The Obsessive Compulsive Cocaine Use Scale: Development and initial validation of a self-rated instrument for the quantification of thoughts about cocaine use

Julia M. Hormes¹, Scott F. Coffey²*, David J. Drobes³, and Michael E. Saladin⁴
¹Louisiana State University Health Sciences Center, School of Public Health and Comprehensive Alcohol, Research Center, 1615 Poydras St., Suite 1400, New Orleans, LA 70112
²University of Mississippi Medical Center, Department of Psychiatry and Human Behavior, 2500 N. State St., Jackson, MS 39211
³Moffitt Cancer Center at the University of South Florida, Department of Health Outcomes and Behavior, 4115 East Fowler Ave, Tampa, FL 33617
⁴Medical University of South Carolina, Department of Health Sciences and Research, 77 President St., Charleston, SC 29425

Abstract

BACKGROUND—Craving is a hallmark of addiction and characterized by obsessive thoughts about, and compulsive urges to use, a substance. While craving is frequently thought of as primarily being a feature of acute withdrawal, there is evidence to suggest that it increases in strength over extended periods of abstinence. While several measures are available to assess acute craving states, there remains a lack of clinical measures appropriate for capturing the enduring cognitive aspects of urges to use drugs. The present study was designed to develop and validate a measure of obsessive-compulsive thoughts in cocaine-dependent individuals.

METHODS—The proposed 14-item Obsessive Compulsive Cocaine Use Scale (OCCUS) was administered to 107 individuals; 55 participants meeting diagnostic criteria for cocaine dependence and 52 recreational users of cocaine. In addition to the OCCUS, participants also completed the Drug Abuse Screening Test, Cocaine Craving Questionnaire-Now, and Social Desirability Scale of the California Personality Inventory.

RESULTS—Results of confirmatory factor analysis indicated that the OCCUS fit the two-factor structure of the Obsessive Compulsive Drinking Scale on which it was based, independently assessing the “obsessive” and “compulsive” aspects of cocaine dependence. The OCCUS demonstrated good internal consistency reliability and convergent, discriminant, and criterion validity.

CONCLUSION—The proposed measure is a promising step towards the successful capture of the long-term cognitive features of craving for cocaine via self-report, and should represent a useful tool for clinical and research use.
Keywords
cocaine dependence; obsessive; compulsive; craving; substance abuse; psychometric properties

1. Introduction

Addiction is characterized by recurrent and persistent thoughts about and uncontrollable urges to use a substance (Anton, 2000; Modell et al., 1992). Craving, a hallmark feature of the transition from substance use to dependence, is closely linked to maintenance of and relapse into addiction (Sinha et al., 2006) and has been defined as a state resulting from the presence of particularly strong obsessions about and irresistible compulsions to use (Robinson and Berridge, 1993). The obsessive-compulsive features of substance disorders are thought to be cognitive in nature and mediated by lasting changes in brain neurochemistry (Koob and Le Moal, 2001; Robinson and Berridge, 1993). The cortico-striatal-thalamic pattern of activation during episodes of craving resembles that observed in obsessive-compulsive disorder (Baxter et al., 1992; Modell et al., 1989; Volkow and Fowler, 2000), emphasizing the similarities between the two disorders.

The obsessive-compulsive aspects of drug abuse are difficult to capture due to a lack of objective clinical measures of the cognitive elements of addiction. Craving is frequently thought of as being a feature of acute withdrawal (Coffey et al., 2000; Satel et al., 1991); however, evidence suggests that urges to use cocaine actually increase in strength over extended periods of abstinence (Grimm et al., 2001). While instruments exist to assess urges for cocaine “right now” or “in the past week” (Tiffany et al., 1993), there is a lack of appropriate measures to capture what are likely to be enduring changes in patterns of thought that accompany cravings. A notable exception is the Obsessive Compulsive Drinking Scale (OCDS), a measure of thoughts about alcohol that is successful in indexing cognitive aspects of alcohol craving (Anton, 2000; Anton et al., 1995, 1996). This study sought to develop a comparable measure designed to capture the obsessive-compulsive nature of cocaine dependence and add meaningfully to existing clinical measures. Of note, the OCDS has previously been adapted successfully in the development and validation of the Obsessive Compulsive Smoking Scale (Hitsman et al., 2010).

