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Substance abuse and psychological flexibility: The development of a new measure

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Psychological flexibility is a relatively new clinical construct targeted by Acceptance and Commitment Therapy, a behavior analytic treatment incorporating mindfulness and values interventions, among other processes. Poor psychological flexibility has been shown to relate to clinical problems as well as normative life challenges, and efforts to increase psychological flexibility have correlated with improvements for a variety of psychological difficulties, including substance abuse. The Acceptance and Action Questionnaire (AAQ) is currently the standard measure of psychological flexibility, but in substance misusing samples, has not shown adequate psychometric properties. Content-specific variants of the AAQ have been effective in other treatment domains, suggesting that a substance abuse focused version of the AAQ may be useful. This article details the construction and initial validation of such a measure, the AAQ-SA, which demonstrated good internal consistency, factor structure, and construct validity. In addition, the AAQ-SA appeared to be empirically distinguishable from the AAQ. Future researchers are advised to address limitations of this study and encouraged to expand the empirical database on substance abuse treatment with this new measure.

Keywords: Substance abuse, psychological flexibility, experiential avoidance, acceptance and commitment therapy, acceptance and action questionnaire

INTRODUCTION

The recent introduction of mindfulness and acceptance strategies into behavior therapy has necessitated the development of new concepts to explain how these strategies work. One such concept, psychological flexibility, has been defined as "the ability to contact the present moment more fully as a conscious human being, and to change or persist in behavior when doing so serves valued ends" (Hayes, Luoma, Bond, Masuda, & Lillis, 2006, p. 6). Psychological flexibility and inflexibility can be seen as opposite ends of a continuum and can be broken down into various components. Two components of psychological inflexibility are experiential avoidance, defined as an attempt to alter the form, frequency, or situational sensitivity of private events even when doing so causes behavioral harm (Hayes et al., 2006; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), and cognitive fusion, which refers to the tendency for humans to become caught up in the literal meaning of thoughts, while at the same time being unaware of the process of thinking (Blackledge, 2007; Luoma, Hayes, & Walser, 2007). Other processes that are a part of psychological inflexibility include a lack of contact with or awareness of values and a difficulty with maintaining consistent patterns of goal-oriented action as indicated by impulsivity or lack of persistence toward long-term valued ends (Hayes et al., 2006). Implied in each of these definitions is an emphasis on the *relationship* one has with unpleasant thoughts and emotions rather than a more traditional focus on the *content* of such experiences.

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RIGHTSLINK

One aspect of psychological inflexibility, experiential avoidance, is particularly apparent in substance abuse. Drugs and alcohol frequently serve the purpose of controlling or eliminating unwanted thoughts, feelings, sensations, or other private experiences (Wilson, Hayes, & Byrd, 2000). Constructs similar to experiential avoidance, such as distress intolerance and thought suppression, are known predictors of substance abuse and treatment failure. For example, persistence at a psychological stressor task, a common measure of distress tolerance, predicts treatment outcomes for smoking cessation (Brandon et al., 2003) as well as duration of alcohol and drug abstinence in treatment-seeking substance abusers (Daughters et al., 2005). Furthermore, reductions in thought suppression following a mindfulness intervention for incarcerated individuals have been found to mediate success at abstaining from alcohol for 3 months following release from jail (Bowen, Witkiewitz, Dillworth, & Marlatt, 2007).

Additional data on the relevance of psychological flexibility and substance misuse comes from data on Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wlison, 1999), a treatment that explicitly attempts to increase psychological flexibility. Case studies using ACT have shown positive outcomes for alcohol dependence (Heffner, Eifert, Parker, Hernandez, & Sperry, 2003) and comorbid polysubstance abuse and PTSD (Batten & Hayes, 2005). A multiple baseline design showed positive effects with marijuana dependence (Twohig, Shoenberger, & Hayes, 2007). An open trial suggested positive effects of ACT on self-stigma (Luoma, Twohig, et al., 2007). Randomized trials on smoking cessation (Gifford, Kohlenburg, & Hayes, 2004), methamphetamine abuse (Smout et al., 2010), and ACT plus methadone maintenance for polysubstance abuse (Hayes, Wilson, et al., 2004) all showed positive effects for ACT.

The most established measure of psychological flexibility is the Acceptance and Action Questionnaire (AAQ; Hayes, Strosahl, et al., 2004). The AAQ provides a general measure of psychological flexibility/inflexibility that cuts across diagnostic categories and particular psychological problems. As a broad measure, the AAQ has performed well in many samples, predicting 16–25% of the variance in outcomes across a broad range of psychological health problems (Hayes et al., 2006). However, versions with a narrower focus may offer greater precision in the measurement of psychological flexibility within particular contexts or populations. For example, a version of the AAQ devised for sufferers of tinnitus was more successful at predicting treatment outcomes than the original AAQ (Westin, Hayes, & Andersson, 2008). Similar results have been shown for other specific variants of the AAQ and related measures of psychological flexibility in such areas as diabetes (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), epilepsy (Lundgren, Dahl, & Hayes, 2008), obesity (Lillis, Hayes, Bunting, & Masuda, 2009), smoking

(Gifford, Kohlenberg, Hyes, Antonuccio, et al., 2004), chronic pain (McCracken, Vowles, & Eccleston, 2004; Wicksell, Renöfält, Olsson, Bond, & Melin, 2008), and auditory hallucinations (Shawyer et al., 2007).

