS anxiety	-.020	-.011	-.034
PANAS negative	.014	.178	-.053
PANAS positive	**.197***	.151	*.176*
Mindfulness & psych flex			
FFMQ observe	*.175*	*.329*	.122
FFMQ describe	.108	.016	.111
FFMQ act w/ awareness	-.010	-.075	.000
FFMQ non-judging	-*.155*	-.251	-.127
FFMQ non-reactivity	.122	**.412***†	.053†
AAQ defused accept.	.-**265***	.-256	.-**265***
AAQ values commit.	**.501***	**.449***	**.506***
Substance use			
ASSIST alcohol	-.104	.081	-.077
ASSIST cannabis	**-.272***	-.038	**-.275***
ASSIST opiates	-.158	-.085	-.185
ASSIST tobacco	-.051	-.191	-.042
ASSIST other	-.207	-.053	-.262
ASSIST drug of choice	-.103	-.272	-.062

Note: WBSI = White Bear Suppression Inventory, BEAQ = Brief Experiential Avoidance Questionnaire, TCQ = Thought Control Questionnaire, AAQ-SA = Acceptance and Action Questionnaire – Substance Abuse, PACS = Penn Alcohol Craving Scale, DASS = Depression Anxiety and Stress Scale, PANAS = Positive and Negative Affect Schedule, psych flex = psychological flexibility, FFMQ = Five Facet Mindfulness Questionnaire, ASSIST = Alcohol Smoking and Substance Involvement Screening Test
Bold* = correlation is significant at *p* < .01
Bold/Italicized = correlation is significant at *p* <. 05
† = correlations for the residential and mTurk samples differ at p < .05

residential sample and mTurk sample do not differ significantly, except for the TCQ self-punishment scale, where both are small and nonsignificant.

Measures of symptoms and affect. In the full sample, the CSS suppression scale was significantly correlated with positive affect, suggesting that respondents who report more suppression of cravings also report more positive emotion. Relationships between the CSS suppression subscale and other measures of symptoms and affect (substance cravings, stress, anxiety, depression, negative affect) were all nonsignificant. In the residential and mTurk samples considered separately, the pattern of findings was similar. None of the differences between correlations were statistically significant.

Measures of mindfulness and psychological flexibility. In the combined sample, the Observe subscale of the FFMQ demonstrated an unexpected positive trend with the CSS suppression subscale and an expected negative trend with the nonjudging of internal experience scale. All other correlations between the CSS suppression subscale and FFMQ scales were nonsignificant. The CSS suppression subscale showed an expected negative correlation with the defused acceptance scale of the AAQ-SA, suggesting that respondents who reported greater suppression of cravings also reported greater problems coping with cravings and reduced ability to refrain from getting caught up in or controlled by them. Unexpectedly, the CSS suppression scale was positively correlated with the values commitment subscale of the AAQ-SA. This finding suggests that respondents who reported greater suppression of cravings also reported more values-consistent behavior.

In the residential and mTurk samples considered separately, most findings were similar to the pattern for the full sample. However, a significant difference was noted for

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the non-reactivity scale of the FFMQ, which was positively correlated with the CSS suppression scale in the residential sample only, suggesting that for these participants, the tendency to suppress cravings is associated with the ability to notice thoughts and feelings without reacting to them in maladaptive ways. This correlation (r = .412) was significantly higher than in the mTurk sample or the full sample.

Measures of substance use. Regarding the ASSIST drug misuse scales, the CSS suppression scale showed an unexpected negative association with the ASSIST cannabis scale, suggesting that respondents who reported greater suppression of cravings also showed lower use of cannabis. Correlations between the CSS suppression scale and the remaining ASSIST scales were unexpectedly nonsignificant. In the residential and mTurk samples considered separately, the pattern of findings was the same. None of the differences in correlations between the mTurk and residential samples were significant.