2. Method

The development and validation of the Obsessive Compulsive Cocaine use Scale (OCCUS) was conducted as part of a larger laboratory-based study assessing emotion and cue reactivity in cocaine and alcohol dependence (Saladin et al., 2003). The measures described below were completed as part of an initial assessment, prior to separate laboratory sessions.

2.1. Participants

Participants were 55 individuals (60.0%, n=33 female) meeting DSM-IV diagnostic criteria for current cocaine dependence and 52 recreational users of cocaine (78.8%, n=41 female). Participants were not excluded if they met criteria for dependence on another substance as long as cocaine was their preferred substance. Recreational use was defined as cocaine use in the absence of current or past abuse or dependence. Dependence versus recreational use was determined using the Structured Clinical Interview for the DSM-IV (First et al., 1996). Dependent individuals were recruited among treatment seekers in the Charleston, SC area and all had used cocaine within the past two months via smoking, nasal administration, or both. Recreational users were recruited from the community via flyers and newspaper and radio advertisements and all reported nasal administration only.
Dependent participants were significantly younger ($M=33.40, SD=7.08$) than recreational users [$M=37.50, SD=11.20; t(105)=2.25, p=.03$]. A majority of dependent respondents were African-American (61.8%, $n=34$) while most recreational users were Caucasian (78.8%, $n=41$). Exclusion criteria included psychosis and current manic or major depressive episodes. All participants had experienced a traumatic event; 54.5% ($n=30$) of the dependent and 48.2% ($n=25$) of the recreational users met diagnostic criteria for posttraumatic stress disorder.

### 2.2. Instruments

#### 2.2.1. Obsessive Compulsive Cocaine Use Scale

The OCCUS is a 14-item questionnaire and was developed based on the existing and well-validated OCDS (Anton, 2000; Anton et al., 1995, 1996), a self-report measure of obsessive thoughts about drinking and compulsive behaviors directed toward alcohol consumption. In creating the OCCUS, items of the OCDS were re-worded to target thoughts and behaviors related to cocaine (e.g., “How much of your time when you’re not drinking is occupied by ideas, thoughts, impulses, or images related to drinking?” changed into “How much of your time when you’re not using cocaine is occupied by ideas, thoughts, impulses, or images related to using?”). All item content on the OCCUS was kept identical to that on the OCDS, with the exception of one question about frequency of use (item #8), which inquired about “hours of use” of cocaine instead of “drinks per day.” Items were rated on a scale of 0 to 4, with higher scores indicating more problematic thoughts and behaviors.

#### 2.2.2. Drug Abuse Screening Test

Convergent validity was assessed via correlations with scores on the 20-item Drug Abuse Screening Test (DAST-20), a measure designed to identify the presence of and the degree of problems related to drug use and misuse (Skinner and Goldberg, 1986). Items on the DAST-20 are rated as “yes” or “no;” the measure has good reliability, validity, sensitivity and specificity (Yudko et al., 2007).

#### 2.2.3. California Personality Inventory – Social Desirability Scale

Divergent validity of the OCCUS was assessed via correlations with scores on the 46-item Social Desirability scale of the California Personality Inventory (CPI). The Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1960), another measure of the tendency to self-report in a socially desirable manner, has been used previously to assess divergent validity in a study of the psychometric properties of a revised version of the Impact of Event scale of post-trauma symptoms (Beck et al., 2008; Weiss and Marmar, 1997).

#### 2.2.4. Cocaine Craving Questionnaire - Now

The Cocaine Craving Questionnaire – Now (CCQ-Now) is a well-validated 45-item measure assessing current craving for cocaine (Tiffany et al., 1993) via five subscale assessing “Desire to Use,” “Intention to Use,” “Anticipation of Positive Outcomes,” “Anticipation of Relief from Withdrawal,” and “Lack of Control over Use.” Craving as measured by the CCQ-Now has been shown to reliably predict time to relapse (Paliwal et al., 2008). The CCQ-Now was included in the present study to assess the extent to which the proposed OCCUS measures aspects of problematic cocaine use that are discriminable from those captured by existing measures.