While the AAQ has shown solid psychometric properties in many samples, it has not performed well in substance misusing samples. For example, while the AAQ has demonstrated adequate reliability in the validation study (Hayes, Strosahl, et al., 2004) and has been similar in other studies (for a meta-analysis see Hayes et al., 2006), the AAQ has shown low internal consistency (Bissett, 2002; Luoma, Kohlenberg, Hayes, Bunting, & Rye, 2008) in two studies with substance misusing samples. While the AAQ has mediated ACT outcomes in non-addicted samples (e.g., Bond & Bunce, 2000) and the AAQ has been shown to change as a result of ACT interventions (Hayes, Wilson, et al., 2004; Luoma, Twohig, et al., 2007), it was not successful in mediating outcomes in the one controlled substance misuse treatment trial where it was included (Bissett, 2002). In sum, the lack of specificity of the AAQ, the poor psychometric properties of the AAQ in substance misusing samples, and its lack of effectiveness in mediating ACT treatment outcomes in addiction suggest that a substance abuse specific version of the AAQ may have utility.

METHOD

Participants

This study involved 352 patients (210 men, 141 women, 1 unidentified) with an average age of 31.1 years (SD = 10.2, range 18–63) who were receiving residential ($n = 29$) or outpatient ($n = 323$) substance abuse treatment at a mostly publicly funded treatment center. Demographic self-reports indicated that 0.6% identified as Alaskan native, 3.4% American Indian, 0.9% Asian/Pacific Islander, 4.3% Black/African American, 80.4% White, 6.5% other, and 4% providing no response. For ethnicity, 7.4% identified as Mexican, 4.6% other Hispanic, 41.8% not of Hispanic origin, and 46.3% providing no response. For marital status, 49.4% identified as never married, 11.4% now married, 10.8% separated, 23.6% divorced, 2.6% widowed, and 2.3% providing no response. A total of 30% ($n = 97$) of the sample had less than a high school education, 52.9% ($n = 171$) had completed high school or obtained a GED, and 17% ($n = 55$) had at least some college education.

Participants reported an average of 1.2 episodes of previous treatment ($n = 342$, SD = 1.7). 68.5% ($n = 209$) of the sample reported current criminal justice involvement including probation, parole, bail status, or awaiting trial. The sample endorsed usage of a variety of drugs, with 82.4% ($n = 290$) reporting use of alcohol for an average of 12.3 years (SD = 9.6), 81.3% ($n = 286$) using marijuana for an average of 12.0

years (SD = 9.3), 49.4% (n = 174) using hallucinogens for an average of 6.9 years (SD = 7.6), 12.5% (n = 44) using inhalants for an average of 6.9 years (SD = 7.6), 78.4% (n = 276) using methamphetamines for an average of 9.6 years (SD = 7.3), 48.9% (n = 172) using cocaine for an average of 5.9 years (SD = 6.7), 10.8% (n = 38) using heroin for an average of 6.4 years (SD = 7.9), 19.3% (n = 68) using opiates for an average of 6.7 years (SD = 6.8), 9.9% (n = 35) using methadone for an average of 3.3 years (SD = 3.7), 12.5% (n = 44) using barbiturates for an average of 5.6 years (SD = 5.8), 14.2% (n = 50) using benzodiazepines for an average of 5.9 years (SD = 5.3), and 74.2% (n = 261) using other substances (mostly tobacco) for an average of 15.1 years (SD = 9.3).

Measures

Acceptance and action questionnaire – Substance abuse

An initial pool of 49 items was created based on the original 49-item pool generated for the development of the AAQ-2 (for more details on item development, see Bond et al., 2009) and http://www.contextualpsy chology. org / acceptance _ action _ questionnaire _aaq_ and_variations. The original AAQ-2 item pool was developed by a panel of 12 ACT researchers and practitioners to reflect the general construct of psychological flexibility. In order to obtain a more specific focus on psychological flexibility as it related to substance misuse, the original item content was modified to focus on substance abuse specific thoughts, urges, or cravings. For example, the AAQ-2 items, "Emotions cause problems in my life" and "I am not very aware of what occurs around me" were adapted to say "Urges and cravings cause problems in my life" and "I am not very aware of what occurs around me when I am thinking of using substances," respectively. The focus of the AAQ-SA on one's relation to or the functions of private events, versus the content of the events themselves, can be seen by examining the content of the items from the final scale shown in Table I. All 49 items were administered in this study described below and were rated on a 7-point Likert-type scale ranging from 1 (never true) to 7 (always true).