Correlations between the CSS beliefs about cravings subscale and other measures

Measures of experiential avoidance. As predicted, for the combined sample (Table 3.4), the CSS beliefs subscale was significantly positively correlated with other well-validated measures of suppression and experiential avoidance, including the WBSI, BEAQ, and the TCQ self-punishment and worry subscales. Contrary to hypotheses, the CSS beliefs subscale was only marginally associated with the TCQ distract subscale and not associated with the social control or reappraisal subscales. In the residential and mTurk samples considered separately, the pattern of findings was largely similar. Although the correlations for the residential sample are not significant (again, probably due to the smaller sample size), most are similar in magnitude to those in the mTurk

Table 3.4

Relationships between CSS beliefs about craving subscale and other constructs

	Full Sample n = 207	Residential n = 41	mTurk n = 166
Experiential avoidance			
WBSI	**.238***	.312	**.257***
BEAQ	**.459***	**.495***	**.505***
TCQ distract	***.149***	.198	.136
TCQ punish	**.273***	.160	**.389***
TCQ reappraisal	.140	.174	.133
TCQ worry	**.226***	.296	**.320***
TCQ social control	-.028	-.043	.124
Symptoms & affect			
PACS	***.164***	.208	.154
DASS stress	.086	-.292†	**.270***†
DASS depression	.081	-.282†	**.235***†
DASS anxiety	.069	-***.328***†	**.293***†
PANAS negative	.048	.038	**.235***
PANAS positive	-.088	.232	-.094
Mindfulness & psych flex			
FFMQ observe	.073	.099	.100
FFMQ describe	-.051	.007	-.089
FFMQ act w/ awareness	-.051	-.260	-.117
FFMQ non-judging	-***.163***	-.148	-.279
FFMQ non-reactivity	.013	***.472****†	-***.167***†
AAQ defused accept.	**-.379***	***-.351***	**-.471***
AAQ values commit.	***-.162***	-.054	***-.206***
Substance use			
ASSIST alcohol	**.204***	-.289†	.161†
ASSIST cannabis	**.282***	-.133†	**.284***†
ASSIST opiates	.005	-.243†	.155†
ASSIST tobacco	-.022	-.077	***.211***
ASSIST other	***.226***	-.103†	**.463***†
ASSIST drug of choice	.121	-.243†	***.207***†

Note: WBSI = White Bear Suppression Inventory, BEAQ = Brief Experiential Avoidance Questionnaire, TCQ = Thought Control Questionnaire, AAQ-SA = Acceptance and Action Questionnaire – Substance Abuse, PACS = Penn Alcohol Craving Scale, DASS = Depression Anxiety and Stress Scale, PANAS = Positive and Negative Affect Schedule, psych flex = psychological flexibility, FFMQ = Five Facet Mindfulness Questionnaire, ASSIST = Alcohol Smoking and Substance Involvement Screening Test
Bold * = correlation is significant at *p* < .01
Bold/Italicized = correlation is significant at *p* <. 05
† = correlations for the residential and mTurk samples differ at p < .05

sample, and correlations for the two samples do not differ significantly according to Fischer's test.

Measures of symptoms and affect. In the full sample, the CSS beliefs scale had nonsignificant correlations with all measures of symptoms and affect except for a marginally significant correlation with the PACS. In the residential sample, the pattern was similar except for a marginally significant positive association with the DASS-anxiety scale. In the mTurk sample, there was an expected positive association between the CSS beliefs subscale and the DASS stress, depression, and anxiety scales, suggesting that those with negative beliefs about craving experience greater levels of psychological symptoms. These correlations were statistically different than those in the residential sample, which were of similar magnitude but in the opposite direction. There was also a significant positive correlation between the CSS beliefs subscale and the PANAS negative affect scale, but this was not statistically different than in the residential sample.

Measures of mindfulness and psychological flexibility. In the combined sample, the CSS beliefs subscale was not correlated with any of the FFMQ subscales except for a marginally significant negative association with nonjudging. The association with the AAQ-SA values commitment subscale also was marginal and negative. There was an expected negative correlation between the AAQ-SA defused acceptance subscale and the CSS beliefs subscale, suggesting that those believing that cravings are harmful are less defused from their thoughts and internal reactions to stimuli and are less accepting of their experiences. For the residential and mTurk samples considered separately, this pattern was similar. However, the CSS beliefs subscale was unexpectedly positively associated with the FFMQ non-reactivity subscale in the residential sample,

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suggesting that individuals in that sample who believe that cravings are harmful were less automatically reactive to their experiences. This was statistically different from the negative correlation observed for the mTurk sample. There was also an expected significant negative correlation between the CSS beliefs subscale and the AAQ-SA defused acceptance subscale for the mTurk sample. This indicates that those believing that cravings are harmful were less accepting of their experiences and more fused with their thoughts and inner reactions to stimuli. Although this correlation was not significant for the residential sample, it was similar in magnitude and the correlations for the two samples were not significantly different from each other.