### 3. Results

#### 3.1. Factor Analysis

OCCUS scores from the 55 cocaine-dependent participants were subjected to confirmatory factor analysis to assess the extent to which the measure fits the two-factor structure of the OCDS. Recommendations for appropriate sample sizes for factor analysis vary greatly; the present sample meets and exceeds more liberal recommendations to have at least twice as
many subjects as variables in factor-analytic investigations (Kline, 1979) and approaches the widely accepted subjects-to-variables ratio of no less than five (Costello and Osborne, 2005; Gorsuch, 1983). Varimax rotation was performed and was found to replicate the two-factor structure of the OCDS, with the “obsessive” and “compulsive” items loading substantially and exclusively on two separate factors, explaining 23.52% and 25.30% of the variance, respectively. The one exception was item #6 “How successful are you in stopping or diverting these thoughts when you’re not using cocaine,” which loaded to approximately equal extents on the “obsessive” (factor loading=0.50) and “compulsive” subscales (factor loading=0.51). In order to facilitate comparisons between the OCCUS and the OCDS it was decided to include ratings on item #6 in the “obsessive” subscale scores, as is the case with the OCDS.

3.2. Normality and Internal Consistency Reliability

Total OCCUS scores were normally distributed (Shapiro-Wilk=0.99, p=0.95), as were scores on the “obsessive” (Shapiro-Wilk=0.98, p=0.51) and “compulsive” subscales (Shapiro-Wilk=0.98, p=0.59). Good internal consistency reliability was demonstrated for the total score (Cronbach’s alpha=0.87); alpha coefficients for the “obsessive” and “compulsive” subscales were 0.82 and 0.80, respectively. “Obsessive” and “Compulsive” subscale scores were significantly and positively correlated with each other (r=.89, p<.001) as well as with OCCUS total scores (r=.96, p<.001 and r=.98, p<.001, respectively).

3.3. Convergent and Divergent Validity

Significant and positive correlations between the DAST-20 and total scores on the OCCUS (r=0.42, p=0.001) as well as the OCCUS “obsessive” (r=0.27, p=0.04) and “compulsive” subscales (r=0.47, p<0.001) suggested good convergent validity of the proposed measure. In addition, there were significant and positive correlations between the CCQ-Now total score and the total OCCUS (r=0.59, p<0.001) and “obsessive” (r=0.53, p<0.001) and “compulsive” subscale scores (r=0.60, p<0.001). Findings from both the DAST-20 and the CCQ-Now demonstrate good convergent validity of the proposed measure. Divergent validity was assessed via examination of the relationship between OCCUS scores and scores on the Social Desirability scale of the CPI. Social desirability scores did not correlate significantly with OCCUS total (r=−0.18, p=0.19) or “obsessive” (r=−0.19, p=0.17) and “compulsive” subscale scores (r=−0.14, p=0.32).

3.4. Criterion Validity

Individuals meeting criteria for cocaine dependence obtained significantly higher subscale and total OCCUS scores than recreational users, indicating good criterion validity of the measure. There were no significant differences in OCCUS subscale or total scores between cocaine-dependent men and women or participants with or without PTSD (Table 2).

4. Discussion

This study was designed to develop a measure of the cognitive aspects of cocaine dependence, with a focus on the obsessive-compulsive thoughts and impulses believed to play a role in persistent craving and recurring urges to use. The proposed new measure fits a two-factor structure that mirrors that of the existing Obsessive Compulsive Drinking Scale, on which it is based. The fact that the two subscales of the OCCUS are highly correlated suggests that an overall score may be sufficiently informative in most clinical settings. The initial validation of the OCCUS yielded evidence for good internal consistency and convergent, divergent and criterion validity. The OCCUS successfully differentiated between dependent and recreational users of cocaine and was positively associated with scores on the DAST-20, a global assessment of problems related to drug misuse. It
furthermore correlated positively and significantly with the CCQ-Now; however, the size of
the correlation coefficients suggests that the two measures capture related but non-redundant
aspects of cocaine use.

The proposed new measure may index elements of craving that are the result of enduring
changes in thought patterns following recurrent use and clearly distinguishable from acute
craving states as it is assessed by existing measures such as the CCQ-Now. The possibility
that the OCCUS is more suitable to the assessment of lasting use-related cognitions in
substance-dependent individuals should be assessed further in future studies.

