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Development and Psychometric Evaluation of a Brief Approach and Avoidance of Alcohol Questionnaire

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Abstract

Background: The Approach and Avoidance of Alcohol questionnaire (AAAQ) was developed as a measure of craving to assess both desires to consume and desires to avoid consuming alcohol.

Although the measure has been used in a variety of populations to predict future alcohol use behavior, the factor structures observed varies based on sample type (e.g., clinical versus college samples) and may be overly long for use in repeated measure designs. The current article describes the development of a brief version of the AAAQ for use in clinical populations.

Methods: Using existing data sets of individuals in treatment for alcohol use disorder, exploratory analyses (e.g. exploratory factor analysis and item response theory) were conducted using an inpatient sample ($N=298$) at a substance abuse treatment facility. Confirmatory analyses (e.g., confirmatory factor analysis and multiple regression) were conducted using an inpatient detoxification sample ($N=175$) and a longitudinal outpatient treatment sample ($N=53$).

Results: The brief AAAQ had comparable internal consistency, explained a similar amount of variance in alcohol consumption and related problems, and exhibited superior model fit as compared to the original measure.

Conclusions: These findings indicate that the brief AAAQ is an effective tool to assess alcohol craving in clinical populations in treatment settings.

Keywords

alcohol; craving; approach; avoidance; measurement; alcohol use disorder; AUD

With over 25% of Americans meeting criteria for a lifetime Alcohol Use Disorder (AUD; Grant et al., 2015), reliable instruments are necessary to assess the full breadth of alcohol-related experiences and problems. Following the reintroduction of craving as a DSM-5 (American Psychiatric Association, 2013) diagnostic criterion for AUD, the inclusion of craving in both alcohol use research and treatment are of utmost priority, which was reflected by a recent emphasis in research to better conceptualize and measure craving. For example, a special edition on craving in *Addictive Behaviors* called for the development of reliable measures in attempts to stimulate advancement in the assessment of craving (e.g., Kavanagh et al., 2013). Despite this recent revival in interest for craving research, serious theoretical and methodological concerns remain (Rosenberg, 2009, Sayette et al., 2000, Drummond et al., 2000). Although most researchers consider craving to be an important factor in the etiology, maintenance, and treatment of problematic alcohol use, there remain several unresolved issues as to how to best conceptualize and measure craving. As such, development of instruments that accurately measure the craving experience in alcohol dependent individuals has been at the forefront of craving research in the conceptualization and treatment of AUDs.

Traditionally, craving has been considered a unidimensional construct, commonly defined as a behavioral intention or desire to use a substance (e.g., Drummond, 2001). However, this broad conceptualization is debated, as it may be more accurate to describe craving as a subjective state associated with a strong desire to use a substance (Tiffany and Wray, 2012). Further, some theories consider craving to be an automatic and unconscious process heavily rooted in neurobiology (e.g., Robinson and Berridge, 1993, Robinson and Berridge, 2000, Koob, 2000). In this context, craving is viewed as a consequence of interruptions to automatic substance use related behavior (e.g., Tiffany, 1990), or similarly, as a manifestation of desires to alleviate negative affect (e.g., Khantzian, 1997) or enhance positive affect and enjoyment (e.g., Brown et al., 1980). Despite this wide range of theoretical approaches to defining craving, these models only consider craving as a desire to use a substance, thus failing to incorporate strong desires to avoid alcohol use or motivational conflicts (i.e., ambivalence) that are commonly reported in a wide range of problematic alcohol users (i.e., across age groups and genders in clinical, community, and collegiate samples; Barkby et al., 2012, Cox and Klinger, 1988, Schlauch et al., 2013b, Schlauch et al., 2015a, Schlauch et al., 2015d, Schlauch et al., 2015b).

The Ambivalence Model of Craving (AMC; Breiner et al., 1999, Stritzke et al., 2007) considers not only desires in favor of using a substance (approach inclinations), but also desires to avoid substance use (avoidance inclinations). Approach and avoidance inclinations are thought to be independent of one another, resulting in four theorized craving profiles representing motivational dispositions toward alcohol use (i.e., approaching, avoidant,

ambivalent, and indifferent). Within the AMC framework, the constructs of approach and avoidance inclinations have demonstrated validity in predicting drinking outcomes in clinical (e.g., Schlauch et al., 2013a, Schlauch et al., 2015b, Schlauch et al., 2015d, Klein et al., 2007) and non-clinical collegiate samples (McEvoy et al., 2004, Schlauch et al., 2015a), as well as in adolescent samples (Curtin et al., 2005). Additionally, individual craving profiles (i.e., approach, avoidant, ambivalent, and indifferent) are predictive of quantity and frequency of alcohol use (Klein and Anker, 2013, Klein et al., 2007, McEvoy et al., 2004, Schlauch et al., 2015a, Schlauch et al., 2015d, Schlauch et al., 2012), treatment initiation (Schlauch et al., 2015d, Schlauch et al., 2012), treatment retention (Schlauch et al., 2012), abstinence rates after treatment (Klein and Anker, 2013, Schlauch et al., 2013b, Stritzke et al., 2004, Stritzke et al., 2007), and alcohol related problems (Schlauch et al., 2015d). Significantly, avoidance inclinations, as well as the level of approach and avoidance relative to one another, predict unique variance in drinking behavior not otherwise accounted for in models that only consider approach. Given the growing support for the utility of measuring and addressing both approach and avoidance inclinations in treatment, valid and reliable measurement is essential to best capture the spectrum of craving experienced by individuals with problematic drinking.

Within the AMC framework, approach and avoidance inclinations have been reliably measured using both cue-reactivity methodology (Curtin et al., 2005, Stritzke et al., 2004, Schlauch et al., 2013a, Schlauch et al., 2015d) and self-report questionnaires (McEvoy et al., 2004, Klein and Anker, 2013, Klein et al., 2007). While assessment of approach and avoidance using cue-reactivity methodology has numerous advantages, it does not lend itself well to repeated assessment. Consequently, cue-reactivity is not an appropriate method for examining processes of change during treatment. With regard to self-report questionnaires, the Approach and Avoidance of Alcohol Questionnaire (AAAQ; McEvoy et al., 2004) was designed to assess approach and avoidance inclinations consistent with the AMC. McEvoy and colleagues (2004) originally designed the measure to include 20 items, but results of initial validation studies with college samples indicated a 14-item three factor solution, which included an avoidance dimension and two approach dimensions. Specifically, a three-factor model was interpreted as being consistent with the neuroanatomical model of craving (Anton, 1999), in which approach inclinations have a threshold that divides the dimension into low (inclined/indulgent) and high levels of intensity (obsessed/compelled).

In later studies examining the AAAQ in clinical samples analyses favored a two factor model (e.g., Klein et al., 2007, Schlauch et al., 2013b). For example, Klein and colleagues (2007) re-examined the original 20-item pool and found support for a two-factor solution, in which both approach subscales loaded onto a single factor. In another study, Schlauch et al. (2013b) confirmed this factor structure in a dually diagnosed population, after elimination of an avoidance item that demonstrated criterion contamination (i.e., “I cut down the amount I drank”). These findings suggest that lower and higher intensity approach inclinations are not distinguishable within clinical samples with problematic alcohol use, both in terms of their factor structure and predictive/incremental validity.