Measures of substance use. In the full sample, the CSS beliefs about cravings scale showed expected positive associations with the ASSIST alcohol and cannabis scales only. None of the ASSIST scales were associated with the CSS beliefs scale in the residential sample. However, expected positive associations with the ASSIST cannabis and other drug category were observed in the mTurk sample. For most of the ASSIST scales, the correlations were significantly different in the two samples.

Incremental validity of the CSS over other measures of craving and experiential avoidance in predicting substance misuse

First, zero-order correlations between substance misuse (ASSIST subscales) and other study variables were computed. These are shown in Table 3.5. There was considerable variability within the sample regarding the particular substances that were most often misused; therefore, a "drug of choice" variable was created, representing the specific substance that each participant reported most often using in problematic ways, based on each participant's highest score. As the CSS is a measure of a specific form of

Table 3.5

Correlations between substance misuse (ASSIST subscales) and other study variables (full sample)

	ASSIST scales					
	alcohol	cannabis	opiates	tobacco	other	choice
Avoidance						
CSS suppression	-.104	**-.272***	-.158	-.051	-.207	-.103
CSS neg beliefs	**.204***	**.282***	.005	-.022	***.226***	.121
WBSI	***.159***	.022	.025	***.189***	.060	**.211***
BEAQ	**.201***	**.256***	.167	**.214***	***.270***	**.264***
TCQ-distract	.066	-.117	.044	-.013	.057	-.031
TCQ-punish	**.276***	**.394***	**.289***	**.307***	**.545***	**.313***
TCQ-reappraise	.119	.108	.045	.023	.145	.040
TCQ-worry	***.198***	**.336***	.181	.156	**.324***	**.225***
TCQ-social	.027	***.188***	.200	.088	.205	.081
Symptoms/affect						
PACS	**.273***	**.218***	.146	**.325***	**.320***	**.377***
DASS stress	**.287***	**.460***	**.408***	**.390***	**.606***	**.483***
DASS dep	**.257***	**.347***	**.322***	**.310***	**.458***	**.415***
DASS anx	**.269***	**.419***	**.454***	**.355***	**.506***	**.464***
PANAS NA	**.228***	**.286***	**.308***	**.465***	**.573***	**.462***
PANAS PA	**-.216***	**-.253***	-.044	***-.203***	-.140	**-.264***
Mindfulness/flex						
FFMQ Observe	.026	-.007	.087	-.021	.038	-.009
FFMQ Describe	-.075	**-.260***	-.195	-.093	**-.316***	-.104
FFMQ Actaware	***-.179***	-.265	***-.231***	**-.300***	**-.373***	**-.277***
FFMQ Nonjudge	**-.211***	-.139	-.189	**-.349***	**-.334***	**-.274***
FFMQ Nonreact	-.109	-.060	-.039	***-.168***	-.215	**-.209***
AAQ-acceptance	**-.302***	**-.161**	-.174	**-.332***	**-.368***	**-.391***
AAQ-values	**-.227***	**-.385**	**-.338***	***-.192***	**-.309***	**-.276***

Note: WBSI = White Bear Suppression Inventory, BEAQ = Brief Experiential Avoidance Questionnaire, TCQ = Thought Control Questionnaire, AAQ = Acceptance and Action Questionnaire – Substance Abuse, PACS = Penn Alcohol Craving Scale, DASS = Depression Anxiety and Stress Scale, PANAS = Positive and Negative Affect Schedule, FFMQ = Five Facet Mindfulness Questionnaire, ASSIST = Alcohol Smoking and Substance Involvement Screening Test
Bold * = correlation is significant at $p < .01$
Bold/Italicized = correlation is significant at $p < .05$

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experiential avoidance, incremental validity of the CSS subscales over other measures of experiential avoidance and craving was tested.   Table 3.5 shows that the relevant measures with significant zero-order correlations with the ASSIST drug of choice scale were the WBSI, BEAQ, TCQ worry, TCQ punish, and the PACS scales. These were included as predictor variables in regression analyses testing whether the CSS subscales are unique predictors of substance misuse (drug of choice) after accounting for other measures of experiential avoidance and craving.