The content validity of the preliminary scale was evaluated by identified experts of Acceptance and

Table I. Result of principle components factor analysis with oblique rotation of final scale.

| | | Factor loading | |
| | | Values commitment | Defused acceptance |
Item			
1	I can do things that are important to me even when I'm feeling urges to use substances (r)	**0.670**	0.233
2	My urges and cravings to use get in the way of my success	0.286	**0.666**
3	If I have urges to use substances, then I am a substance abuser	0.043	**0.522**
4	I try to achieve my sobriety goals, even if I am uncertain that I can (r)	**0.637**	0.042
5	I work toward things I value, even though at times I feel cravings to use substances (r)	**0.744**	0.064
6	I am not very aware of what occurs around me when I am thinking of using substances	0.234	**0.623**
7	I can set a course in my life and stick to it, even if I have doubts about my sobriety (r)	**0.697**	0.168
8	Memories of my substance abuse history make it difficult for me to live a life that I would value	0.205	**0.570**
9	If I get bored working toward my recovery, I can still take the steps necessary to succeed (r)	**0.668**	0.257
10	If I feel uncertain about my recovery, I can still make a choice and take action (r)	**0.636**	0.214
11	If I promised to do something, I'll do it, even if I later don't feel like it (r)	**0.702**	0.154
12	Having some worries about substance use will not prevent me from living a fulfilling life (r)	**0.608**	0.087
13	I would rather achieve my goals than avoid thoughts and feelings about substances (r)	**0.508**	0.251
14	Urges and cravings cause problems in my life	0.220	**0.687**
15	I'm afraid of my positive feelings about a substance I've abused	0.108	**0.676**
16	When I think of substance use my mind is often on "automatic pilot," not fully involved in what I am doing in the moment	0.079	**0.713**
17	I worry about not being able to control my urges and cravings	0.187	**0.726**
18	Feeling sad or anxious makes me want to use substances	0.110	**0.623**

Note: Reverse scored items are indicated with an (r); bold indicate the factor on which the item loads.

Commitment Therapy. These experts were contacted *via* e-mail, asked to participate, and provided an Internet link to a web-based rating task. All of those invited agreed to participate ($N = 8$) and were presented with the initial 49-item version of the AAQ-SA and rating instructions. Experts first provided an overall fit rating for each item, defined as the degree to which each item reflected the constructs of psychological flexibility or experiential avoidance among those with substance problems, using a 4-point Likert-type rating scale ranging from 1 (poor) to 4 (excellent). Second, they provided an overall quality rating for each item, defined as the degree of readability and lack of socio-cultural bias, on a 4-point Likert-type scale ranging from 1 (poor) to 4 (excellent).

Across the 49 items, the mean rating for fit was 3.04 ($SD = 0.43$) and for quality, 3.13 ($SD = 0.44$). Eight items had average expert ratings at or below 2.5 (the mid-point of the rating scale) for one or both scales and were removed from the item pool. The remaining 41 items had an average fit rating of 3.16 ($SD = 0.32$) and an average quality rating of 3.24 ($SD = 0.37$), indicating that our eight judges felt the items fit the content of the scale and were clear and well written. While the full 49-item scale was completed by all study participants, only these remaining 41 items were analyzed in terms of their psychometric properties.

Demographics
A brief 32-item questionnaire was created to obtain basic participant demographic and background information related to drug use and functional status.

Psychological flexibility
The AAQ (Hayes, Strosahl, et al., 2004) is a nine-item measure of psychological flexibility and experiential avoidance. Items ask about willingness to accept unwanted thoughts and feelings and commitment to engage in valued activities, utilizing a 7-point rating scale from 1 (never true) to 7 (always true). High scores represent high psychological flexibility. Although Cronbach's alpha was 0.70 in the validation study (Hayes, Strosahl, et al., 2004) and has been similar in other studies (for a meta-analysis see Hayes et al., 2006), studies with substance abusing samples have reported relatively low levels of internal consistency (e.g., Luoma et al., 2008). This study obtained a very low Cronbach's alpha of 0.40.

Depression
The Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988) is a commonly used 21-item measure developed to measure the construct of depression. This study obtained a high Cronbach's alpha of 0.90.

Internalized shame
The Internalized Shame Scale (ISS; Cook, 1996) is a 24-item questionnaire that measures a participant's level of shame-related thoughts and feelings. The original instrument contains response options on a 5-point scale ranging from 0 (never) to 4 (almost always). Due to an administrator's error, this study used a 7-point scale ranging from 1 (never) to 7 (always). Cook (1996) obtained a high Cronbach's alpha of 0.94, while this study obtained an alpha of 0.96.