To address this concern, Klein and colleagues (2013) examined the factor structure of the 14-item AAAQ within an alcohol-dependent sample attending residential treatment.

Although examination of both two and three factor solutions within the confirmatory sample favored the three factor solution, the overall fit fell within the adequate but not excellent range on several model fit indices. Further, the correlation between the two approach subscales (inclined/indulgent and obsessed/compelled) was 0.82, suggesting that both subscales may be representative of a single latent approach factor. More importantly, correlations between each approach subscale and measures of drinking behaviors suggested that the two scales were performing similarly. Additionally, approach and avoidance only accounted for unique variance in associated outcomes when the two approach subscales were combined to form a single approach scale. Thus, while confirmatory procedures favored a three factor solution, including two approach subscales did not provide incremental and predictive utility above and beyond the two factor model (i.e., a single approach dimension and avoidance dimension) in a clinical population.

Beyond general measurement concerns, recent recommendations for the design and analysis of treatment outcomes in clinical trials for AUD highlight the importance of the timing and frequency of assessments for both drinking and mechanism of change variables (Witkiewitz, Finney, Harris, Kivlahan, & Kranzler, 2015). The latter is of particular importance in the study of mechanisms of change, as more frequent assessments during clinical trials permit the examination of dynamic relationships between proposed process variables and drinking outcomes. Although the current versions of the AAAQ are not overly long, with 14 or 19 items (the original 20-item pool minus the problematic avoidance item identified in Schlauch, Levitt, et al., 2013), these measures still may be deemed too time intensive for use in clinical and research settings with constraints on the amount of time allotted for assessment. Specifically, brief measures prove advantageous in numerous clinical and research contexts, as they can be more easily utilized in settings where resources are limited. Further, many research contexts benefit from shortened assessment tools, most notably those with procedures that are concerned with minimizing participant burden (i.e., repeated assessments within a single session and methods facilitating real-time data collection such as Ecological Momentary Assessment; EMA). Given the significance of craving in diagnosing and treating individuals with alcohol use disorders, the ability to reliably assess craving using brief, cost-effective, and practical methods is crucial..

Current Study

Given the mixed findings regarding the factor structure of the AAAQ between clinical and college student samples, the current study sought to develop a brief six item version of the AAAQ that best captures craving in clinical populations and retains the predictive validity and psychometric properties of the original measure. Analyses were conducted using existing data sets of individuals in AUD treatment. Item selection from the original 20-item pool was guided by item response theory (IRT); initial item selection (i.e., exploratory analyses) was conducted on a clinical sample from an inpatient substance use treatment facility. Confirmatory factor analysis (CFA) was used to test model fit of the items generated during exploratory analyses; confirmatory analyses were conducted using two independent clinical samples.

Materials and Methods

Participants.

A total of 298 participants were screened at an inpatient treatment center for substance abuse in the northeastern United States for participation in a longitudinal study which sought to investigate the potential of Heart Rate Variability (HRV) biofeedback to improve impulse control in AUD treatment. To be eligible for the initial screening interview, potential participants were required to: (a) be 18 years or older and (b) be English speaking. To be eligible for invitation to the HRV lab assessments (typically 2–3 days after screening), potential participants were required to (a) be 18 to 65 years of age and (b) meet DSM-IV criteria for a current diagnosis of alcohol dependence. Potential participants were excluded from the lab assessments if they (a) reported current psychoactive or cardiac medication use, (b) reported a history of seizures, neurosurgery, or serious medical conditions, (c) met diagnostic criteria for a psychotic disorder or bipolar disorder, or (d) presented with neurocognitive impairment.

Participants were 65% male, 69% Caucasian, and had an average age of 37.9 years old ($SD = 10.9$; see Table 1 for further demographic information). A majority of participants met criteria for either alcohol abuse ($n = 31$) or alcohol dependence ($n = 198$) on the MINI International Neuropsychiatric Interview for DSM-IV (MINI; Sheehan et al., 1998). All 298 participants provided responses to the AAAQ, which were used for exploratory analyses and item selection; a smaller subset of the sample ($n = 45$) enrolled in the study and had data available reporting their alcohol consumption and related behaviors, which was used to examine reliability and validity. The following summarizes the 45 participants that comprise that subset of the data. Participants ranged in age from 19 to 60 ($M = 39.4$; $SD = 10.4$). Of the 45 participants, 27 were male (60%). Participants were predominately Caucasian (69%; 29% African American, 2% Other). Average stay on the unit was 13.4 days ($SD = 6.0$) at the time of participation. Participants reported consuming an average of 12.56 drinks per drinking day ($SD = 8.63$), elevated symptoms of alcohol dependence, and a moderately high number of drinking related problems (based on normed data in the SIP manual; $M = 22.29$, $SD = 22.39$; Miller et al., 1995).

Measures.

Approach and Avoidance of Alcohol Questionnaire (AAAQ; McEvoy et al., 2004).—The 20-item AAAQ measures desires to approach and avoid alcohol. Participants rated how much they agreed with each statement on a scale of 0 (Not at All) to 8 (Very Strongly). Based on previous research and concerns for criterion contamination, item 2 (“I cut down the amount I drank”) was excluded from analyses.

Alcohol Dependence Scale (ADS; Skinner and Allen, 1982).—The ADS is a 25-item measure assessing symptoms of Alcohol Dependence based on DSM-IV criteria. Respondents answer each question with regard to the past twelve months. Total scores range from 0 to 47, with higher scores indicative of stronger dependence.

MINI International Neuropsychiatric Interview for DSM-IV (MINI; Sheehan et al., 1998).—The MINI is a semi-structured diagnostic interview designed to assess psychopathology according to DSM-IV standards. The MINI is often used because it is considered to be both short and accurate. Participants were administered the Alcohol Abuse and Dependence module of the MINI in order to determine which participants met criteria for an alcohol use disorder.

Short Inventory of Problems (SIP; Miller et al., 1995).—The SIP is a 15-item measure of alcohol-related problems across multiple domains including physical, social, intrapersonal, impulsive and interpersonal consequences. Respondents were asked to indicate how often each consequence had occurred on a scale of 0 to 3 (0=Not at all, 1=A little, 2=Somewhat, 3=Very much) in the last 6 months.

Procedures.

Prior to participants taking part in any study activities, a member of the research staff reviewed study procedures and obtained informed consent; the study was reviewed and approved by the Institutional Review Board (IRB). Potential participants for the HRV study were screened for inclusion and exclusion criteria on-site and received a \$10 retail gift card as compensation. Screening interviews lasted approximately 30 minutes and data collected included demographic and health history questions, diagnosis of AUD, and the AAAQ. Eligible participants were scheduled and transported via taxi from the treatment site to the research laboratory for a three hour in-person assessment. Consenting participants completed a battery of self-report measures (including the SIP and ADS) and computerized behavioral tasks, as well as an introductory session on HRV training. Upon completion of the assessment, participants were compensated \$60 in retail gift cards and transported back to the treatment site via taxi.