A potential limitation of the present study is its relatively small sample size of dependent
and recreational cocaine users. While a majority of published studies do not exceed a 5:1
subjects-to-item ratio in factor analysis (Costello and Osborne, 2005) many sources still
recommend larger samples and the present findings should be considered preliminary. It has
been suggested that “stronger data” allows for smaller sample size in factor analysis
(Fabrigar et al., 1999; MacCallum et al., 1999), and the fact that the confirmatory factor
analysis of the OCCUS generally matches the OCDS two-factor structure provides greater
confidence in the results. An assessment of the extent to which results are replicable in more
diverse samples of cocaine users, including individuals using cocaine via routes of
administration other than inhalation, is recommended for future studies. Future research
should also examine the extent to which scores on the OCCUS are sensitive to dynamic
changes in use, including the effects of treatment.

Of note, all study participants had experienced a traumatic event, which in itself is
associated with susceptibility to the development of obsessive-compulsive disorder (Cromer
et al., 2007). The study sample is representative of individuals seeking treatment for cocaine
dependence who are highly likely to have experienced trauma and meet diagnostic criteria
for current PTSD (Back et al., 2000; Dansky et al., 1997). The absence of significant
differences in OCCUS scores between individuals with a criterion A event only versus
PTSD suggests that the proposed measure captures obsessive-compulsive thoughts related to
drug use, as opposed to trauma-related thoughts.

In summary, the OCCUS demonstrates good psychometric properties and may be a useful
tool in the assessment of the cognitive aspects of cocaine addiction and their role in the
maintenance of and relapse into drug use. It may aid in investigations designed to further our
understanding of the impact of changes in thought patterns on cocaine craving and
compulsive drug seeking.

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<table>
<thead>
<tr>
<th>Table 1</th>
<th>Factor 1 “Obsessive” Loading</th>
<th>Factor 2 “Compulsive” Loading</th>
<th>Cronbach’s α (Item Deletion)</th>
<th>Item-Total Correlation</th>
<th>Dependent Users M (SD)</th>
<th>Recreational Users M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. How much distress do these ideas, thoughts, impulses, or images related to using cocaine cause you when you’re not using?</td>
<td>.78</td>
<td>.85</td>
<td>.73</td>
<td>1.64 (1.11)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>2. How frequently do these thoughts occur?</td>
<td>.77</td>
<td>.86</td>
<td>.57</td>
<td>1.45 (1.10)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>1. How much of your time when you’re not using cocaine is occupied by ideas, thoughts, impulses, or images related to using?</td>
<td>.76</td>
<td>.86</td>
<td>.59</td>
<td>1.98 (1.19)</td>
<td>.04 (.19)</td>
<td></td>
</tr>
<tr>
<td>5. How much of an effort do you make to resist these thoughts or try to disregard or turn your attention away from these thoughts as they enter your mind when you’re not using cocaine?</td>
<td>.67</td>
<td>.86</td>
<td>.54</td>
<td>1.67 (.94)</td>
<td>.02 (.14)</td>
<td></td>
</tr>
<tr>
<td>3. How much do these ideas, thoughts, impulses, or images related to using cocaine interfere with your social or work (or role) functioning? Is there anything you don’t or can’t do because of them?</td>
<td>.58</td>
<td>.86</td>
<td>.70</td>
<td>1.80 (1.37)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>6. How successful are you in stopping or diverting these thoughts when you’re not using cocaine?</td>
<td>.50</td>
<td>.86</td>
<td>.70</td>
<td>1.73 (1.06)</td>
<td>.02 (.14)</td>
<td></td>
</tr>
<tr>
<td>10. How much does your cocaine use interfere with your social functioning? Is there anything that you don’t or can’t do because of your using?</td>
<td>.76</td>
<td>.85</td>
<td>.71</td>
<td>2.36 (1.21)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>13. How strong is your drive to use cocaine?</td>
<td>.71</td>
<td>.86</td>
<td>.50</td>
<td>2.11 (1.20)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>11. If you were prevented from using cocaine when you desire to use, how anxious or upset would you become?</td>
<td>.68</td>
<td>.86</td>
<td>.67</td>
<td>2.22 (1.07)</td>
<td>.06 (.31)</td>
<td></td>
</tr>
<tr>
<td>9. How much does your cocaine use interfere with your work functioning? Is there anything that you don’t or can’t do because of your using?</td>
<td>.64</td>
<td>.86</td>
<td>.70</td>
<td>2.09 (1.29)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
<tr>
<td>14. How much control do you have over your cocaine use?</td>
<td>.57</td>
<td>.87</td>
<td>.46</td>
<td>2.49 (1.18)</td>
<td>.02 (.14)</td>
<td></td>
</tr>
<tr>
<td>7. How many days each week do you use cocaine?</td>
<td>.52</td>
<td>.86</td>
<td>.65</td>
<td>2.75 (1.28)</td>
<td>.02 (.14)</td>
<td></td>
</tr>
<tr>
<td>8. On the days that you use, how many hours do you use cocaine?</td>
<td>.51</td>
<td>.87</td>
<td>.52</td>
<td>2.95 (1.10)</td>
<td>.02 (.14)</td>
<td></td>
</tr>
<tr>
<td>12. How much of an effort do you make to resist using?</td>
<td>.42</td>
<td>.87</td>
<td>.43</td>
<td>2.09 (.97)</td>
<td>.00 (.00)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2
Mean Obsessive Compulsive Cocaine Use Scale (OCCUS) Obsessive, Compulsive, and Total Scores in Cocaine Dependent versus Recreational Users, Men versus Women, and Individuals with Criterion A Events only versus Current Posttraumatic Stress Disorder