Internalized stigma
The Internalized Stigma of Substance Abuse scale (ISSA) is an adaptation of the Internalized Stigma of Mental Illness scale (Ritsher, Otilingam, & Grajales, 2003) and measures subjective experience of stigma related to substance abuse. This adapted measure has not been studied, though the original measure obtained good psychometric properties. The scale consists of 29 items rated on a 4-point Likert-type scale ranging from 1 (strongly disagree) to 4 (strongly agree). Luoma et al. (2008) measured internal consistency before and after an intervention and obtained Cronbach's alphas of 0.82 and 0.92. The current study obtained a high Cronbach's alpha of 0.92.

Social support
The Multidimensional Scale of Perceived Social Support (MSPSS; G.D. Zimet, Dahlem, S.G. Ziment, & Farley, 1988) is a 12-item questionnaire assessing one's perception of social support from family, friends, and significant others, with high scores indicating poor social support. Items are rated along a 7-point Likert-type scale, ranging from 1 (very strongly agree) to 7 (very strongly disagree). Zimet, Powell, Farley, Werkman, and Berkoff (1990) obtained high coefficient alphas before and after an intervention, generating reliability estimates of 0.92 and 0.95. This study obtained a high Cronbach's alpha of 0.95.

Self-esteem
The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) is a common measure of global self-esteem. It contains 10 items which are rated on a 4-point Likert scale from 0 (strongly disagree) to 3 (strongly agree). The use of this scale is well established in the literature (e.g., Blascovich & Tomaka, 1991). This study obtained a moderate Cronbach's alpha of 0.88.

Self concealment
The Self Concealment Scale (SCS; Larson & Chastain, 1990) is a 10-item measure of one's tendency to hide distressing or negative personal information. Each item is rated on a Likert-type scale from 1 (strongly agree) to 5 (strongly disagree). Larson and Chastain (1990) obtained a coefficient alpha of 0.83 for internal consistency, while this study obtained a high Cronbach's alpha of 0.90.

Stigma-related rejection
The Stigma-Related Rejection Scale (SRS; Luoma, Twohig, et al., 2007) is a survey of ongoing experiences of personal rejection related to enacted stigma

that was originally developed by Wahl (1999). For our study, the term "mental health consumer" was changed to fit individuals with reported substance abuse problems and items were rated along a 7-point Likert-type scale, ranging from 1 (never) to 7 (always), with agreement indicating higher rejection. Reliability and validity data are not reported by Wahl (1999); the data was presented descriptively. This study obtained a moderate Cronbach's alpha of 0.82.

Active coping with stigma

We created a seven-item scale based on two subscales from previous research on stigma toward mental illness (Link, Struening, Neese-Todd, Asmussen, & Phelan, 2002). Items were adapted to relate to stigma toward substance misusing individuals. This seven-item scale measures the tendency to take an active approach to coping with stigma through educating others about stigma or challenging stigmatizing behavior when it occurs. Items are rated along a 7-point Likert scale, ranging from 1 (very strongly agree) to 7 (very strongly disagree). In this study, the scale showed a unidimensional factor structure and a moderate Cronbach's alpha of 0.81.

Procedure

Participants were recruited over a 6-month period by study staff for this IRB approved study. All those who were present at treatment groups where study recruitment occurred were invited to participate in the study. Those who volunteered were led to another room where informed consent was obtained. Participants then completed the questionnaires, typically taking about 1 h, and were reimbursed with $10 gift cards to a department store chain.

All participants received the AAQ-SA ($n = 348$), the AAQ ($n = 347$), and the measure of active coping with stigma ($n = 304$). Two questionnaire packets were created, both of which included the preceding scales. The remaining scales were divided between the two packets, resulting in approximately half the sample completing the BDI ($n = 218$), ISS ($n = 164$), ISSA ($n = 160$), RSES ($n = 184$), SCS ($n = 161$), MSPSS ($n = 182$), and SRS ($n = 187$). Two packets were created to reduce the workload of participants. Because these latter measures were included to examine convergent validity, a smaller n for each of these measures was considered adequate.

RESULTS

Initial analyses

Following the recommendations of Clark and Watson (1995), individual item distributions were examined. No items were highly skewed or unbalanced. Visual inspection of the data indicated that some participants appeared to respond carelessly to the study measure, particularly through repeated endorsement of the same

numerical response with very little variability. In an attempt to remove data that was likely invalid, we created two criterion for removal from the dataset: (1) overly consistent responding, defined as any string of responses representing more than 1/3 of the study measure (i.e., more than 16 identical responses in a row), and (2) overly common responding, defined as endorsing the same score more than 75% of the time (i.e., more than 36 endorsements of the same item). We felt this was important as these response patterns appeared extremely unlikely to be valid since almost half of the items in the measure are reverse scored. On this basis, 26 participants were deleted for exceeding the criterion for overly consistent responding, and an additional 2 participants were deleted for overly common responding.