Data Analytic Strategy.

Factor Structure.—Exploratory factor analysis (EFA; full sample $N=298$) was conducted in Mplus Version 7.31 using the original 20-item pool from the development of the AAAQ to determine the number of factors to extract. Extraction was determined using parallel analysis and an oblique geomin rotation with maximum likelihood estimation was used, as approach and avoidance are thought to be separate but related constructs.

Unidimensionality.—An underlying assumption of the item response theory (IRT) based model used in this study is the data are essentially unidimensional (i.e., the data represent a single latent trait; Drasgow and Parsons, 1983). EFA was conducted separately on each subscale of the AAAQ (i.e., approach and avoidance) using the methods described above to test this assumption.

Item Functioning.—An IRT based graded response model (GRM; Samejima, 1969) for polytomous data was used to analyze responses to the 19-item pool of the AAAQ (the “I cut down the amount I drank” item was eliminated from all analyses due to criterion contamination). IRT analyses were conducted in IRTPRO Version 3.0; items on the approach and avoidance subscales were analyzed separately to select the three best performing items

for each sub-scale to comprise the six item measure. Discrimination and threshold parameters were examined along with graphical representations of item characteristic curves, item information curves, test information curves, option response curves, and test characteristic curves. Information curves were used to select items that provided the most information across the spectrum of approach and avoidance (i.e., height and width of the curve) and option response curves were used to select items with response options that discriminated well within the item's coverage on the spectrum (i.e. minimally overlapping curves). Items with high discrimination values were selected that adequately discriminated across the continuum of latent trait level in order to capture the wide range of intensity in approach and avoidance inclinations often present in heterogeneous drinking populations.

Results

Factor Structure.

EFA indicated that a 2 factor solution best fit the data (see Figure 1 and Table 2). Upon examination, the factors were consistent with an approach factor and an avoidance factor. The results from subsequent analyses indicated that the approach and avoidance subscales of the AAAQ both met requirements of unidimensionality.

Item Selection.

Separate analyses were conducted to analyze approach and avoidance items using an IRT based graded response model for polytomous data. Analysis of the ten approach items from the 19-item pool indicated that items 1 ("I would have liked to have a drink or two"), 16 ("I was thinking about alcohol a lot of the time"), and 17 ("I wanted to drink as soon as I had the chance") were the three best performing items: they differentiated well at the item level across the spectrum of latent trait level for approach (i.e., minimally overlapping option response curves as seen in Figure 2), and combined these items also differentiated well at the test level. Analysis of the nine avoidance items from the AAAQ-19 indicated that items 10 ("I deliberately occupied myself so I would not drink alcohol"), 14 ("I did things to take my mind off alcohol"), and 15 ("I avoided places in which I might have been tempted to drink alcohol") were the three best performing items. They discriminated well at the item level across the spectrum of latent trait level of avoidance (i.e., minimally overlapping option response curves as seen in Figure 3), and as with the three approach items, avoidance items 10, 14, and 15 also discriminated well together at the test level. The three items selected for each scale were those with the highest discrimination values that contributed the most information (i.e., highest peak amplitudes as seen in Figures 2 for approach and 3 for avoidance). See table 3 for item discrimination and threshold values.

Reliability Comparisons.

Reliability analyses yielded good internal consistency for the three item approach ($\alpha = .86$) and avoidance ($\alpha = .80$) scales. This is comparable to the internal consistency of the results from the fourteen and nineteen-item versions of the measure (see Table 4 for estimates). Differences in internal consistency among the three forms were statistically significant (as indicated by non-overlapping confidence intervals) on the approach subscale levels; the AAAQ-19 had significantly stronger internal consistency on the approach subscale than the

newly created 6-item measure (AAAQ-6) and AAAQ-14, which were statistically equivalent. Differences in internal consistency on the avoidance subscales were not statistically significant. Given the bias of internal consistency estimates in favor of longer measures (Streiner, 2003), the relatively small observed differences, and correspondence with previous research (e.g., Klein et al., 2007, Klein and Anker, 2013, Schlauch et al., 2013b), the results suggest that data from the short form of the AAAQ are reliable in clinical samples.

Validity.

Convergent validity was analyzed using bivariate correlations of subscale means with pairwise deletion in order to examine associations of the AAAQ-6 with the AAAQ-14 and AAAQ-19. The AAAQ-6 approach scale had strong significant positive correlations with the AAAQ-14 and AAAQ-19 approach scales; the AAAQ-6 avoidance scale was also highly correlated with the avoidance scales of the longer forms (see Table 4 for scale means, standard deviations, and correlation coefficients). The strong association of the AAAQ-6 with the longer versions of the measure demonstrates good convergent validity and indicates that the brief measure is likely capturing similar constructs as the longer validated forms.

Validity was further evaluated by conducting multiple regression analyses estimated using bootstrapping with 1,000 iterations and comparing the variance of drinking days, alcohol dependence, and drinking-related problems predicted by the AAAQ-6 with those predicted by the AAAQ-14 and AAAQ-19. Interactions between the approach and avoidance scales were tested and reported when significant. Bootstrapped analyses were used due to a limited subset of the original sample having data available for drinking days ($n=45$), the alcohol dependence scale ($n=37$), and drinking related problems ($n=38$). Approach and avoidance subscales were centered on the grand mean for each scale. The AAAQ-6 regression model explained 16% of variance in drinking days, 28% in alcohol dependence, and 24% in drinking related problems, as compared to 16%, 26%, and 28% for the AAAQ-14 model and 16%, 24%, and 33% for the AAAQ-19 model (see Table 5 for the regression models and coefficient values).

Materials and Methods

Participants.

Participants ($N=175$) were recruited from an inpatient detoxification unit for substance abuse located in the southeastern United States for a study that sought to examine the validity the Substance Use Risk Profile Scale (see Schlauch et al., 2015c) in a clinical sample. Admission criteria to the unit included (a) a substance use disorder diagnosis, (b) being assessed as cooperative and nonviolent, (c) current alcohol or other substance use at a quantity and frequency sufficient to have developed tolerance and be at risk for withdrawal symptoms when substances are terminated, (d) requiring medical and nursing services to manage withdrawal symptoms, and (e) absence of signs and symptoms requiring acute inpatient hospitalization (e.g. schizophrenia, actively suicidal). The unit included both voluntary and involuntary admissions. Participants were 68% male, 58% Caucasian, and had mean age of 41.6 years ($SD=11.2$; see Table 1 for further demographic information). The

average stay on the unit was 2.3 days ($SD = 1.3$) at the time of participation. A majority of participants (66%) had checked themselves into the unit voluntarily and most participants (95%) reported they were actively trying to change their alcohol or drug use. Participants reported consuming alcohol an average of 6.73 occasions per week ($SD = 7.09$) and an average of 7.25 drinks per occasion ($SD = 4.11$). Further, participants reported a significant number of drinking-related problems ($M = 7.75$, $SD = 4.20$) on the Short Michigan Alcohol Screening Test (Selzer et al., 1975)

Measures

AAAQ.—Participants were asked to complete the 20-item AAAQ based on their attitudes toward alcohol over the last week. Answers ranged from Not at All (0) to Very Strongly (8). As in study 1, item 2 was excluded from the current analyses.

