Assessing Craving for Alcohol

David J. Drobes, Ph.D., and Suzanne E. Thomas, Ph.D.

Craving for alcohol is common among alcohol-dependent people. Accordingly, measures to assess craving can play important roles in alcohol research as well as in alcoholism treatment. When developing or employing craving-assessment instruments, researchers and clinicians must consider numerous factors, such as the specific characteristics of craving to be evaluated, the instrument’s psychometric properties, and the timeframe over which craving is assessed. The measures most commonly used for assessing craving in clinical settings are single-item questionnaires, although several multi-item questionnaires also have been developed. Behavioral measures (e.g., amount of alcohol consumption or performance on cognitive tests) and psychophysiological measures (e.g., changes in salivation, respiration, or heart rate) are being used primarily in research settings. The assessment of craving can have numerous clinical benefits, such as helping the clinician to evaluate the severity of a patient’s alcohol dependence, to select appropriate treatment approaches, and to monitor changes throughout a patient’s treatment. The role of craving assessment in predicting treatment outcome, however, remains controversial.

Factors Affecting Craving Assessment

Variables Assessed

The accuracy with which various instruments, or indices, measure craving for alcohol and other drugs (AODs) depends to a considerable extent on the type of variables the instruments evaluate. Early perspectives on alcohol craving focused on the subjective nature of craving. That is, craving was viewed as an experience that could only be assessed through the verbal report of the alcoholic. Consequently, the accuracy of most craving indices was limited by the ability and willingness of the individual alcoholic to accurately report his or her personal experience.

More recent conceptualizations of craving have fostered a broader perspective on the nature of craving and, consequently, on sources of data that
could provide important information on craving. For instance, most researchers assume that craving among alcoholics is inexorably linked to alcohol consumption and to relapse to drinking in abstinent alcoholics. This perspective considers behaviors related to seeking or consuming alcohol as direct manifestations of craving. Some investigators, however, have challenged the assumption that alcohol-related behaviors directly result from craving on both theoretical and empirical grounds (see Tiffany 1990). Therefore, researchers must further determine for whom, when, and under what circumstances meaningful relationships may exist between craving and alcohol consumption.

Instruments that measure autonomic physiological activity1 (e.g., changes in heart rate, blood pressure, or sweat gland activity) in response to alcohol-related cues, such as the sight and smell of alcohol, also have received increased attention in studies of alcohol craving. Instruments that assess such autonomic responses to alcohol-related cues are particularly relevant to theories of craving that postulate a role for classical conditioning2 (e.g., Drobes et al. in press).

Psychometric Issues
With the recent surge in interest in the theoretical and clinical importance of craving, researchers have attempted to develop ways to measure craving as well as ways to assess the utility of existing craving instruments. The utility of any craving assessment instrument depends on its psychometric properties; specifically, on whether the instrument reliably and validly measures craving.

The term “reliability” refers to the degree to which items on an instrument yield consistent results. Several types of reliability exist, not all of which are applicable to every type of assessment instrument. For example, test-retest reliability refers to the consistency of results when a subject is tested several times. Because craving is considered a relatively transient state that is expected to differ from one occasion to another, a high degree of test-retest reliability is not necessarily desirable for craving instruments. Other indices of reliability are more important to craving instruments—for example, whether consistent results are obtained with an instrument when several testers evaluate the same person (i.e., inter-rater reliability) and whether similar items on a test do not yield inconsistent or contradictory responses (i.e., internal consistency).

The term “validity” refers, in general, to the degree to which an instrument measures what it purports to measure. Because the empirical study of craving is a relatively new endeavor, and investigators consequently are still trying to understand exactly what craving is (and is not), assessing the validity of an instrument that proposes to measure craving is a difficult (and possibly premature) task. After more data have been generated and some agreement has been established on what constitutes craving, researchers can more confidently assess the validity of craving instruments.

