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Barriers to Quitting Smoking among Substance Dependent Patients Predict Smoking Cessation Treatment Outcome

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Abstract

For smokers with substance use disorders (SUD), perceived barriers to quitting smoking include concerns unique to effects on sobriety as well as usual concerns. We expanded our Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT) scale, added importance ratings, validated it, and then used the importance scores to predict smoking treatment response in smokers with substance use disorders (SUD) undergoing smoking treatment in residential treatment programs in two studies (n = 184 and 340). Both components (General Barriers, Weight Concerns) were replicated with excellent internal consistency reliability. Construct validity was supported by significant correlations with pretreatment nicotine dependence, smoking variables, smoking self-efficacy, and expected effects of smoking. General Barriers significantly predicted 1-month smoking abstinence, frequency and heaviness, and 3-month smoking frequency; Weight Concerns predicted 1-month smoking frequency. Implications involve addressing barriers with corrective information in smoking treatment for smokers with SUD.

Keywords

Barriers; quitting smoking; nicotine dependence; substance use disorders; smoking relapse; point-prevalence abstinence

1.0 Introduction

Cigarette smoking among individuals with substance use disorders (SUD) occurs at more than three times the rate than in the general population (Hughes, 1996; Kalman et al., 2001). Among individuals currently receiving treatment for a SUD, smoking remains prevalent, with between 65 and 90% of patients self-reporting smoking (Guydish et al., 2011).

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Alcoholics are more likely to die from a smoking-related cause than from complications relating to alcohol (Hurt et al. 1996), so encouraging smoking cessation in this at-risk population is an important goal. SUD treatment provides a window of opportunity for smoking interventions. However, smokers with SUD find it difficult to quit and are often unsuccessful (Drobes, 2002; Rohsenow, 2015; Sobell, Sobell, & Agrawal, 2002).

Perceived barriers to quitting smoking exist for all smokers, including concern about withdrawal symptoms and inability to cope with negative emotions (Macnee & Talsma, 1995). In addition to these general barriers, individuals with SUD may have concern about effects of quitting smoking on SUD recovery. In an early exploration with alcohol-dependent smokers, 70% reported that they were concerned that smoking cessation would negatively impact their sobriety, and the majority reported using smoking a way to cope with urges to drink (Monti et al., 1995). While evidence shows that smoking cessation does not in fact increase substance relapse (Bobo et al., 1987; Burling et al., 2001; Kalman et al., 2001; Sobell et al., 2002), the prevalence of these beliefs demonstrates that assessing barriers unique to substance abusers is important for increasing quit rates in this disproportionately affected population. Additionally, since continued smoking undermines long-term sobriety (Rohsenow, 2015; Weingerger, Platt, Jiang, & Goodwin, 2015), these smokers need corrective information about this belief.

The first version of the Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT) was developed and administered to alcohol-dependent smokers in treatment (Asher et al., 2003). The measure contained 11 yes/no items related to different perceived barriers to smoking cessation (e.g., withdrawal, affective effects, etc.) and an open-ended item that asked participants to explain any other perceived barriers. Two of the items were specific to substance abuse (“If I quit smoking, my urge to drink/use drugs will be so strong I won't be able to stand it” and “Quitting smoking during substance abuse treatment would make it harder to stay sober”). This initial small study found that alcohol-dependent smokers who endorsed more barriers overall were more likely to be heavier smokers, more highly nicotine dependent, and report more smoking temptations, but not to have greater alcohol disorder severity. Two barriers concerning effects on sobriety, endorsed by almost half the smokers, were also not endorsed more by smokers with greater alcohol disorder severity or heaviness of drinking pre-treatment. In sum, the yes/no version of the BQS-SAT showed promising initial validity for this population of alcohol-dependent smokers in treatment.

However, several improvements to this measure were needed, as well as a larger sample for psychometrics. First, many smokers in SUD treatment are being treated for SUDs other than or in addition to alcohol use disorders and we need to validate the measure with this broader population. Second, the perceived importance of the barriers could improve its clinical value so we added ratings of the perceived importance of each barrier. Third, based on open-ended responses in the earlier study, six items were added to the measure (see Table 1). Two of these items related to barriers specific to individuals in treatment for SUD. The remaining additional barriers included two items involving changes in eating and appetite, one item involving the presence of other people smoking, and one item regarding the difficulty of giving up the first cigarette of the day. Eating/appetite items were added as research has suggested that increased caloric intake is common during smoking cessation (Klesges et al.,

1989) and concerns regarding post-cessation weight gain are associated with lower readiness and motivation to quit (Pomerleau et al., 2001; Clark et al., 2004). The item involving the presence of other smokers was included as social networks appear important in smoking behavior and smoking cessation (Christakis & Fowler, 2008). Finally, the item regarding difficulty with giving up the first cigarette of the day was included based on Asher et al., (2003) and as speed of smoking the first cigarette reflects a pattern of heavy automatic smoking strongly predictive of relapse to smoking (Baker et al., 2007).