Short Michigan Alcohol Screening Test (SMAST; Selzer et al., 1975).—The SMAST is a 13-item measure that assesses for severity of alcohol abuse and related problems. Participants respond to items such as “Do you ever feel guilty about your drinking” and “Have you ever gotten into trouble about your drinking” with a yes (1) or no (0). Responses are summed and a total score indicates severity of the alcohol problem, with a cutoff of 4 or more suggestive of potential alcohol abuse.

Drinking History Questionnaire.—Alcohol use was assessed using the 10-item Drinking History Questionnaire (DHQ; adapted from Cahalan et al., 1969). This instrument was used to assess both quantity and frequency of alcohol consumption. Frequency is assessed using a 10-point scale ranging from once a month or less to 21 or more times a week. Quantity is assessed by the number of standard drinks typically consumed per drinking occasion.

Procedures.

Individuals were recruited from an inpatient detoxification unit to participate in a study designed to examine the relationships between personality variables and cue-elicited craving across a variety of substances (see Schlauch et al., 2015 for details). All study activities were reviewed and approved by the IRB. Potential participants were told that they would complete two tasks over one three hour session: a) an image rating phase (i.e., cue-reactivity task) and b) a self-report questionnaire task. Each session could have up to 12 participants, though most sessions involved fewer than four participants due to a low census, prior participation, or patient decisions not to participate. Consenting participants first completed two baseline measures (i.e., a personality and mood questionnaire) followed by the image rating/cue-reactivity task. Following the cue-reactivity task, participants were given a 15-minute break and then asked to complete additional measures (i.e., AAAQ, alcohol/drug use histories, SMAST, and demographics).

Statistical Analyses

Confirmatory factor analyses were conducted in Mplus Version 7.31 using maximum likelihood estimation with robust standard errors. A model for the AAAQ-6 was specified using the items selected during Study 1, with items 1, 15, and 16 loading onto a latent

approach factor and items 10, 14, and 15 loading onto a latent avoidance factor. Factor variance for approach and avoidance was fixed at 1 in order to estimate factor loadings for all six items. Additional models were specified for the three-factor AAAQ-14 (see Klein and Anker, 2013) and the two-factor AAAQ-19 (Klein et al., 2007, Schlauch et al., 2013b), in order to compare fit indices among the three models. Similar to study 1, validity was examined using both bivariate and regression analyses.

Results

Confirmatory Factor Analysis.

Confirmatory factor analysis of the AAAQ-6 indicated adequate to good model fit (see Hu and Bentler, 1999) that was comparable or superior to the longer forms of the measure in all three samples. Modification indices indicated that there were not any modifications that would result in a significant improvement in fit. Subsequently, CFA was conducted on the AAAQ-14 and AAAQ-19 models cited above to compare fit indices of the three measures. The AAAQ-14 and AAAQ-19 on average had worse fit, mostly falling into the mediocre to poor range (see Table 6 for fit indices comparing all three models). Modification indices in both models indicated several modifications that would improve model fit; however, most of the modification values were relatively small and none of the changes suggested were theoretically tenable.

Reliability Comparisons.

Reliability analyses showed acceptable to excellent internal consistency for both the AAAQ-6 three-item approach scale ($\alpha = .92$) and three-item avoidance scale ($\alpha = .72$). This is comparable to the internal consistency of the results from the AAAQ-14 (inclined-indulgent $\alpha = .90$, obsessed-compelled $\alpha = .90$, and resolved-regulated $\alpha = .72$) and AAAQ-19 (approach $\alpha = .95$, avoidance $\alpha = .81$), as well as the results from Study 1 (see Table 4 for summary). These findings offer support indicating that data from the AAAQ-6 is likely reliable in clinical samples.

Validity.

Similar to study 1, the AAAQ-6 approach scale had strong significant positive correlations with the AAAQ-14 and AAAQ-19 approach scales (i.e., approach, inclined-indulgent and obsessed-compelled), and the AAAQ-6 avoidance scale was highly correlated with the avoidance scale of the AAAQ-14 and AAAQ-19 (see table 4 for scale mean, standard deviation, and correlation coefficients). Further, the AAAQ-6 regression model explained 33% of variance in drinks per week and 50% in drinking related problems, as compared to 32% and 51% for the AAAQ-14 model and 32% and 50% for the AAAQ-19 model (see Table 7 for regression models and coefficient values).

Materials and Methods

Participants.

Participants were 53 individuals seeking outpatient treatment for alcohol use disorder, recruited using local newspaper and radio advertisements (see Connors et al., 2016).

Participants were recruited to take part in a study examining whether providing therapists with session by session feedback and guidance on participant ratings of therapeutic alliance impacted treatment outcomes. Inclusion criteria were: (1) sought outpatient treatment for a drinking problem and met criteria for alcohol dependence based on the DSM-IV; (2) were between the age of 18 and 85 years of age; (3) resided within commuting distance of the program site; and (4) demonstrated proficiency with the English language that would allow them to complete assessment materials. Participants were excluded if they (1) had met criteria for a current psychotic disorder, (2) demonstrated gross neurocognitive impairment, or (3) had received treatment for substance use disorder currently or in the past year. Participants were 71.7% male, 92.5% Caucasian, and had an average age of 48.5 years old ($SD = 9.4$; see Table 1 for further demographic information)

Measures.

Timeline Follow-Back—(TLFB; Sobell and Sobell, 1992). TLFB is a calendar based retrospective recall of daily drinking data. TLFB was administered at baseline to measure drinking data for the six months prior to intake and at the end of treatment (12 weeks). TLFB has consistently proven reliable and accurate in treatment populations for both alcohol and other substance use (Ehrman and Robbins, 1994, Sobell et al., 1996, Sobell and Sobell, 1992).

AAAQ.—Participants completed the 20-item AAAQ at baseline and following treatment assessing their attitudes toward alcohol over the last week. Answers ranged from Not at All (0) to Very Strongly (8). Item 2 was excluded as in studies 1 and 2 above.

Procedure.

Initial screening interviews were scheduled for all potential participants who were responded to advertisements. Eligible participants were scheduled for a baseline assessment, during which informed consent and drinking data (using TLFB) were collected. Subsequently, participants received twelve weeks of Cognitive Behavioral Therapy (CBT, Kadden et al., 1992), tailored to treat alcohol dependence, conducted in an outpatient research clinic by experienced clinicians. Following the completion of treatment, post-treatment assessments included the TLFB and the AAAQ.

Results

Reliability Comparisons.