Two hierarchical linear regressions were conducted; one for the full sample and one for the mTurk sample. The mTurk sample was examined separately because the zero-order correlations reported earlier showed that the CSS beliefs subscale was differentially related to the ASSIST drug of choice score in the mTurk and residential samples. Results of these analyses can be seen in Tables 3.6 and 3.7. All VIF values were well below the suggested maximum value of 10 (Myers, 1990), suggesting that multicollinearity between independent variables was not problematic.

The first analysis (Table 3.6) examined whether the CSS scales were unique predictors of substance misuse (drug of choice) after accounting for other measures of experiential avoidance and craving in the full sample. The PACS, WBSI, BEAQ, and two TCQ scales (worry and self-punish) were entered into Step 1. The R^2 value was significant at .189 (p < .01), with only the PACS obtaining a significant standardized beta weight. The CSS scales were added at Step 2, resulting in a non-significant increase in R^2 to .208 (p > .05), indicating that neither of the CSS suppression scales accounted for significant variance in substance misuse above and beyond other measures of craving and suppression/avoidance. In the final model, the PACS remained the only significant

Table 3.6

Hierarchical regression analyses showing prediction of substance-related problems

(drug of choice) by measures of craving, experiential avoidance, and the CSS scales (full

sample)

Step	Predictor(s)	R^2	ΔR^2	β
1	PACS			.318**
	BEAQ			.151
	TCQ punish			.138
	TCQ worry			.035
	WBSI			-.097
	Model Total	.189	.189*	
2	PACS			.316**
	BEAQ			.189
	TCQ punish			.114
	TCQ worry			.008
	WBSI			-.017
	CSS suppression			-.152
	CSS beliefs			-.062
	Model Total	.208	.019	

Note: PACS = Penn Alcohol Craving Scale, WBSI = White Bear Suppression Inventory, BEAQ = Brief Experiential Avoidance Questionnaire, TCQ = Thought Control Questionnaire, CSS = Craving Suppression Scale
*p<.05, **p<.01

Table 3.7

Hierarchical regression analyses showing prediction of substance-related problems

(drug of choice) by measures of craving, experiential avoidance, and the CSS scales

(mTurk sample)

Step	Predictor(s)	R^2	ΔR^2	β
1	PACS			.463**
	BEAQ			.453*
	TCQ punish			.309
	TCQ worry			-.839**
	WBSI			-.258
	Model Total	.385	.385**	
	PACS			.466**
	BEAQ			.538**
	TCQ punish			.261
	TCQ worry			-.724**
	WBSI			-.183
	CSS suppression			-.260
	CSS craving beliefs			-.277
	Model Total	.493	.108	

Note: PACS = Penn Alcohol Craving Scale, WBSI = White Bear Suppression Inventory,
BEAQ = Brief Experiential Avoidance Questionnaire, TCQ = Thought Control
Questionnaire, CSS = Craving Suppression Scale
*p<.05, **p<.01

independent predictor of substance misuse, suggesting that severity of cravings predicts substance use, as expected, but that measures of experiential avoidance, suppression of cravings, and beliefs about cravings showed no incremental validity.

The second analysis was identical, except that it used the mTurk sample only. The PACS, WBSI, BEAQ, and two TCQ scales (worry and self-punish) were entered into Step 1. The R^2 value was significant at .385 ($p < .01$). The PACS, BEAQ, and TCQ-worry scales obtained significant standardized beta weights. The CSS scales were added at Step 2, resulting in a non-significant increase in R^2 to .493 ($p > .05$), indicating that the CSS scales did not account for significant variance in substance dependence above and beyond other measures of craving and suppression/avoidance. In the final model, only the PACS, BEAQ, and TCQ-worry scales remained significant independent predictors of substance dependence. This finding suggests that, in the mTurk sample, severity of cravings and general measures of experiential avoidance predict substance misuse (drug of choice), but that the CSS, which is specific to the experience of cravings, showed no incremental validity.

Chapter Four: Discussion

The purpose of this study was to develop a measure of craving suppression. Existing measures of other types of thought suppression and experiential avoidance were examined to identify items that could be adapted to be specific to substance use for inclusion in the CSS. A focus group was also conducted at a local residential treatment facility. Participants were asked to discuss what they do when they experience cravings and what thoughts go through their minds when cravings come up. Their responses were used to guide the content development of further CSS items. Two scales were developed, one regarding the suppression of craving and one regarding negative beliefs about craving. The items were reviewed by another focus group at the same facility with a different set of participants. Based on their feedback, a few items were eliminated or modified.