Factor analyses

Responses to the retained 41-items were subject to an exploratory factor analysis using principal components analysis without rotation, as suggested by Cortina (1993). This analysis resulted in 10 factors with eigenvalues greater than 1.0 accounting for 58% of the variance. However, the Scree plot clearly indicated a two or three factor solution, with factors one and two having much higher eigenvalue than the other factors. We decided to follow the recommendation of Floyd and Widaman (1995) who argued that the eigenvalue cutoff of 1.0 often overestimates the number of factors and that the Scree plot is a more useful guide. We initially attempted to refine a three factor solution. We used an exploratory factor analysis with principal components extraction and an oblimin rotation because we expected the factors to correlate with each other on theoretical grounds. All items loaded above 0.4 on at least one of the three factors. Items that cross-loaded on secondary factors above 0.3 were removed. This resulted in two extremely small factors, with factor two having only six items and factor three only five items. In addition, the patterns of correlations between subscales did not make sense theoretically. Thus, a three factor solution was not able to converge into a workable scale.

Next, we attempted to refine a two factor solution. We again used an exploratory factor analysis with principal components extraction and an oblimin rotation, this time forcing two factors. In an attempt to improve factor discriminability, we only retained items that loaded at least 0.4 on a primary factor and below 0.3 on the second factor. This resulted in the removal of an additional 11 items, resulting in 30 remaining items. We proceeded to examine the two subscales individually, removing items that correlated below $r = 0.4$ with the subscale total score. This resulted in removing an additional eight items across the two factors. The resultant 22-item scale was subjected to another exploratory factor analysis with principal components extraction and an oblimin rotation and

showed a clear two factor solution. We again decided to retain items that loaded at least 0.4 on a primary factor and below 0.3 on a second factor. This resulted in the removal of an additional four items. The final 18-item scale was subjected to a final exploratory factor analysis with principal components extraction and an oblimin rotation and showed a clear two factor solution that accounted for 43% of the variance, with 27% by factor one and 16% by factor two. The final scale is described in Table I, along with the factor loadings based on the structure matrix and information on scoring.

After reviewing the content of the remaining items for each factor, we noted that items for factor 1 generally referred to the ability to take action toward goals and values, even in the presence of difficult private experiences, and items for factor 2 generally referred to difficulties coping with unwanted private experiences. We reviewed the naming conventions embraced by papers detailing the analysis of other content-specific versions of the AAQ (McCracken et al., 2004; Westin et al., 2008) and considered the items in respect to the processes theorized in ACT treatment (Hayes et al., 2006). Based on our analysis of the item content, we decided to name subscale 1 "values commitment" and subscale 2 "defused acceptance."

Finally, we calculated Cronbach's alpha and item-total correlations for the two subscales. All item-total correlations within the subscale were above 0.4 for both subscales. The alpha for values commitment was 0.82 and the alpha for defused acceptance was 0.84, both of which are good, especially for a short scale. The internal consistency of the overall scale was $\alpha = 85$. The two subscales correlate with each other at a low level, $r(288) = 0.26$, $p < 0.001$.

Relationship between AAQ-SA and other constructs
Relationships with demographics
We did not expect the AAQ-SA to be related to demographic factors. As expected, one-way ANOVAs for each subscale and the full scale were not significant for marital status (all $ps > 0.19$) or race (all $ps > 0.25$). Age was not correlated with either subscale or the full scale (all $ps > 0.09$). For sex, t-tests revealed a significant difference between females ($M = 48.01$, SD = 9.43) and males ($M = 44.36$, SD = 9.82) for values commitment, $t(298) = -3.20$, $p = 0.002$, and a significant difference between females ($M = 90.1$, SD = 16.02) and males ($M = 85.04$, SD = 15.83) for the full scale, $t(288) = -2.641$, $p = 0.009$, but no significant difference for defused acceptance ($p = 0.289$). For ethnicity, there was a significant difference in values commitment between Hispanics ($M = 40.57$, SD = 10.62) and non-Hispanics ($M = 46.19$, SD = 9.53), $t(161) = 2.92$ $p = 0.004$, but not for defused acceptance or the full scale (all $ps > 0.27$).