As with reliability, several types of validity exist. Some of the most common measures of validity include construct validity, external validity, discriminant validity, and criterion-oriented validity. Construct validity refers to the degree to which results from an instrument reflect the underlying quality (e.g., craving) that the instrument is trying to measure. External validity describes the degree to which the results obtained with the instrument agree with results obtained with a different instrument with established validity. Discriminant validity indicates an instrument’s ability to accurately discriminate between populations with and without the quality of interest. For example, for alcohol craving, discriminant validity might be tested by whether the instrument discriminates alcoholics from nonalcoholics. Finally, criterion-oriented validity refers to how well scores on an instrument correlate with behaviors that are supposedly relevant to the quality being measured. For example, good criterion-oriented validity might be suggested if a craving instrument yields high scores for people who are willing to work for a drink in an experimental setting and low scores for people who are not willing to work for alcohol.

Most clinical and research assessments of craving have relied on brief measurement scales with unknown psychometric properties. In fact, the majority of investigators and clinicians have used instruments consisting of only a single question (i.e., single-item tests) to assess craving. Typically, these instruments ask questions such as, “How strong is your craving for alcohol?” or “How much do you crave an alcoholic beverage when you have gone without a drink for 1 to 2 days?” Because these indices consist of only one question, it is impossible to obtain an estimate of their internal consistency. Nonetheless, single items or brief scales that capture important aspects of the craving construct may demonstrate satisfactory inter-rater or test-retest reliability. Therefore, brief scales may provide especially useful tools where multiple craving assessments are desired and lengthier instruments would be impractical.

Alcohol cravings are generally thought to arise either from the desire to experience alcohol’s positive effects (i.e., positive reinforcement) or from the desire to avoid the negative effects of withholding alcohol, such as withdrawal symptoms (i.e., negative reinforcement). More recent models have suggested other important dimensions of craving, such as the desire and intention to consume alcohol, lack of control over alcohol use, and preoccu-

---

1 Autonomic physiological responses are those reactions that are not normally controlled consciously, such as heart rate and blood pressure.

2 Classical conditioning is the process by which an originally neutral stimulus (e.g., sight of a bar) can induce a predictable response (e.g., an increase in heart rate) if it is repeatedly paired with another stimulus which elicits that response (e.g., alcohol consumption).
Assessing Craving for Alcohol

Methods of Assessing Alcohol Craving

Assessment tools for craving generally fall into two broad categories: (1) self-report instruments and (2) behavioral and psychophysiological measures. Self-report instruments typically are questionnaires that can be either filled out by the patients themselves or administered by clinicians. These instruments are frequently used in both research and clinical settings. Behavioral and psychophysiological measures are primarily used in experimental settings.

Self-Report Instruments

Self-report is the most frequently used method to obtain information about craving. In everyday clinical practice, therapists usually administer single-item instruments on which the patient reports his or her level of subjective craving. These instruments include questions such as “How strong is your craving for alcohol?” or “How strong is your urge to drink?” The therapist also provides anchor statements, such as “not at all” and “the most I’ve ever felt.” The patient then rates his or her craving either by selecting the most appropriate choice on a 7- or 10-point scale (i.e., a Likert-type scale) or by indicating a vertical mark along a line that connects the two anchor statements (i.e., a visual analog scale [VAS]). With VAS scales, the distance between the “no-craving” end of the line and the patient’s mark serves as the index of craving. For both types of assessment, the patient may be asked to rate his or her current level of craving or average level of craving over a longer time period.

Brief Likert-type and VAS scales provide a straightforward and time-effective approach to assessing a patient’s level of subjective craving. However, as noted earlier, these assessments are limited in their ability to provide information about the multiple elements that can define the craving experience (Tiffany 1992). Furthermore, researchers cannot determine the internal consistency of the instrument used. Because of these limitations, brief Likert-type or VAS ratings should be supplanted with multi-item instruments with desirable psychometric properties whenever possible. Several such instruments are described in the following paragraphs (also see table on p. 182).