<table>
<thead>
<tr>
<th></th>
<th>OCCUS Obsessive</th>
<th>OCCUS Compulsive</th>
<th>OCCUS Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cocaine Dependent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=55)</td>
<td>10.27 (4.97)</td>
<td>19.05 (5.98)</td>
<td>29.33 (9.82)</td>
</tr>
<tr>
<td><strong>Recreational Users</strong></td>
<td>0.08 (0.44)</td>
<td>0.14 (0.63)</td>
<td>0.20 (0.83)</td>
</tr>
<tr>
<td>(n=52)</td>
<td>0.08 (0.44)</td>
<td>0.14 (0.63)</td>
<td>0.20 (0.83)</td>
</tr>
<tr>
<td><strong>Statistic</strong></td>
<td>(t) (105) = -15.15, (p \leq 0.001)</td>
<td>(t) (104) = -23.33, (p \leq 0.001)</td>
<td>(t) (104) = -21.92, (p \leq 0.001)</td>
</tr>
<tr>
<td><strong>Dependent Men</strong></td>
<td>9.45 (5.45)</td>
<td>17.73 (4.99)</td>
<td>27.18 (9.22)</td>
</tr>
<tr>
<td>(n=22)</td>
<td>9.45 (5.45)</td>
<td>17.73 (4.99)</td>
<td>27.18 (9.22)</td>
</tr>
<tr>
<td><strong>Dependent Women</strong></td>
<td>10.82 (4.63)</td>
<td>19.94 (6.48)</td>
<td>30.76 (10.09)</td>
</tr>
<tr>
<td>(n=33)</td>
<td>10.82 (4.63)</td>
<td>19.94 (6.48)</td>
<td>30.76 (10.09)</td>
</tr>
<tr>
<td><strong>Statistic</strong></td>
<td>(t) (53) = -1.00, (p = 0.32)</td>
<td>(t) (53) = -1.43, (p = 0.16)</td>
<td>(t) (53) = -1.36, (p = 0.18)</td>
</tr>
<tr>
<td><strong>Criterion A Event Only</strong></td>
<td>4.44 (5.77)</td>
<td>8.50 (9.41)</td>
<td>12.94 (14.63)</td>
</tr>
<tr>
<td>(n=52)</td>
<td>4.44 (5.77)</td>
<td>8.50 (9.41)</td>
<td>12.94 (14.63)</td>
</tr>
<tr>
<td><strong>PTSD</strong></td>
<td>6.15 (6.59)</td>
<td>11.35 (11.23)</td>
<td>17.59 (17.49)</td>
</tr>
<tr>
<td>(n=55)</td>
<td>6.15 (6.59)</td>
<td>11.35 (11.23)</td>
<td>17.59 (17.49)</td>
</tr>
<tr>
<td><strong>Statistic</strong></td>
<td>(t) (105) = -1.42, (p = 0.16)</td>
<td>(t) (104) = -1.41, (p = 0.16)</td>
<td>(t) (104) = -1.49, (p = 0.14)</td>
</tr>
</tbody>
</table>