Reliability analyses showed adequate internal consistency before and after treatment for both the AAAQ-6 three-item approach scale ($\alpha = .75$ and $\alpha = .90$, respectively) and three-item avoidance scale ($\alpha = .81$ and $\alpha = .92$). This is comparable to the internal consistency of the results from the 14-item version of the measure (inclined-indulgent $\alpha = .83$ and $\alpha = .93$, obsessed-compelled $\alpha = .82$ and $\alpha = .92$, and resolved-regulated $\alpha = .79$ and $\alpha = .84$), the 19-item version of the measure (approach $\alpha = .88$ and $\alpha = .95$, avoidance $\alpha = .86$ and $\alpha = .88$), as well as the results from studies 1 and 2. Additionally, test-retest reliability for the AAAQ-6 (approach = .52 and avoidance = .39) was comparable to that of the AAAQ-14 (inclined-indulgent = .54, obsessed-compelled = .48, and resolved-regulated = .38 and

AAAQ-19 approach = .58 and avoidance = .35. Although these correlations fall well below those expected for test-retest reliability, the current measure is designed to measure change in craving over time, and thus lower test-retest correlations are expected.

Validity.

The AAAQ-6 approach scale had strong significant positive correlations with the AAAQ-14 and AAAQ-19 approach scales (i.e., approach, inclined-indulgent and obsessed-compelled), and the AAAQ-6 avoidance scale was highly correlated with the avoidance scale of the AAAQ-14 and AAAQ-19 (see table 4 for scale mean, standard deviation, and correlation coefficients).

Predictive validity was evaluated by conducting multiple regression analyses and comparing the variance of percent days abstinent (PDA) and percent heavy drinking days (PHD) predicted by the AAAQ-6 with that predicted by the AAAQ-14 at post-treatment (controlling for baseline drinking). The AAAQ-6 regression model explained 23% of variance in PDA and 16% in PHD, as compared to 22% and 15% for the AAAQ-14 model and 20% and 13% for the AAAQ-19 model (see Table 8 for regression models and coefficient values).

Discussion

The aim of the current research was to develop a brief version of the Approach and Avoidance of Alcohol Questionnaire for use in clinical samples. Based on current and prior results we determined that a two-factor solution was appropriate in clinical samples; subsequently, item responses to the AAAQ in a clinical sample were analyzed using an IRT based graded response model, resulting in the selection of the six best performing items (three approach and three avoidance) that comprise the brief measure (AAAQ-6). Analyses in two independent clinical samples were then conducted in order to examine model fit, reliability, and validity. CFA model fit indices indicated that the AAAQ-6 demonstrated superior fit; the brief measure correlated strongly with the original measure in all samples, displayed good convergent validity with other instruments assessing alcohol use and related behaviors, as well as predictive validity in a treatment sample. Internal consistency for the new measure fell within the acceptable to excellent range, performing surprisingly well given the low number of items on the test. Further, multiple regression analyses showed that all versions of the AAAQ explained comparable proportions of variance in drinking and problems related to drinking. These findings indicate that the AAAQ-6 functions similarly to the AAAQ-14 and AAAQ-19, and is appropriate for use in clinical samples in different stages of the treatment process.

Construction of the current measure was guided by both theoretical (i.e., the AMC) and practical concerns (i.e., applied research). Furthermore, consistent with past recommendations (e.g., Kavanagh et al., 2013), the AAAQ-6 attempts to minimize the confounding influence of other constructs known to influence drinking such as self-efficacy and expectancies. Results also indicated that across all samples, the inclusion of an avoidance dimension explained additional variance above and beyond traditional approach craving on several alcohol use related measures. For example, consistent with theory,

avoidance uniquely predicted alcohol use (frequency/quantity measures), alcohol dependence, and problems associated with alcohol use (e.g., higher avoidance associated with greater problems related to drinking; higher avoidance associated with or attenuating the effect of approach on alcohol use). Further, sub-scale scores on approach and avoidance differed depending on type of clinical sample. The inpatient sample receiving longer term treatment had higher levels of avoidance than the inpatient sample undergoing detoxification, and the treatment sample showed the expected changes (i.e., lower approach and higher avoidance after treatment). The observed differences in avoidance is consistent with the AMC, as well as prior research suggesting that avoidance develops as a result of both consequences related to alcohol use and treatment effects. Taken together, these results further suggest that the AAAQ-6 is a valid and useful tool to assess craving and competing desires (i.e., approach and avoidance) in clinical samples.

Although research has indicated that the AAAQ is a reliable measure to assess approach and avoidance inclinations in a variety of populations the factor structure of approach inclinations appear to be sample-dependent. Specifically, whether the approach dimension should be divided into inclined/indulgent and obsessed/compelled, or measured as a unitary dimension. It is possible that some of these inconsistent findings are methodological; inspection of the inclined/indulgent (lower intensity approach) and obsessed/compelled (higher intensity) items suggests that the factors may be capturing methodological/content variance, such that inclined/indulgent items represent behavioral intentions and obsessed/compelled items represent cognitive desires. Interestingly, it has been argued within the craving literature that the distinction between behavioral intentions and cognitive desires tends to be minimal, with such items often loading onto one factor (e.g., Tiffany and Wray, 2012); however, this may only hold true among those with heavier and more problematic alcohol use. Others have argued that the inclusion of behavioral intentions are outside the often strict definition of craving (i.e., strong desires for a substance) and can result in inflated predictions of drinking behaviors (e.g., Kavanagh et al., 2013). Indeed, among college students, the inclined/indulgent scale (lower intensity items assessing behavioral intentions) has shown to be more predictive of alcohol use, whereas the obsessed/compelled scale (higher intensity items assessing cognitive desires) is more predictive of problems associated with use (McEvoy et al., 2004). However, as seen in the current and past research, the inclined indulgent scale has not made meaningful predictions among clinical samples. Further, some have argued that it may not be necessary to consider mild inclinations as craving (Sayette, 2016), casting doubt upon whether the inclusion of a separate inclined/indulgent approach scale is warranted. Future research should continue to investigate whether it is appropriate to distinguish between low and high intensity approach inclinations in clinical samples.

Despite the AAAQ-6 exhibiting sound psychometric properties, the current development is not without limitations. Firstly, the AAAQ-6 was not administered independently, rather responses to the original 20-item pool were used to determine scores on the AAAQ-6. Although we analyzed responses from three independent data sets, it is possible that the correlations of approach and avoidance scales (approach with approach and avoidance with avoidance) among the two forms of the measure may be artificially inflated. Future psychometric evaluations of the AAAQ-6 should administer the measure independently in

order to clarify this issue and replicate the current findings. Similarly, examination of how the measure performs in non-clinical samples, including comparison of different response profiles across populations, would provide further validation of the brief measure. Second, in the exploratory sample, drinking data and other alcohol use related measures were only available for a small subset of the sample who were selected to participate in the main study. Although having alcohol-related data for the entire sample may have helped to strengthen our findings, our use of three independent samples with consistent results across them helps to attenuate this concern. Further, and similar to the previous point, the samples did not use the same instruments to assess alcohol consumption and related behaviors. While this makes it difficult to make direct comparisons among samples, the consistency of the current findings across different measures of alcohol-related behaviors helps to eliminate some concern about variance caused by methodological measurement error. Lastly, the brief measure no longer contains separate scales for mild (i.e., inclined/Indulgent) and strong (i.e., Obsessed/Compelled) approach inclinations. Although this change was guided by both past and current statistical results in clinical samples, we are uncertain how the brief measure will function in non-clinical samples, and thus future research in other populations is needed.