The remaining items were subjected to a factor analysis using samples obtained from the residential treatment facility and an online sample collected through mTurk. Instructions for the online sample requested that only individuals with a history of or current substance misuse problems respond to the battery of self-report measures. The factor analysis indicated that a two-factor solution best fit the data. The final scales demonstrated acceptable to excellent internal consistency. An examination of their patterns of correlations with other variables revealed some hypothesized and some unexpected results. As these patterns differed somewhat for the two subscales of the CSS, they will be considered separately.

Suppression of craving subscale

As expected, the suppression of craving subscale demonstrated positive associations with well-validated self-report measures of thought suppression, general experiential avoidance, and distraction, suggesting that the tendency to suppress cravings is associated with the tendency to avoid other unpleasant thoughts and emotions. However, the suppression of cravings subscale was not significantly correlated with measures of psychological symptoms or affect, except for a trend with positive affect, suggesting that the tendency to suppress cravings may be modestly associated with higher levels of positive affect. This pattern was unexpected because previous findings have shown that experiential avoidance is often positively correlated with a variety of psychopathological symptoms and negative affect (Hayes, Strosahl, & Wilson, 1999). It is also somewhat puzzling that levels of substance craving (PACS) was not associated with suppression of cravings, although it is possible that those who suppress cravings may not be as aware that they experience them and would therefore be less likely to report them.

Also unexpectedly, the suppression of craving subscale showed mostly nonsignificant or trend-level correlations with mindfulness subscales. Previous studies in other samples have shown stronger associations between mindfulness and various forms of suppression (Baer et al., 2006). Regarding the measures of psychological flexibility, the pattern of findings was mixed. As expected, the suppression of craving subscale was negatively correlated with the defused acceptance scale of the AAQ-SA, suggesting that a lesser tendency to suppress cravings was associated with more defusion from and acceptance of cravings. Conversely, those lower in defusion and acceptance may get

caught up more in the experience of cravings and in turn engage in higher levels of suppression to avoid them or get rid of cravings. However, the suppression of craving scale also showed a positive correlation with values commitment, unexpectedly suggesting that participants who suppress their cravings are better able to engage in values-consistent behavior. This could imply that participants may engage in suppression of cravings in order to make it more possible to engage in valued behaviors such as abstaining from substance use. Whether this is effective for them cannot be examined with the measures included in this study. Finally, the suppression of craving scale showed only one significant correlation with the substance use scales from the ASSIST, and this was in the unexpected direction. Participants who reported a greater tendency to suppress cravings also reported less use of cannabis.

Correlations for the two samples were examined separately in order to investigate whether differential patterns between the residential and the mTurk samples might have accounted for the lack of expected findings. However, only two of the 26 pairs of correlations showed a significant difference between the residential and the mTurk samples. In one case (the TCQ-self-punishment scale) both of the correlations were nonsignificant; thus, the fact that they differed significantly from each other may not be meaningful. The other case, however, was more striking. For the residential sample, the correlation between suppression of craving and the nonreactivity facet of mindfulness was .412, whereas for the mTurk sample it was .053. Nonreactivity is an important mindfulness skill that involves allowing thoughts and feelings to come and go without getting caught up in them or being controlled by them. This finding suggests that, for the residential sample, participants who reported suppressing their cravings also endorsed the

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ability to be mindfully nonreactive to thoughts and feelings. Although this sounds contradictory, it may mean that participants in this sample tend to notice their cravings and then promptly suppress them, making it possible to avoid being driven by them. On the other hand, participants in the mTurk sample appear not to follow this pattern, as they showed no significant relationship between suppression of cravings and the mindfulness skill of nonreactivity.