The Yale-Brown Obsessive Compulsive Scale for Heavy Drinking (Y-BOCKS-HD). This scale, which was adapted from the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) (Goodman et al., 1992).
### Summary of Questionnaires for Assessing Alcohol Craving

| Instrument | Source Reference (Supporting References) | Description | Administration | Psychometric Properties Reported |
|------------|------------------------------------------|-------------|----------------|----------------------------------|
| Yale-Brown Obsessive Compulsive Scale for heavy drinkers (Y–BOCS–hd) | Modell et al. 1992a (Goodman et al. 1989a) | Ten items in a structured interview; subscale scores for alcohol obsessions and compulsive behaviors related to alcohol can be obtained | Administered by a trained clinician; 15- to 30-min interview | Good psychometric properties reported on parent instrument (Y–BOCS); discriminant validity of Y–BOCS–hd supported by high sensitivity and specificity in correctly classifying alcoholics and normal controls |
| Obsessive Compulsive Drinking Scale (OCDS) | Anton et al. 1995 (Kranzler et al. 1999; Roberts et al. 1999) | Fourteen items; measure thoughts about alcohol during nondrinking period; can be scored for multiple subscales and factors | Self-administered questionnaire; requires 5 to 10 min to complete | High internal consistency (0.86); moderate to high internal consistency for individual subscales and factors (0.71–0.85); concurrent validity evidenced by strong correlations with measures of alcohol dependence severity and Y–BOCS–hd; good predictive validity shown by relationship between subscale scores and midtreatment drinking |
| Alcohol Urge Questionnaire (AUQ) | Bohn et al. 1995 | Unidimensional Likert-type scale with eight items to assess acute craving | Self-administered questionnaire; requires 1 min to complete | High internal consistency (0.91); high test-retest reliability (1-day interval, 0.82); construct validity evidenced by strong correlations with measures of alcohol dependence severity and the OCDS |
| Alcohol Craving Questionnaire (ACQ) | Singleton et al. 1994 (Love et al. 1998) | General form contains 47 items and short form contains 12 items; both forms provide measure of acute craving and can be scored for multiple subscales or factors | Self-administered questionnaire; general form requires 10 min and short form less than 5 min to complete | Moderate to strong factor (0.75–0.97) and subscale (0.77–0.86) reliability |

Min = Minute(s)

NOTE: Discriminant validity indicates an instrument’s ability to accurately discriminate between populations with and without the quality of interest (e.g., alcoholics and nonalcoholics). Construct validity refers to the degree to which results from an instrument reflect the underlying quality (e.g., craving) that the instrument is trying to measure. Concurrent and predictive validity are types of criterion-oriented validity; they both describe the degree to which the results obtained with an instrument agree with other devices that purport to measure the same characteristic. Concurrent validity examines the relationship between measures taken around the same time, and predictive validity evaluates the relationship between the instrument and another measure taken at a later time. The reliability of an instrument indicates the degree to which items on an instrument yield consistent results. Test-retest reliability refers to the consistency of results when a subject is tested on multiple occasions. Internal consistency reliability indicates that similar items on a test do not yield inconsistent or contradictory responses. Reliability estimates can range from 0 to 1.0, with 1.0 indicating the highest degree of reliability.
The term "craving" refers here to the frequency and intrusive nature of thoughts about drinking, especially after 1 or 2 days of abstinence, whereas the term "compulsion" refers to the loss of control over drinking.

The Y-BOCS–hd consists of 10 questions, of which 5 comprise an obsessionality subscale and the remaining 5 comprise a compulsivity subscale. The instrument is administered in a structured clinical interview lasting approximately 15 to 30 minutes.

In a study assessing the validity and reliability of the Y-BOCS–hd, Modell and colleagues (1992b) administered the questionnaire to 62 alcoholics. The results were then compared with ratings from a single-item subjective craving measure (i.e., "How much do you crave an alcoholic beverage when you’ve gone without a drink for 1 to 2 days?"). The study found that for both the total score and the two subscale scores, a statistically significant, albeit moderate, correlation existed between the ratings obtained with the two instruments.

The Obsessive Compulsive Drinking Scale (OCDS). Anton and colleagues (1995) modified the Y-BOCS–hd to derive the Obsessive Compulsive Drinking Scale (OCDS), a 14-item questionnaire that the patient can self-administer and complete in about 5 minutes. Because the instrument is self-administered, each respondent is likely to interpret the questions similarly each time that he or she completes the questionnaire, thereby improving test-retest reliability and eliminating or reducing interviewer bias and differences in interpretation between interviewer and respondent. The OCDS is a global measure in which patients are asked to rate their craving over a period of 1 or 2 weeks (but no less than 1 day).