Relationships with recent substance use
As substance use is thought to represent a kind of experiential avoidance (Wilson, Byrd, Hayes, & Strosahl, 2005), we expected that self-reports of recent substance use would correlate with AAQ-SA scores. Self-reports of number of days of substance use in the last 30 days were combined into a single variable by summing all endorsements for days of consumption for all substances included in the measure (except for the "other" category, which was usually tobacco). The resulting distribution of this variable was highly positively skewed, in part because the majority of the sample endorsed no substance usage in the last 30 days ($n = 259$). Thus, a t-test was conducted where participants reporting zero days of usage in the last 30 days were compared to participants reporting any days of usage. Results were significant for values commitment, $t(294) = -3.21$, $p < 0.001$, defused acceptance, $t(287) = -3.44$, $p < 0.001$, and the full scale, $t(284) = -4.30$, $p < 0.001$, such that AAQ-SA scores were always higher, indicating more psychological flexibility, among the group reporting no substance usage in the last 30 days (values commitment $M = 46.72$, SD = 9.75; defused acceptance $M = 42.25$, SD = 10.19; full scale $M = 89.09$, SD = 16.11) compared to the group reporting usage ($M = 42.03$, SD = 9.49; $M = 36.93$, SD = 10.51; $M = 78.87$, SD = 13.18).

Relationships with previous treatment
We predicted that those with a more serious and persistent history of substance abuse would be less than those with a less serious or persistent history of substance abuse. In order to test this hypothesis, we examined responses to an item on the drug usage questionnaire, "How many times in your life have you been treated for alcohol and/or drug abuse?," which showed a highly skewed response distribution because the majority of the sample endorsed no previous treatment ($n = 120$). Thus, a t-test was conducted where participants reporting no previous treatment were compared to participants with any amount of previous treatment. Results were significant for defused acceptance, $t(286) = -2.45$, $p = 0.015$, such that defused acceptance was higher among the no previous treatment group ($M = 43.25$, SD = 10.71) compared to the group with treatment experience ($M = 40.18$, SD = 10.07). Results did not achieve significance for values commitment or the full scale (all $ps > 10$).

Relationship with other measures
The pattern of correlations of each subscale and the full scale with other psychological measures is displayed in Table II. Overall, higher psychological flexibility predicted higher self-esteem and social support, as well as lower depression, internalized shame, internalized stigma, self concealment, and stigma-related rejection. Correlations were stronger with scales

Table II. Correlation matrix of AAQ-SA with other measures.

	Values commitment	Defused acceptance	Full scale
Values commitment	1.000 (300)	0.259** (290)	0.779** (290)
Defused acceptance		1.000 (293)	0.807** (290)
Full scale			1.000 (290)
Psychological flexibility (AAQ)	0.192** (289)	0.508** (283)	0.464** (280)
Depression (BDI)	−0.149 (119)	−0.333** (115)	−0.312** (114)
Internalized shame (ISS)	−0.100 (125)	−0.536** (124)	−0.424** (122)
Internalized stigma (ISSA)	−0.151 (112)	−0.619** (109)	−0.519** (109)
Social support (MSPSS)	−0.085 (158)	−0.223* (153)	−0.185 (153)
Self-esteem (RSES)	0.481** (153)	0.538** (150)	0.613** (149)
Self concealment (SCS)	0.015 (135)	−0.416** (134)	−0.270* (132)
Active coping with stigma	0.364** (282)	0.135 (276)	0.298** (273)

Notes: Numbers represent the correlation with sample size in parentheses.
*$p < 0.01$ and **$p < 0.001$.

measuring more closely aligned concepts, such as psychological flexibility or scales measuring negative self evaluative thoughts and feelings, such as self-esteem, internalized shame, and internalized stigma, than with less similar concepts, such as social support or active coping with stigma. In addition, both subscales were significantly correlated with psychological flexibility, self-esteem, and stigma-related rejection. Generally, defused acceptance was more highly correlated with these variables, with the exception of active coping with stigma. Also, higher scores on defused acceptance were significantly correlated with higher social support, but values commitment and the full scale were not.

Relationship with the AAQ

A primary purpose of the present investigation was to create a more specific version of the AAQ appropriate for substance abusing samples. As has been noted, the internal consistency of the AAQ-SA was good with this sample ($\alpha = 0.85$) while that of the AAQ was very poor ($\alpha = 0.40$). The AAQ correlated 0.46 with the AAQ-SA total scale, and 0.19 with values commitment and 0.51 with defused acceptance (all $p < 0.001$), which indicate that the general and substance abuse specific measures of psychological flexibility were related but distinguishable.

To further explore whether the two scales were discriminable we entered the final items of the AAQ-SA and the items of the AAQ into a principle components factor analysis with Varimax rotation. The Scree plot suggested four distinct factors (Table III). Examining factor loadings, all the items from the AAQ-SA, except one, loaded above 0.4 onto two distinct factors. Items from the AAQ loaded above 0.4 on the other two factors. One item from the AAQ-SA, "Memories of my substance use history make it difficult for me to live a life that I would value," loaded above 0.4 on both the AAQ and

AAQ-SA. This indicates that AAQ and AAQ-SA items are distinguishable in this sample.