Negative beliefs about craving subscale

As expected, the negative beliefs about craving subscale also showed positive correlations with other measures of thought suppression and experiential avoidance. Participants who endorsed stronger beliefs that craving is bad or harmful also reported greater tendencies to punish themselves for having unwanted thoughts and to shift their attention to worrying about other matters when unwanted thoughts come to mind. The negative beliefs about craving subscale showed no significant correlations with measures of psychological symptoms or affect, except for a trend with substance craving, suggesting that those with more substance cravings reported a slightly greater tendency to believe that cravings are harmful. Relationships with the mindfulness subscales were nonsignificant except for a trend in the expected direction for the nonjudging facet; this finding suggests that people who believe that craving is bad may also be more judgmental about other thoughts and feelings. The correlation with the defused acceptance scale was significant and negative, suggesting that participants who believe craving is bad are less able to be accepting of cravings. The correlation with values commitment was only marginally significant but in the expected direction, suggesting that participants who believe that craving is bad are less able to behave in values consistent ways. Finally,

negative beliefs about craving were positively correlated with the alcohol and cannabis scales from the ASSIST, suggesting that participants who believe that cravings are harmful are more likely to use these substances.

Once again, correlations were also examined in the residential and mTurk samples separately. Several differences between the two samples were noted. In the mTurk sample, significant positive correlations between negative beliefs about craving and psychological symptoms (stress, depression, anxiety) suggested that the more participants believe that craving is bad, the more symptoms they experience. In the residential sample, these relationships were of similar magnitude and negative, suggesting that the more participants believe that craving is bad, the fewer psychological symptoms they report. A similar pattern was seen for the substance misuse scales. For the mTurk sample, beliefs that craving is bad were associated with greater substance misuse, whereas in the residential sample, such beliefs were associated with less substance misuse. Finally, the correlation between negative beliefs about craving and the nonreactivity facet of mindfulness differed substantially between samples. For the residential sample, the belief that craving is bad was associated with greater nonreactivity, whereas for the mTurk sample, the relationship was negative and much smaller.

This pattern of findings suggests that, for the mTurk sample, it is maladaptive to believe that craving is bad; i.e., this belief is associated with more stress, anxiety, depression, and substance misuse. This result is consistent with other findings in the mindfulness and substance use literature, which generally suggest that it is helpful to practice acceptance of cravings as normal experiences that don't have to control behavior. For the residential sample, in contrast, findings suggest that the belief that

craving is bad may serve a protective function; i.e., this belief is associated with lower levels of psychological symptoms and substance misuse. For the residential sample, most of these correlations were not statistically significant (probably due to the smaller sample size), but they were of similar magnitude to the significant correlations in the opposite direction for the mTurk sample.

Regression analyses

Hierarchical regression analyses were conducted to determine if the CSS scales were independent predictors of substance misuse (drug of choice) over and above established measures of experiential avoidance and craving. In neither the full sample nor the mTurk sample were the CSS scales independent predictors of substance misuse. This is a limitation to the CSS as it currently stands, and suggests that suppression of cravings in substance misusers, at least as measured by the CSS, may function differently from other forms of experiential avoidance.

Impact of sample characteristics

The factors that may account for differences between the two samples in their beliefs about craving and the relationship between these beliefs and other variables are unclear. Members of the residential sample had likely been in intensive treatment for less than 3 months when they participated in the study. It is unknown whether or not these participants had received treatment before coming to this residential center. Members of the mTurk sample were eligible to participate in the study if they had either current or previous problems with substance misuse, and therefore may have had a wide range of current or past treatments, may not have been in treatment at the time of the study, or may never have been in treatment.

If the residential sample was earlier in treatment, on the average, than the mTurk sample, then the present findings may suggest that attitudes about craving and the effects of trying to suppress them may shift with treatment experience. Early in an intensive residential treatment, participants may be firmly convinced that cravings are harmful and must be suppressed. They may observe that when they suppress their cravings they are better able to pursue goals and, therefore, may think of craving suppression as a workable strategy. On the other hand, participants who are later in treatment, in a less intensive or nonresidential treatment, or not in treatment, may have experienced the rebound effects associated with thought suppression and experiential avoidance (Abramowitz et al., 2001). That is, they may have noticed that suppression of cravings never gets rid of them for long. They may be discouraged about the apparent need for endless suppression and may be having doubts about suppression as a workable strategy, yet are probably untrained in the mindfulness and acceptance skills that could provide helpful alternatives.

The above hypothesis is highly speculative, but if true it would help explain why there is generally no zero-order correlation between suppression of craving and severity of substance use. This study did not collect data regarding the amount or type of treatment that participants had received. If the amount of time that one has been in treatment is an important intervening variable in the relationship between suppression and severity of substance use, then future studies will need to measure treatment received in order to detect a potential interaction.