Like the Y-BOCS–hd, the OCDS contains an obsessive subscale, which consists of eight items, and a compulsive subscale, which consists of six items. However, the questions in the obsessive subscale on the OCDS relate to the occurrence of intrusive thoughts about alcohol at any time when the respondent is not drinking and thus encompass a more general timeframe than that specified in the Y-BOCS–hd. Patients respond to each item by selecting one of five statements that range from minimal to maximum endorsement of the item. The OCDS has demonstrated good test-retest reliability and high internal consistency; furthermore, its scores are strongly and significantly correlated with ratings obtained with the Y-BOCS–hd (Anton et al. 1995). The OCDS also has been shown to be a valuable tool for outcome assessment and for monitoring a patient’s progress during treatment (Anton et al. 1996).

The Alcohol Craving Questionnaire (ACQ). The self-administered ACQ (Singleton et al. 1995) contains 47 items, each of which is scored on a 7-point Likert-type scale ranging from "strongly disagree" to "strongly agree." Each item is related to one of five domains that are considered relevant to alcohol craving: (1) desire to drink alcohol, (2) intention to drink alcohol, (3) lack of control over the use of alcohol, (4) anticipation of positive effects from drinking (i.e., positive outcome expectancy), and (5) expectancy of relief from withdrawal or alcohol’s negative effects. The ACQ is a state measure providing an index of acute craving, because the questions relate to the degree to which the respondent is currently experiencing these urges.

Initial validation work with the ACQ revealed four dimensions with moderate to high internal consistency. These factors were labeled emotionality, purposefulness, compulsivity, and expectancy (Singleton and Gorelick 1998). The ACQ also has been modified into a short form, the ACQ-SF, that contains the 12 items most strongly correlated with the total ACQ score.

The Alcohol Urge Questionnaire (AUQ). The AUQ (Bohn et al. 1995) is an eight-item, self-administered state measure that assesses the patient’s urge for an alcoholic drink at the time the questionnaire is completed, thereby providing an index of acute craving. As with the ACQ, the items are scored along a seven-point Likert-type scale. The AUQ contains four items pertaining to the desire for a drink, two items regarding expectations of positive effects from drinking and two items relating to the inability to avoid drinking if alcohol were present. The AUQ has demonstrated good test-retest reliability, both after a 1-day and 1-week interval.

Furthermore, the instrument has shown significant (but moderate) positive correlations with the patient’s alcohol-dependence severity and with scores on the OCDS, as well as a negative correlation with the length of time the patient has been abstinent (Bohn et al. 1995).

Psychophysiological and Behavioral Measures

Researchers frequently use psychophysiological and behavioral indices in conjunction with self-report measures to elucidate the full range of responses that may relate to craving. A major advantage of measuring these additional response domains is that they provide more objective data than do self-reports and thus may be influenced less by various sources of bias. In addition, many craving theories make specific predictions regarding the physiological responses that should accompany craving reports and the relationships that should be observed across various indices of craving. The assessment of behavioral and psychophysiological variables can help support or disprove these predictions.

In laboratory settings, psychophysiological and behavioral responses are often measured within “cue reactivity” studies, which assume that the subject's responses to alcohol-related stimuli can reflect craving (for more information on cue-reactivity studies, see the article in this issue by Litt and Cooney, pp. 174–178). Cues that have been used in studies of alcohol craving include the sight, smell, and taste of alcohol; pictures or videos of alcohol or alcohol-related scenarios, such as a barroom; the study participant’s belief that he or she will consume alcohol; and mental imagery of alcohol-related situations. Negative
mood manipulations, which typically involve the participant imagining being in an unpleasant situation or being presented with a stressor that will invoke such a mood, also have been used as a cue for alcohol craving in some studies. Unfortunately, these studies have rarely demonstrated close relationships among behavioral, psychophysiological, and subjective measures of craving. Alcoholics’ responses to craving-induction procedures appear to vary considerably as a result of numerous individual differences and situational factors. Nonetheless, cue-reactivity measures have provided valuable information about the correlates of craving. Significantly, some studies have shown that autonomic reactions to alcohol cue presentations, such as changes in skin conductance, can predict later relapse to drinking (e.g., Drummond and Glautier 1994).