Two analyses were then conducted to assess the functional relation of the AAQ-SA and AAQ to substance use related measures or processes. First, as in the earlier analysis, a t-test was conducted comparing participants reporting no previous treatment to participants with some previous treatment on their scores on the AAQ. Unlike the AAQ-SA (see above), these two groups were not different on the AAQ, $t(300) = -1.45$, $p = 0.15$. A second t-test on the AAQ compared participants reporting zero days of usage in the last 30 days to those reporting some substance use on their scores, as was done earlier with the AAQ-SA. This analysis showed similar results: those reporting no substance usage in the last 30 days reported higher psychological flexibility as measured by the AAQ ($M = 36.77$, SD $= 7.76$) compared to those reporting no use ($M = 32.95$, SD $= 6.55$), $t(303) = -3.47$, $p < 0.001$. Thus, general levels of psychological flexibility were related to substance use, but not substance abuse treatment history, while substance abuse specific levels of psychological flexibility were related to both.

Finally, we expected that the AAQ, which is a more general measure of psychological flexibility, should correlate more highly with general measures of distress than the AAQ-SA, which focuses on substance misuse. Previous research has shown that the AAQ is typically correlated at a moderate level with self-reports of depression (0.36–0.72; Hayes, Strosahl et al., 2004). As expected, the AAQ was correlated at moderate level with depression scores, $r(119) = 0.46$, with the AAQ-SA less so, $r(113) = 0.31$.

DISCUSSION

This manuscript describes the development of a measure of psychological flexibility in relation to substance use related thoughts, feelings, and urges. A refinement and piloting process resulted in an

Table III. Result of principle components factor analysis with varimax rotation of AAQ-SA and AAQ.

Scale/item	Component			
	1	2	3	4
AAQ-SA				
Item 1 – values commitment	0.668			
Item 2 – defused acceptance		0.607		
Item 3 – defused acceptance		0.558		
Item 4 – values commitment	0.643			
Item 5 – values commitment	0.745			
Item 6 – defused acceptance		0.534	−0.311	
Item 7 – values commitment	0.669			
Item 8 – defused acceptance		0.414	−0.498	
Item 9 – values commitment	0.639			
Item 10 – values commitment	0.612			
Item 11 – values commitment	0.688			
Item 12 – values commitment	0.615			
Item 13 – values commitment	0.466			
Item 14 – defused acceptance		0.697		
Item 15 – defused acceptance		0.695		
Item 16 – defused acceptance		0.679		
Item 17 – defused acceptance		0.703		
Item 18 – defused acceptance		0.578		
AAQ				
Item 1 – reverse scored				0.352
Item 2			0.582	
Item 3		−0.313	0.505	
Item 4 – reverse scored				0.655
Item 5 – reverse scored				0.562
Item 6 – reverse scored				0.528
Item 7			0.728	
Item 8			0.568	
Item 9			0.539	

Note: Only loadings above 0.3 are presented in the table.

18-item instrument containing two subscales. In a sample of 352 individuals in treatment for substance problems, the final measure exhibited moderate internal consistency, a good factor structure that aligned with patterns found in previous studies of related measures, and predicted correlations with established psychological measures. In addition, the AAQ-SA showed much improved internal consistency compared to the AAQ, which had a poor internal consistency, and the AAQ-SA appeared to be distinct from the AAQ.

As substance use is thought to reflect a form of experiential avoidance (Brown, Lejuez, Kahler, & Strong, 2002; Wilson et al., 2005), we hypothesized that those with more severe and persistent histories of substance misuse would score lower on the AAQ-SA. Results were generally supportive of this idea in that those reporting any substance abuse in the last 30 days scored lower on both subscales of the AAQ-SA as well as on the total score. Some support also came from a second analysis, which showed that those who had previously been in treatment scored lower on the defused acceptance scale than those without previous treatment.

Examining the pattern of correlations with other measures, the single highest correlations were found between the total scale and our measure of self-esteem, $r(147) = 0.61$. This finding is somewhat unexpected and points to the possibility that scores on the AAQ-SA may, at least in part, reflect a tendency to evaluate oneself positively. Future studies could examine this relationship in further detail by using measures or methods that allow for assessment of response bias. Moderate correlations were found between the AAQ-SA and a measure of internalized shame, $r(120) = 0.42$, and internalized stigma, $r(107) = 0.52$. Examining the two subscales, the defused acceptance subscale had a much stronger correlation with these variables than did values commitment. Relationships with depression, social support, and self concealment were also stronger with the defused acceptance subscale than with the values commitment subscale. In general, it appears that reports of difficult psychological experiences relate more strongly to defused acceptance than values commitment. This makes sense from the perspective of ACT theory in that the processes of defusion and acceptance both relate to the function of difficult and

entangling private experiences, and thus, the presence of these experiences should correlate with a measure that describes one's difficulty coping with them. Conversely, values commitment is mainly about the ability to take active steps toward values and goals, regardless of the presence of difficult private experiences, and thus would be relatively less related to reports of difficult private experiences. Thus, we would expect the values commitment subscale to correlate more strongly with overt goal-directed action, rather than with measures of psychological distress. Indeed, in this study, values commitment related more strongly than defused acceptance to our only measures of more overt goal-directed behavior – the tendency to react to stigmatizing situations through educating others and verbally challenging stigma.