While it should be noted that the general pattern of correlations is comparable between the residential, mTurk, and combined samples, there are significant demographic differences between the samples that may impact the interpretability of the results based

on the combined sample. The mTurk sample was significantly more racially diverse and had a higher level of education, whereas the residential sample was comprised entirely of female participants.

Treatment implications

For treatment participants who are strongly convinced that cravings are bad, harmful and should be suppressed, it may be difficult to implement a mindfulness-based intervention that relies on the central principle that people with a history of substance abuse can learn to observe cravings and accept them nonjudgmentally while refraining from yielding to them. Mindfulness-based relapse prevention (MBRP), the leading mindfulness-based treatment for addictive behavior, was designed for participants who have completed a course of treatment for substance abuse and are interested in sustaining their gains. The idea that cravings and other unwanted internal experiences (thoughts, emotions, sensations) can be mindfully observed and accepted is gradually introduced over the course of eight weeks of intensive mindfulness practice. Randomized trials have shown that MBRP has significant benefits in preventing relapse of substance abuse (Witkiewitz & Bowen, 2010). The present findings suggest that it may be helpful for MBRP providers to remember that beliefs about the harmful effects of cravings and the need to suppress them may be quite strong in some participants and that introducing the nonjudgmental and accepting approach of mindfulness training may initially be anxiety provoking.

Further limitations and future directions

The CSS scales were not independent predictors of severity of substance misuse in the regression analyses. It could be argued this indicates that the CSS subscales are of

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questionable utility. However, the findings raise interesting questions about the role of craving suppression and beliefs about craving in substance misusing samples and suggest that the CSS may have potential research and clinical utility even if it requires further development in future studies.

Several other limitations of this study must be noted. First, this study needs replication using a larger, more diverse clinical sample. Although the overall sample contained adequate observations to be confident in the factor analysis, for the correlational analyses the clinical sample in this study likely had low power. Additionally, it is not possible to verify that the mTurk sample respondents have a history of or current substance misuse problems, and it is possible that some mTurk respondents have never had a substance use disorder. In future studies the CSS will need to be examined using a large clinical sample of individuals at different stages of treatment to evaluate its clinical utility in a clinical setting.

Another factor that may be complicating the results is that especially for the mTurk sample, the number of observations for the ASSIST substance categories were highly variable. For example, there was a relatively high number of respondents reporting problematic alcohol, tobacco, and cannabis use but relatively few opiate or "other" drug use. It may be helpful to evaluate whether the CSS functions differently depending upon the specific drug of choice or to obtain a more balanced sample in the future.

Conclusions

Although there is more work to be done, the Craving Suppression Scale is a promising measure that may be useful in future research investigating the mechanisms of change within mindfulness-based treatments for substance use disorders. Exploratory

data suggests a consistent two-factor structure as intended. The CSS suppression scale appears to be similar in nature to other measures of thought suppression and experiential avoidance, but is specific to the suppression of cravings to use substances. Additionally, the CSS contains a subscale evaluating negative beliefs and cognitions about cravings; i.e., that they are a sign of weakness and indicate that relapse will occur. This scale may be useful in future research regarding why individuals engage in craving suppression and experiential avoidance, which may have important implications for treatment. However, future studies will need to implement some important adjustments to the design of this study such as the use of a larger, more diverse clinical sample. Additionally, in order to fully investigate the effects that treatment may have upon the relationship between the suppression of cravings and severity of substance use, the amount of treatment will need to be measured.

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Mindfulness meditation for substance use disorders: A systematic

review. *Substance Abuse*, *30*(4), 266-294.

EDUCATION

2015	Doctoral Internship Gulf Coast Veterans Health Care System Biloxi, MS
2011	M.S., Clinical Psychology University of Kentucky Lexington, KY
2008	B.A., Psychology, Magna Cum Laude B.A., French, Magna Cum Laude University of Southern Mississippi Hattiesburg, MS
2005-2006	Study Abroad – University of Southern Mississippi Université d'Orléans Orléans, France

INTERNSHIP – Gulf Coast Veterans Health Care System

8/25/14 – 11/16/14	PTSD/SUD Outpatient Clinic
11/17/14 – 2/15/15	Home Based Primary Care
2/16/15 – 5/11/15	Clinical Health Psychology/Behavioral Medicine
5/12/15 – 8/12/15	Primary Care Mental Health Integration