Psychophysiological Measures. Several psychophysiological variables have been assessed in response to alcohol cues, including salivation, skin conductance, skin temperature, respiration, heart rate, and blood pressure. Carter and Tiffany (1999) recently analyzed the results of numerous studies (i.e., conducted a meta-analysis) of cue-reactivity effects on psychophysiological variables across a range of AODs. Consistent with the assumption that alcoholics exhibit increased urges and cravings for alcohol in response to alcohol cues, this analysis revealed that alcoholics across studies demonstrate significant increases in heart rate and skin conductance in response to alcohol cues. That is, most studies showed that alcoholics responded with greater autonomic responses to alcohol cues than to control cues. However, substantial variability existed in the sizes of these effects among the studies included in this analysis, and it is important to note that the effects were generally larger for self-reports of craving than for the psychophysiological signals. The fact that most of these studies included single-item ratings suggests that as alluded to earlier, these items may indeed reliably assess craving in the context of cue-reactivity studies.

One physiological measure that was not included in the meta-analysis by Carter and Tiffany (1999) was salivation. Previous reviews have suggested that salivation increases reliably in the presence of alcohol cues (Niaura et al. 1988; Rohsenow et al. 1990–1991). This finding was confirmed in another recent meta-analysis, which also indicated a moderate increase in salivation among alcoholics in response to alcohol cues relative to control cues (Tiffany et al. in press).

Behavioral Measures. The behavioral measure most closely related to the concept of alcohol craving is alcohol consumption itself. Some researchers consider alcohol seeking and drinking during or after treatment to reflect, at least in part, craving processes. Various direct measures of drinking behavior can serve as outcome variables during or after alcoholism treatment, including frequency of drinking, number of drinks per drinking occasion (i.e., drinking intensity), and latency to drink. More fine-grained behavioral analyses of drinking patterns also have been conducted. Although researchers generally are reluctant to conduct studies involving alcohol consumption with alcohol-dependent subjects, craving studies performed in laboratory rather than treatment settings occasionally include direct measures of alcohol consumption (Drobes and Anton in press). For example, Davidson and colleagues (1999) recently demonstrated that treatment with the medication naltrexone for 1 week diminished overall alcohol consumption and drinking speed in a laboratory session among young (i.e., with a mean age of 22 years) heavy drinkers.

Some recent cue-reactivity studies have incorporated indirect behavioral measures in lieu of actual drinking behavior. For example, Tiffany (1990) proposed that craving involves mental processes requiring conscious cognitive efforts (i.e., nonautomatic cognitive processing) and therefore should interfere with simultaneous activities that also require conscious cognitive effort (for more information on this model, see the article in this issue by Tiffany, pp. 215–224). To evaluate this hypothesis, Sayette and colleagues (1994) randomly assigned 24 alcohol men admitted for inpatient alcoholism treatment to hold either a glass of water or their preferred alcoholic beverage for 3 minutes and to sniff the contents at specified intervals. Simultaneously, the men were instructed to respond by pressing a button whenever they heard a computer-generated tone. The reaction time on this button-pressing task was considered an indirect marker of the cognitive efforts associated with craving. The study found that during the period when the subjects were asked to sniff the beverages, the men holding the alcoholic beverage exhibited significantly longer reaction times than the men holding a glass of water, suggesting that the men in the alcoholic beverage group experienced greater craving.

Another indirect behavioral measure that may potentially serve as an indicator of alcohol craving is choice cue-viewing time—that is, the length of time a person chooses to look at a stimulus. Within studies on motivation and emotion, choice cue-viewing time has been related to various subjective and physiological indicators of arousal (e.g., Lang et al. 1993). Several other novel behavioral measurement approaches are currently being developed in the alcohol-craving research arena, some of which borrow methodologies from research on other drugs and from the emotion and motivation research field.