Despite these limitations, the current research constitutes a significant contribution to the craving and addictions literature. This brief version of the AAAQ retains the same psychometric properties as the original measures, while significantly reducing participant and researcher burden. Additionally, the brevity of the AAAQ-6 makes it well suited for use in repeated assessments (e.g., laboratory and longitudinal time series based research) conjunctively with other variables of interest (e.g., self-efficacy, positive and negative affect, expectancies, and contextual information). Future research should investigate the performance of the AAAQ-6 in the context of repeated assessments and EMA; more frequent assessments of alcohol process variables are vital to increasing our understanding of problematic alcohol use, including the role of craving and motivational conflicts during the development, maintenance, and treatment of AUD's. The current measure holds promise in advancing this effort, as the joint consideration of both approach and avoidance inclinations has potential to aid in the prediction of drinking outcomes, and may ultimately lead to knowledge that helps to elucidate processes affecting treatment initiation and outcomes.

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Figure 1.
EFA Parallel Analysis for Study 1

Figure 2.

Option response curves and item information curves for approach items. The item information curves are thick dashed lines and correspond to the Y axis on the right. The Item Information Curve shows how well each item measures the latent trait across the spectrum. The option response curves are thin solid lines that correspond to the Y axis on the left. The option response curves show how well each item discriminates at different levels of the trait.

Figure 3.

Option response curves and item information curves for avoidance items. The item information curves are thick dashed lines and correspond to the Y axis on the right. The Item Information Curve shows how well each item measures the latent trait across the spectrum. The option response curves are thin solid lines that correspond to the Y axis on the left. The option response curves show how well each item discriminates at different levels of the trait.

Table 1

Demographic characteristics of study samples

	Study 1(N = 298)	Study 2(N = 175)	Study 3(N = 53)
Age			
Mean (SD)	37.9 (10.9)	41.6 (11.2)	48.5 (9.4)
Range	19 – 64	18 – 66	20 – 63
Gender			
Male	65%	68%	71.7%
Race			
Caucasian	69.0%	58.1%	92.5%
African American	24.9%	28.8%	1.9%
Other	6.1%	13.2%	5.7%
Employment Status			
Unemployed	47.8%	51.6%	18.8%
Part-time	7.4%	10.2%	13.2%
Full-time	29%	21.7%	50.9%
Other	15.8%	16.5%	17%

Note: study 1=inpatient treatment sample; study 2=inpatient detox sample; study 3=longitudinal treatment sample.

Table 2
Exploratory Factor Analysis Using Maximum Likelihood With Oblique Geomin Rotation

Factor/Item	Item	Factor Loading	
		F1	F2
Approach			
Item 1	I would have liked to have a drink or two.	0.802	0.026
Item 2	I was thinking of ways to get alcohol.	0.731	−0.012
Item 4	If I had been at a pub or club I would have wanted a drink.	0.565	0.008
Item 7	My desire to drink seemed overwhelming.	0.724	0.256
Item 9	I had planned to drink alcohol.	0.669	−0.191
Item 12	I wanted to drink alcohol so much that if I had started drinking I would have found it difficult to stop.	0.689	0.271
Item 13	I would have accepted a drink if one had been offered to me.	0.685	−0.272
Item 16	I was thinking about alcohol a lot of the time.	0.852	0.18
Item 17	I wanted to drink as soon as I had the chance.	0.822	−0.093
Item 19	If I had been at a party I would have had a drink without thinking twice.	0.612	−0.249
Avoidance			
Item 5	I abstained from alcohol because of my personal beliefs or values.	−0.166	0.506
Item 6	Drinking did not seem such a good idea to me.	−0.32	0.573
Item 8	I avoided people who were likely to offer me a drink.	−0.097	0.67
Item 10	I deliberately occupied myself so I would not drink alcohol.	0.158	0.726
Item 11	I was thinking about the benefits of being sober.	−0.122	0.558
Item 14	I did things to take my mind off alcohol.	0.201	0.761
Item 15	I avoided places in which I might have been tempted to drink alcohol.	0.005	0.698
Item 18	The bad things that could happen if I drank alcohol were fresh in my mind.	0.093	0.676
Item 20	If I had been in a social situation I would have wanted to avoid drinking alcohol.	−0.281	0.669
Eigen Value		6.008	4.642

Table 3Approach and Avoidance Graded Model Item Parameter Estimates, logit: $a(\theta - b)$

Item	a	SE	b ₁	SE	b ₂	SE	b ₃	SE	b ₄	SE	b ₅	SE	b ₆	SE	b ₇	SE	b ₈	SE
Approach																		
1	3.15	0.33	-0.20	0.08	0.05	0.07	0.30	0.07	0.46	0.07	0.69	0.08	0.86	0.08	1.07	0.09	1.15	0.10
3	3.08	0.38	0.62	0.08	0.75	0.08	0.90	0.08	1.09	0.09	1.26	0.10	1.41	0.11	1.53	0.12	1.74	0.14
4	1.91	0.22	-1.10	0.13	-0.87	0.12	-0.74	0.11	-0.60	0.11	-0.40	0.10	-0.14	0.09	-0.02	0.09	0.16	0.09
7	2.33	0.25	-0.13	0.09	0.11	0.08	0.46	0.08	0.67	0.09	0.77	0.09	0.89	0.10	1.01	0.10	1.17	0.11
9	2.15	0.27	0.58	0.09	0.71	0.09	0.81	0.10	0.93	0.10	1.11	0.11	1.25	0.12	1.44	0.14	1.60	0.15
12	2.13	0.25	0.01	0.09	0.11	0.09	0.28	0.09	0.41	0.09	0.52	0.09	0.62	0.09	0.74	0.10	0.82	0.10
13	1.79	0.20	-0.41	0.10	-0.19	0.10	-0.01	0.09	0.21	0.09	0.57	0.10	0.77	0.10	1.06	0.12	1.23	0.13
16	3.28	0.35	-0.23	0.08	0.09	0.07	0.35	0.07	0.58	0.07	0.79	0.08	1.00	0.09	1.10	0.09	1.32	0.11
17	3.77	0.45	0.22	0.07	0.39	0.07	0.59	0.07	0.71	0.07	0.92	0.08	1.07	0.09	1.22	0.10	1.35	0.10
19	1.66	0.19	-0.93	0.13	-0.66	0.12	-0.43	0.11	-0.11	0.10	0.07	0.09	0.20	0.09	0.47	0.10	0.60	0.10
Avoidance																		
5	1.35	0.17	-0.88	0.14	-0.74	0.13	-0.47	0.12	-0.28	0.11	0.03	0.11	0.13	0.11	0.43	0.12	0.65	0.13
6	1.57	0.19	-1.37	0.16	-1.26	0.15	-1.04	0.13	-0.87	0.12	-0.49	0.11	-0.31	0.10	-0.01	0.10	0.23	0.11
8	2.06	0.25	-0.85	0.11	-0.73	0.10	-0.62	0.10	-0.46	0.09	-0.31	0.09	-0.17	0.09	0.08	0.09	0.26	0.10
10	2.26	0.27	-0.60	0.09	-0.53	0.09	-0.41	0.09	-0.34	0.09	-0.13	0.08	0.02	0.08	0.26	0.09	0.45	0.10
11	1.70	0.23	-2.04	0.22	-2.01	0.22	-1.87	0.20	-1.69	0.18	-1.56	0.17	-1.30	0.15	-0.94	0.12	-0.64	0.11
14	2.42	0.29	-0.72	0.09	-0.64	0.09	-0.54	0.09	-0.46	0.09	-0.23	0.08	-0.10	0.08	0.11	0.08	0.48	0.10
15	2.20	0.28	-0.70	0.10	-0.65	0.09	-0.58	0.09	-0.50	0.09	-0.32	0.09	-0.26	0.09	-0.09	0.09	0.07	0.09
18	1.97	0.24	-1.21	0.13	-1.17	0.12	-1.06	0.12	-0.92	0.11	-0.71	0.10	-0.52	0.09	-0.27	0.09	0.02	0.09
20	1.82	0.22	-1.31	0.14	-1.15	0.13	-0.90	0.11	-0.67	0.10	-0.29	0.09	-0.10	0.09	0.18	0.10	0.38	0.11