PRACTICUM EXPERIENCE

2013 – 2014	Psychology Student Affiliate - Eastern State Hospital
2013 – 2014	Advanced Trainee – Bluegrass Health Psychology
2012 – 2013	Psychology Trainee - Bluegrass Health Psychology
2011 – 2012	Psychology Resident - Orofacial Pain Clinic, Chandler Hospital
2011 – 2012	MBRP Group Leader - Chrysalis House, Inc.
2011 – 2013	DBT Group Leader - Jesse G. Harris Psychological Services Center
2010 – 2011	Student Therapist - Chrysalis House, Inc.
2010 - 2011	MBSR Group Leader - Jesse G. Harris Psychological Services Center
2009 - 2010	Clinic Assistant Coordinator - Jesse G. Harris Psychological Services Center
2009 – 2011	Student Individual Therapist - Jesse G. Harris Psychological Services Center

HONORS AND AWARDS

2009	Research Fellow, Mind and Life Summer Research Institute
2008 - 2011	University of Kentucky Daniel R. Reedy Quality Achievement Fellowship Award
2013	University of Kentucky Excellence in Clinical Performance Award

PUBLICATIONS

Peters, J.R., **Upton, B.T.**, & Baer, R.A. (in press). Relationships between facets of impulsivity and borderline personality features. *Journal of Personality Disorders*.

Peters, J.R., Eisenlour-Moul, T.A., **Upton, B.T**, & Baer, R.A. (2013). Nonjudgment as a moderator of the relationship between present-centered awareness and borderline features: Synergistic interactions in mindfulness assessment. *Personality and Individual Differences.*

Peters, J.R., Erisman, S.M., **Upton, B.T.**, Baer, R.A, & Roemer, L. (2011). A preliminary investigation of the relationships between dispositional mindfulness and impulsivity. *Mindfulness.*

Upton, B.T. (2009). Book Review: Mindfulness and the Therapeutic Relationship. *The Journal of Psychosomatic Research, 68*, 101.

MANUSCRIPTS in PREPARATION or UNDER REVIEW

Upton, B.T., Peters, J.R., Eisenlour-Moul, T.A., & Baer, R.A. (in preparation). Ruminative thought in individuals with borderline personality disorder features.

Custodio, L., Carlson, C.R., **Upton, B.T.**, Okeson, J.P., Harrison, A.L., & de Leeuw, R. (under review). The Impact of Cigarette Smoking on Sleep Quality of Patients with Masticatory Myofascial Pain.

PRESENTATIONS ACCEPETED FOR SCIENTIFIC MEETINGS

Custodio, L., DDS, **Upton, B.T.,** Carlson, C.R., de Leeuw, R., DDS, PhD. (2012, March). *Patients with myofascial pain who smoke report significantly more sleep disturbances than those who don't smoke.* Poster presented at the 20th CCTS Spring Conference – UK College of Dentistry Research Day, Lexington, KY. **Clinical Sciences 1st Prize**

Peters, J.R., Eisenlohr-Moul, T., **Upton, B.T.** & Baer, R.A. (2012, November). *Nonjudgment as a Moderator of the Effect of Awareness on Borderline Personality Features: Do Interactions Add Validity to Mindfulness Assessment?* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, National Harbor, MD

Upton, B.T., Peters, J.R., & Baer, R.A. (2011, November). *Rumination and borderline personality disorder features: Using a writing sample to assess characteristics of ruminative thought.* Poster accepted for presentation at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.

Upton, B.T., Peters, J.R., & Baer, R.A. (2010, November). *Forms of Rumination and Borderline Personality Disorder Features*" Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.

Peters, J.R., **Upton, B.T.**, & Baer, R.A. (2010, November). *Relationships between facets of impulsivity and borderline personality disorder features*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.

TEACHING EXPERIENCE – University of Kentucky

2013 (Summer)	Teaching Assistant – Social Psychology
2013 (Spring)	Lab Instructor – Experimental Psychology
2012 (Fall)	Lab Instructor – Statistics in the Behavioral Sciences
2012 (Spring)	Lab Instructor – Statistics in the Behavioral Sciences
2011 (Fall)	Lab Instructor – Statistics in the Behavioral Sciences
2011 (Spring)	Teaching Assistant – Research Methodology in Social Psychology
2011 (Fall)	Lab Instructor – Statistics in the Behavioral Sciences
2010 (Summer)	Lab Instructor – Statistics in the Behavioral Sciences
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