Clinical Utility of Craving Measurements

Most alcoholics report that cravings are a frequent and troublesome aspect of their addiction. Consequently, clinicians should monitor their patients’ cravings. Assessment and discussion of craving
may improve rapport between clinicians and patients, thereby increasing the relevance of therapeutic interactions. In everyday clinical practice, self-report instruments will likely continue to be the most frequently employed type of craving measure, because behavioral and psychophysiological measures, despite their theoretical relevance, clearly extend beyond the resource capacities of most treatment settings.

Incorporating craving measurements into routine clinical practice can produce several potential benefits. First, craving-related measures appear to provide a good index of a patient’s overall level of alcohol dependence. Anton and Drobos (1998) reported that alcoholics scored increasingly higher on the OCDS as a function of the severity of their dependence and, consequently, level of treatment involvement. That is, OCDS scores increased in order from nonalcoholics, to non-treatment-seeking alcoholics (i.e., patients with a low level of dependence severity), to alcoholics receiving outpatient therapy, to alcoholics in inpatient treatment (i.e., patients with the greatest dependence severity).

Second, craving assessment can provide valuable information concerning a patient’s capacity to recognize and monitor internal states that may be related to his or her drinking. If a patient can be taught to recognize his or her specific level of craving, then that person may be more likely to use learned coping strategies at the appropriate time or to return for additional treatment sessions as craving-inducing situations arise during recovery.

Third, clinicians may find it useful to assess craving in order to recommend appropriate treatment alternatives. For instance, studies have suggested that alcoholics who report higher levels of craving benefit the most from the medication naltrexone as an adjunct to psychosocial treatment components (Jaffe et al. 1996).

Finally, because craving measures have been shown to predict alcohol consumption during active treatment (Anton et al. 1995), regular monitoring of craving throughout treatment may aid clinicians and patients in decisions regarding treatment intensity and duration. For example, patients who continue to experience high levels of craving (either constantly or in certain situations) despite compliance with their current treatment may require continued support, more intensive treatment, or possibly changes in their environment (e.g., social network and activities).

The relationship between craving and drinking outcome is still somewhat controversial in the alcohol field. Some studies have demonstrated that self-reported craving can predict treatment outcome or relapse, whereas other studies report that acute craving often does not lead to alcohol consumption in either active or relapsing alcoholics. One explanation for this discrepancy may involve the types of measures used to assess craving. It is possible that global measures of craving are more strongly related with drinking behavior than are state-oriented measures, because global measures involve the cognitive integration of craving-related experiences over a longer time period. As a result, such measures may more reliably incorporate aspects of craving that cannot be obtained from state measures of craving. In particular, global measures may be better suited to assess the overall anguish and distress experienced by an alcoholic, which may be related to the likelihood of relapse. Conversely, state-oriented measures only give a snapshot of an alcoholic’s immediate alcohol-related struggle. Whether drinking occurs at the time of the assessment, however, likely depends on several other factors.

Nevertheless, a pattern of high scores on state-oriented measures of craving, while probably unrelated to drinking at a particular time, may show a similar positive relationship with eventual drinking as do more global measures. Although this hypothesis needs to be tested empirically, its tenet is that clinicians need to regularly administer both state-oriented and global measures of craving in order to estimate both current and general levels of alcohol-related distress. Such an approach could help optimize clinical judgments regarding the probability of relapse and the most appropriate interventions to prevent relapse.

**Summary and Future Directions**

The past decade has witnessed the development and increased availability of psychometrically sound and theoretically relevant self-report measures of craving. The measures described in this article are better able to capture the dynamic and multidimensional nature of craving across and within individual patients over time compared with traditional single-item assessments. These measures also can be used in a wide range of research and clinical settings according to the needs of the administrator. Additional work is necessary, however, to further refine and validate these measures. In particular, the generalizability of the available measures to various types of drinking populations must be evaluated, because different subpopulations of alcoholics (e.g., treatment-seeking, non-treatment-seeking, abstinent, and adolescent alcoholics) may require new and unique craving instruments. The currently available measures can serve as useful guides in the development and validation of such instruments.