Analyses also suggest the AAQ-SA is distinct from the original AAQ. As expected, the AAQ-SA full scale, as well as both subscales, were moderately correlated with the original AAQ, indicating that while the measures overlap, they are not redundant. This conclusion was further supported by a principle components factor analysis of both scales that resulted in four factors with items from the two scales loading across different factors. Other data suggested that the AAQ-SA may predict some variables that the AAQ does not. For example, the AAQ-SA was lower in people with previous experience in substance abuse treatment, while the AAQ did not differentiate between these groups. On one analysis the AAQ-SA did not outperform the AAQ in that both were related to reports of substance use in the last 30 days.

Our inability to rule out the possibility that the two factor solution was due to method variance from positive *versus* negative wording (Hazlett-Stevens, Ullman, & Craske, 2004) is a serious limitation to this study. All items in the defused acceptance subscale are negatively worded, while all the items in the values commitment subscale are positively worded. This possibility is further reinforced by a recent study on the revised version of the AAQ, the AAQ-2 (Bond et al., 2009) suggested that a single, higher-order factor solution with method variance relating to the item valence was the best fit for the data. We considered running a confirmatory factor analysis in order to examine method variance, but since the initial two factor solution which led to the development of the instrument was based on the same sample, we were concerned that any findings might be due to capitalization on chance, rather than true variance. Thus, we decided to not run this analysis until another sample could be obtained. Our recommendation is that future studies of the AAQ-SA with other samples include a confirmatory factor analysis that allows for examination of whether a higher order single factor solution with lower order factors based on method variance is a better fit for the data than the two factor solution found in our exploratory analysis. Until such an analysis accomplished, we recommend using the overall scale score as the primary measure of psychological flexibility in a substance abusing sample.

The preliminary nature of this study merits further examination of the psychometric properties of the AAQ-SA. Particularly useful would be the inclusion of a broader range of measures for analyses of convergent and divergent validity, especially in relation to the values commitment subscale. In particular, we would be interested in relationships between the values commitment subscale and established measures of addiction-related self-efficacy (Forcehimes & Tonigan, 2008; Gwaltney, Metrik, Kahler, & Shiffman, 2009; Hyde, Hankins, Deale, & Marteau, 2008). Self-efficacy refers to the degree to which an individual believes he or she is capable of performing a particular behavior (Bandura, 1977). While there appears to be some content overlap between the AAQ-SA and established measures of addiction related self-efficacy, from theoretical perspective, psychological flexibility is a much broader concept than self-efficacy and includes mindfulness, acceptance, and valued action, none of which would necessarily be presumed in the narrower construct of self-efficacy. Psychological flexibility is also based on different analytic assumptions that focus on a person's relationship to difficult or entangling private experiences, rather than the content of those experiences (for a thorough review see Hayes & Wilson, 1995). While self-efficacy suggests that the presence or absence of beliefs about one's behavior directly relate to the behavior in question, psychological flexibility focuses on a person's relationship to such thoughts and how these relate to overt action, rather than simply the presence of absence of self-efficacious thoughts. As a result, we would expect that psychological flexibility would be somewhat related to, but independent of self-efficacy, such that a person with high psychological flexibility could take effective action, even in the presence of thoughts of low self-efficacy. Unfortunately, the lack of a self-efficacy measure in this study makes it impossible to empirically test whether the values commitment subscale successfully measures what is distinct about the psychological flexibility construct compared to self-efficacy.

Future studies might also include measures of drug and alcohol craving or commitment to abstinence, as content from the AAQ-SA seems to be related to these two concepts. Measures of experiential avoidance, psychological flexibility, or related constructs such as emotion-focused coping (Bond & Bunce, 2000) or distress tolerance (Brown et al., 2002; Daughters et al., 2005) would also be helpful in assessing the specificity of this measure. Better measures of overt substance-related behavior, such as reliable drug usage data or drug impact data would be helpful in assessing predictive validity. It might also be useful to examine this measure in a broader range of substance misusing samples, such as those not in treatment and to better

characterize sample characteristics, such as through reliable assessment of co-occurring disorders.

Given the encouraging data on the role of experiential avoidance in psychological problems, including substance misuse, the AAQ-SA may offer a more effective means of measuring this construct in both research and applied settings. This instrument may provide useful information about processes of change in substance abuse treatment and guide modifications to ongoing treatment strategies and packages. Such efforts ultimately may contribute to more efficient interventions leading to more desirable outcomes, as well as providing a means of identifying individuals who would benefit from treatment. We look forward to further developments in research on psychological flexibility in substance misusing populations.

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