Note: a=discrimination; b=category threshold between response options of an item; SE=standard error; bolded items selected for brief measure.

Table 4
Approach and Avoidance Sub-scale Means, Standard Deviations, and Correlations

	Mean	SD	Alpha	95% CI	1	2	3	4	5	6	7
Study 1											
1. AP6	2.419	2.600	0.861	0.831 – 0.886	--						
2. AV6	4.641	2.911	0.800	0.757 – 0.837	0.15**	--					
3. AP19	2.848	2.274	0.909	0.893 – 0.924	0.93**	0.13*	--				
4. AV19	5.083	2.239	0.868	0.845 – 0.890	-0.04	0.88**	-0.08	--			
5. II14	3.368	2.460	0.835	0.803 – 0.863	-0.81**	-0.02	0.93**	-0.21**	--		
6. OC14	2.577	2.641	0.867	0.840 – 0.890	0.91**	0.28**	0.92**	0.10	0.71**	--	
7. RR14	5.312	2.382	0.802	0.764 – 0.836	0.05	0.90**	0.02	0.95**	-0.10	0.16**	--
Study 2											
1. AP6	4.204	3.214	0.923	0.900 – 0.942	--						
2. AV6	2.773	2.310	0.718	0.630 – 0.787	0.04	--					
3. AP19	4.400	2.752	0.948	0.934 – 0.959	0.95**	0.03	--				
4. AV19	2.949	1.887	0.814	0.766 – 0.856	0.04	0.87**	0.03	--			
5. II14	4.674	2.736	0.903	0.876 – 0.925	0.87**	-0.07	0.95**	-0.08	--		
6. OC14	4.202	3.009	0.898	0.869 – 0.922	0.94**	0.14	0.95**	0.14	0.81**	--	
7. RR14	3.088	2.082	0.718	0.640 – 0.784	0.17*	0.85**	0.15	0.93**	0.05	0.25**	--
Study 3 Pre-Treatment											
1. AP6	5.698	1.971	0.752	0.609 – 0.849	--						
2. AV6	3.252	2.511	0.811	0.701 – 0.884	-0.10	--					
3. AP19	5.372	1.907	0.880	0.826 – 0.923	0.88**	-0.27*	--				
4. AV19	3.765	1.921	0.861	0.797 – 0.911	-0.13	0.92**	-0.34*	--			
5. II14	5.747	2.156	0.829	0.744 – 0.892	0.68**	-0.44**	0.91**	-0.53**	--		
6. OC14	5.335	2.124	0.820	0.726 – 0.888	0.94**	-0.11	0.87**	-0.33	0.60**	--	
7. RR14	3.966	1.999	0.788	0.682 – 0.866	-0.10	0.91**	-0.27*	0.96**	-0.46**	0.24	--
Study 3 Post-Treatment											
1. AP6	2.812	2.178	0.895	0.828 – 0.938	--						

	Mean	SD	Alpha	95% CI	1	2	3	4	5	6	7
2. AV6	4.688	2.674	0.915	0.861 – 0.950	0.03	--					
3. AP19	2.600	2.181	0.953	0.930 – 0.971	0.96**	-0.01	--				
4. AV19	5.075	1.970	0.881	0.821 – 0.926	-0.24	0.82**	-0.32*	--			
5. III4	2.804	2.463	0.926	0.885 – 0.955	0.89**	-0.05	0.97**	-0.38**	--		
6. OC14	2.598	2.246	0.921	0.876 – 0.953	0.95**	0.05	0.95**	-0.22**	0.84**	--	
7. RR14	4.935	2.096	0.839	0.751 – 0.902	-0.09	0.91**	-0.15	0.95**	-0.21	-0.07	--

**
p < .01.

*
p < .05

Table 5

Study 1 (Inpatient Treatment) Regression Models Predicting Alcohol Consumption, Dependence, and Problems

Model	R ²	Predictor	B	SE(B)	95% CI		p	B
					Lower	Upper		
AAAQ-6	0.28	Alcohol Dependence (Constant)	.417	.082	.260	.576	.001	
		Approach	.071	.028	.019	.134	.023	.408
		Avoidance	.085	.037	.005	.156	.030	.322
AAAQ-14	0.27	Alcohol Dependence (Constant)	.458	.108	.266	.693	.002	
		Inclined/Indulgent	-.075	.052	-.166	.039	.142	-.350
		Obsessed/Compelled	.128	.040	.040	.200	.007	.705
		Resolved/Regulated	.037	.072	-.122	.179	.581	.092
AAAQ-19	0.24	Alcohol Dependence (Constant)	.405	.084	.255	.589	.001	
		Approach	.093	.034	.031	.161	.010	.436
		Avoidance	.147	.055	.027	.248	.013	.391
AAAQ-6	0.24	Alcohol Problems (Constant)	.938	.185	.574	1.276	.001	
		Approach	.188	.068	.069	.335	.026	.343
		Avoidance	.269	.134	.043	.578	.083	.326
AAAQ-14	0.28	Alcohol Problems (Constant)	.701	.247	.067	1.105	.012	
		Inclined/Indulgent	-.023	.127	-.269	.231	.870	-.033
		Obsessed/Compelled	.276	.130	.032	.541	.095	.476
		Resolved/Regulated	.439	.232	.054	.967	.103	.348
AAAQ-19	0.33	Alcohol Problems (Constant)	.753	.173	.346	1.03	.003	
		Approach	.316	.086	.175	.512	.005	.457
		Avoidance	.588	.255	.195	1.78	.057	.510
AAAQ-6	0.16	Drinking Days (Constant)	.630	.065	.477	.740	.001	
		Approach	.005	.024	-.042	.062	.810	.039
		Avoidance	.004	.027	-.043	.062	.883	.024
		Approach x Avoidance	.021	.011	-.005	.039	.049	.368
AAAQ-14	0.16	Drinking Days (Constant)	.561	.067	.423	.698	.001	
		Inclined/Indulgent	.021	.034	-.038	.100	.503	.146
		Obsessed/Compelled	.038	.028	-.020	.091	.165	.289
		Resolved/Regulated	.053	.038	-.029	.124	.160	.209
AAAQ-19	0.16	Drinking Days (Constant)	.588	.074	.440	.727	.001	
		Approach	.055	.027	-.001	.106	.004	.404
		Avoidance	.060	.033	-.009	.116	.068	.247