Technological advances are likely to improve the multidimensional measurement and understanding of craving in the coming years. For example, researchers have begun to apply neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), in studies of craving (for more information on these techniques, see the article in this issue by Hommer, pp. 187–196). These new tools will be critical for identifying the brain regions activated concurrent with alcohol craving, particularly when combined with other existing technologies for measuring craving. Improvements in existing cue-reactivity approaches also hold promise for advancing measurements of craving phenomena. For example, methodological advances within the general study of emotion and motivation could be adapted for alcohol-cue reactivity analyses in order to better elucidate the role of emotions in alcohol craving. Such investigations are particularly important in light of recent
studies demonstrating a link between emotion, cue reactivity, and treatment outcome (Cooney et al. 1997; Litt et al. 1990).

REFERENCES

ANTON, R.F., and DROBES, D.J. Clinical measurement of craving in addiction. Psychiatric Annals 28:553–560, 1998.

ANTON, R.F.; MOAK, D.H.; AND LATHAM, P. The Obsessive Compulsive Drinking Scale: A self-rated instrument for the quantification of thoughts about alcohol and drinking behavior. Alcoholism: Clinical and Experimental Research 19(1):92–99, 1995.

ANTON, R.F.; MOAK, D.H.; AND LATHAM, P. The obsessive compulsive drinking scale: A new method of assessing outcome in alcoholism treatment studies. Archives of General Psychiatry 53(3):225–231, 1996.

BOHN, M.J.; KRAHN, D.D.; AND STAHELNER, B.A. Development and initial validation of a measure of drinking urges in abstinent alcoholics. Alcoholism: Clinical and Experimental Research 19(3):600–606, 1995.

CARTER, B.L.; AND TIFFANY, S.T. Meta-analysis of cue-reactivity in addiction research. Addiction 94: 327–340, 1999.

COONEY, N.L.; LITT, M.D.; MORSE, P.A.; BAUER, L.O.; AND GAUPP, L. Alcohol cue reactivity, negative mood reactivity, and relapse in treated alcoholic men. Journal of Abnormal Psychology 106:243–250, 1997.

DAVIDSON, D.; PALFAI, T.; BIRD, C.; AND SWIFT, R. Effects of naltrexone on alcohol self-administration in heavy drinkers. Alcoholism: Clinical and Experimental Research 23:195–203, 1999.

DROBES, D.J., AND ANTON, R.F. Drinking in alcoholics following an alcohol challenge research protocol. Journal of Studies on Alcohol, in press.

DROBES, D.J.; SALADIN, M.E.; AND TIFFANY, S.T. Classical conditioning mechanisms in alcohol dependence. In: Heather, N.; Peters, T.J.; and Stockwell, T., eds. Handbook of Alcohol Dependence and Alcohol-Related Problems. Chichester, England: John Wiley & Sons, in press.

DRUMMOND, D.C.; AND GLAUTIER, S. A controlled trial of cue exposure treatment in alcohol dependence. Journal of Consulting and Clinical Psychology 62:809–817, 1994.

GOODMAN, W.K.; PRICE, L.H.; RASMUSSEN, S.A.; MAZURE, C.; FLEISCHMANN, R.L.; HILL, C.L.; HENINGER, G.R.; AND CHARNEY, D.S. The Yale-Brown Obsessive Compulsive Scale: I. Development, use, and reliability. Archives of General Psychiatry 46:1006–1011, 1989a.

GOODMAN, W.K.; PRICE, L.H.; RASMUSSEN, S.A.; MAZURE, C.; DELGADO, P.; HENINGER, G.R.; AND CHARNEY, D.S. The Yale-Brown Obsessive Compulsive Scale: II. Validity. Archives of General Psychiatry 46:1012–1016, 1989b.

JAFFE, A.J.; ROUNSAVILLE, B.; CHANG, G.; SCHOTTENFELD, R.S.; AND MEYER, R.E. Naltrexone, relapse prevention, and supportive therapy with alcoholics: An analysis of patient treatment matching. Journal of Consulting and Clinical Psychology 64:1044–1053, 1996.

KRAZNLER, H.; MULGREW, C.; MODESTO-LOWE, V.; AND BURLESON, J.A. Validity of the Obsessive Compulsive Drinking Scale (OCDS): Does craving predict drinking behavior? Alcoholism: Clinical and Experimental Research 23:108–114, 1999.

LANG, P.J.; GREENWALD, M.K.; BRADLEY, M.M.; AND HAMM, A.O. Looking at pictures: Affective, facial, visceral, and behavioral reactions. Psychophysiology 30(3):261–273, 1993.

LITT, M.D.; COONEY, N.L.; KADDEN, R.M.; AND GAUPP, L. Reactivity to alcohol cues and induced moods in alcoholics. Addictive Behaviors 15(2):137–146, 1990.

LONG, A.; JAMES, D.; AND WILLNER, P. A comparison of two alcohol craving questionnaires. Addiction 93:1091–1102, 1998.

MODELL, J.; GLASER, F.; MOUNTZ, J.; SCHMALTZ, S.; AND CYR, L. Obsessive and compulsive characteristics of alcohol abuse and dependence: Quantification by a newly developed questionnaire. Alcoholism: Clinical and Experimental Research 16(2):266–271, 1992a.

MODELL, J.G.; GLASER, F.B.; CYR, L.; AND MOUNTZ, J.M. Obsessive and compulsive characteristics of craving for alcohol in alcohol abuse and dependence. Alcoholism: Clinical and Experimental Research 16(2):272–274, 1992b.

NAURA, R.S.; ROHSENOW, D.J.; BINKOFF, J.A.; MONTI, P.M.; PEDRAZA, M.; AND ABRAMS, D.B. Relevance of cue reactivity to understanding alcohol and smoking relapse. Journal of Abnormal Psychology 97:133–152, 1988.

ROBERTS, J.S.; ANTON, R.F.; LATHAM, P.K.; AND MOAK, D.H. Factor structure and predictive validity of the Obsessive Compulsive Drinking Scale. Alcoholism: Clinical and Experimental Research 23(9):1484–1491, 1999.

ROHSENOW, D.J.; CHILDRESS, A.R.; MONTI, P.M.; NAURA, R.S.; AND ABRAMS, D.B. Cue reactivity in addictive behaviors: Theoretical and treatment implications. International Journal of the Addictions 25(7A–8A):957–993, 1990–1991.

SAYETTE, M.A.; MONTI, P.M.; ROHSENOW, D.J.; GULLIVER, S.B.; COLBY, S.M.; SIROTA, A.D.; NAURA, R.; AND ABRAMS, D.B. The effects of cue exposure on reaction time in male alcoholics. Journal of Studies on Alcohol 55:629–633, 1994.

SINGLETON, E.G., AND GORELICK, D.A. Mechanisms of alcohol craving and their clinical implications. In: Galanter, M., ed. Recent Developments in Alcoholism: Volume 14. The Consequences of Alcoholism. New York: Plenum Press, 1998. pp. 177–195.

SINGLETON, E.G.; TIFFANY, S.T.; AND HENNINGFIELD, J.E. Development and validation of a new questionnaire to assess craving for alcohol. In: Harris, L.S., ed. Problems of Drug Dependence, 1994: Proceedings of the 56th Annual Scientific Meeting, The College on Problems of Drug Dependence, Inc. National Institute on Drug Abuse Research Monograph Series. Vol. 153. Rockville, MD: the Institute, 1995. p. 289.

TIFFANY, S.T. A cognitive model of drug urges and drug use behavior: Role of automatic and nonautomatic processes. Psychological Review 97:147–168, 1990.

TIFFANY, S.T. Critique of contemporary urge and craving research: Methodological, psychometric, and theoretical issues. Advances in Behaviour Research and Therapy 14:123–139, 1992.

TIFFANY, S.T.; CARTER, B.L.; AND SINGLETON, E.G. Challenges in the manipulation, assessment and interpretation of craving relevant variables. Addiction, in press.