Note: B=unstandardized beta; *B*=standardized beta; SE=standard error; CI=confidence interval; Alcohol Dependence based on ADS; Alcohol problems based on SIP-A; Drinking days based on TLFB; results based on 1000 bootstrap samples; only interaction terms with a significance level of $p < .1$ are reported. Analysis based on $n=45$ who were enrolled in the main study and completed additional alcohol use measures.

Table 6

Study 2 Confirmatory Factor Analysis Model Fit Indices

Model	χ^2	df	p (χ^2)	RMSEA	90% CI	CFI	TLI	SRMR
AAAQ-6	8.426	8	.393	0.018	0.000–0.096	0.999	0.997	0.026
AAAQ-14	183.038	74	.001	0.096	0.079–0.114	0.888	0.862	0.108
AAAQ-19	343.281	151	.001	0.089	0.077–0.102	0.857	0.838	0.114

Note: df=degrees of freedom; RMSEA=root mean square error of approximation; CI=confidence interval; CFI=comparative fit index; SRMR=standardized root mean residual.

Table 7

Study 2 (Inpatient Detox) Regression Models Predicting Alcohol Consumption and Problems

Model	R ²	Predictor	B	SE(B)	95% CI		p	B
					Lower	Upper		
AAAQ-6	0.50	Alcohol Problems (Constant)	7.990	.245	7.506	8.474	.001	
		Approach	.812	.076	.661	.963	.001	.626
		Avoidance	.423	.106	.215	.632	.001	.423
		Approach × Avoidance	-.086	.031	-.148	-.024	.007	-.162
AAAQ-14	0.51	Alcohol Problems (Constant)	7.942	.237	7.474	8.411	.001	
		Inclined/Indulgent	.170	.153	-.132	.471	.268	.112
		Obsessed/Compelled	.776	.143	.492	1.059	.001	.562
		Resolved/Regulated	.344	.123	.101	.587	.006	.172
AAAQ-19	0.50	Alcohol Problems (Constant)	7.946	.239	7.475	8.418	.001	
		Approach	1.002	.087	.831	1.173	.001	.664
		Avoidance	.499	.127	.248	.75	.001	.225
AAAQ-6	0.33	Drinks per Week (Constant)	67.141	5.966	55.342	78.94	.001	
		Approach	13.737	1.862	10.055	17.42	.001	.522
		Avoidance	-3.368	2.599	-8.507	1.771	.197	-.091
		Approach × Avoidance	-2.00	.769	-3.52	-.48	.010	-.184
AAAQ-14	0.32	Drinks per Week (Constant)	67.509	5.929	55.816	79.427	.001	
		Inclined/Indulgent	1.739	3.857	-5.887	9.364	.653	.055
		Obsessed/Compelled	15.13	3.605	8.003	22.257	.001	.538
		Resolved/Regulated	-5.529	3.14	-11.738	.679	.080	-.133
AAAQ-19	0.32	Drinks per Week (Constant)	66.744	5.904	55.073	78.416	.001	
		Approach	17.239	2.158	12.973	21.505	.001	.557
		Avoidance	-5.715	3.235	-12.11	.68	.079	-.123

Note: B=unstandardized beta; *B*=standardized beta; SE=standard error; CI=confidence interval; Alcohol Problems based on SMAST; Drinks per Week based on DHQ; only interaction terms with a significance level of $p < .1$ are reported.

Table 8

Study 3 (Longitudinal Treatment) Regression Models Predicting Percent Days Abstinent

Model	R ²	Predictor	B	SE(B)	95% CI		p	B
					Lower	Upper		
AAAQ-6	0.23	PDA Post-Tx (Constant)	.774	.069	.639	.917	.001	
		PDA Baseline	.279	.074	.126	.416	.002	.240
		Approach	-.038	.009	-.057	-.021	.001	-.229
		Avoidance	.035	.011	.011	.057	.002	.265
AAAQ-14	0.22	PDA Post-Tx (Constant)	.638	.123	.391	.870	.001	
		PDA Baseline	.263	.070	.125	.397	.001	.226
		Inclined/Indulgent	.003	.021	-.033	.046	.886	.019
		Obsessed/Compelled	-.035	.019	-.073	.001	.074	-.222
		Resolved/Regulated	.051	.021	.013	.095	.010	.310
AAAQ-19	0.20	PDA Post-Tx (Constant)	.692	.200	.263	1.063	.001	
		PDA Baseline	.270	.142	-.001	.546	.050	.232
		Approach	-.031	.020	-.067	.014	.121	-.177
		Avoidance	.038	.026	-.010	.089	.154	.222
AAAQ-6	0.16	PHD Post-Tx (Constant)	.031	.046	-.048	.125	.538	
		PHD Baseline	.142	.057	.039	.258	.008	.196
		Approach	.016	.005	.005	.026	.004	.131
		Avoidance	-.024	.008	-.041	-.009	.003	-.248
AAAQ-14	0.15	PHD Post-Tx (Constant)	.108	.095	-.067	.295	.286	
		PHD Baseline	.149	.079	.010	.308	.060	.206
		Inclined/Indulgent	-.006	.013	-.033	.021	.683	-.051
		Obsessed/Compelled	.017	.012	-.006	.039	.172	.148
		Resolved/Regulated	-.031	.013	-.057	-.008	.013	-.255
AAAQ-19	0.13	PHD Post-Tx (Constant)	.071	.140	-.188	.387	.592	
		PHD Baseline	.179	.103	-.023	.387	.101	.247
		Approach	.008	.017	-.029	.041	.670	.060
		Avoidance	-.024	.020	-.066	.016	.243	-.186

Note: B=unstandardized beta; *B*=standardized beta; SE=standard error; CI=confidence interval; PDA and PHD based on TLFB; results based on 1000 bootstrap samples; only interaction terms with a significance level of $p < .1$ are reported.