The aim of the present investigation was to validate the modified BQS-SAT among a large number of smokers with SUD in treatment and use it to predict response to smoking interventions, an aim not investigated with the earlier measure. We gave the measure pretreatment to two separate populations of smokers undergoing residential treatment for SUDs and enrolled in smoking cessation studies. In the first study, we explored the factor structure of the scale and validated it against measures of nicotine dependence, smoking expectancies and motivation to quit (construct validation). In the second study, we replicated the factor structure and assessed the predictive validity of the importance scoring. A validated scale for measuring importance of barriers to cessation in the SUD population will be a useful tool for clinicians and researchers interested in increasing smoking cessation, as feedback derived from this measure can be incorporated into targeted interventions aimed at reducing smoking in this population.

2.0 Study 1: Development of the BQS-SAT

2.1 Material and Methods

2.1.1 Participants—Participants were 184 smokers with SUD in 28-day residential substance treatment participating in a larger study (Rohsenow et al., 2015) who had smoked 10 or more cigarettes per day for the past 6 months. As part of the larger study participants were enrolled in smoking counseling (4 sessions of brief advice or motivational interviewing with coping skills discussions) with half randomized to contingency management for smoking cessation (19 days), and half randomized to non-contingent payments. Exclusionary criteria included current use of any smoking cessation treatment or medication, and psychosis. Subjects did not need to be motivated to quit smoking to participate since the study was intended to motivate smokers who had not sought smoking cessation. Recruits were told the study would provide “informational sessions about smoking” without requiring cessation and payments either for reduced smoking and then abstinence or just for providing breath samples for 19 days. After the 19-day voucher period, we provided free nicotine replacement for up to 8 weeks. The research procedures were approved by the Institutional Review Board of Brown University and informed consent was obtained.

Characteristics of the 184 participants are shown in Table 2. The majority of participants (83%) were White, 9% were Black, 8% were of other races, and 6.6% identified as Hispanic, consistent with the demographics of Rhode Island where this study was conducted. Mean legal income was $\$9,487 \pm 13,619$ in the past year and 10.9% were currently unemployed. The current substance diagnoses were: 71.2% alcohol use disorder, 73.9% cocaine use disorder, 52.8% opiate use disorder, and 37% marijuana use disorder.

2.1.2 Instruments—A Timeline Followback interview (Brown et al., 1998; Ehrman & Robbins, 1994; Sobell & Sobell, 1995) was used at baseline (for 6 months pre-admission) to collect daily data on smoking scored for number of days of use and number of cigarettes per day. Current SUD diagnoses were made using the criteria of the Structured Clinical Interview for DSM-IV-Patient version (First et al., 1995), administered by trained research interviewers. The Smoking Contemplation Ladder (Biener & Abrams, 1991) measured motivation to quit smoking and was used for concurrent validation. It is a 10-point scale of motivation to change smoking, anchored at each point, which provides a single continuous measure of motivation to change smoking. The Fagerström Test for Nicotine Dependence (FTND; Heatherton et al., 1991) provides a reliable and valid measure of severity of tobacco involvement to test whether more perceived barriers are endorsed by people with greater nicotine dependence for construct validity. The Smoking Effects Questionnaire (SEQ; Rohsenow et al., 2003) is a reliable and valid 33-item measure of positive and negative effect domains with eighth-grade reading level developed on general adult populations. The positive expectancy scale was used to investigate whether perceived barriers to quitting correlated with more positive expected effects from smoking. The Smoking Temptations Inventory (Velicer et al., 1990), worded for confidence that one could refrain from smoking in various situations, provided a measure of smoking self-efficacy across situations, consisting of three subscales – positive/social, negative affective, and habitual/addictive. It was used to test whether barriers were correlated with experiencing less self-efficacy to change smoking, for construct validity. The Smoking Decisional Balance Scale (Velicer et al., 1985), assesses the pros and the cons of smoking. The pros score was chosen as a measure of concurrent validity. The Addiction Severity Index (ASI; McLellan et al., 1992) drug severity composite score (McGahan, Griffith & McLellan, 1986) was used to assess severity of substance problems to investigate concurrent validity of the BQS-SAT. A demographics questionnaire assessed age, gender, ethnicity, education, and employment status for discriminant validity.

The revised BQS-SAT is a 17-item self-report measure of the importance of perceived barriers to quitting smoking expanded from the BQS-SAT (Asher et al., 2003). Participants were instructed that this was a list of reasons why some smokers do not want to change their smoking behavior, and were asked to indicate which items were true for them and then to rate their importance (how much each of the reasons “mattered”) on 5-point Likert scales ranging from “hardly matters at all” (1), “matters somewhat” (3) to “matters a lot” (5). Importance was coded as 0 for people who had responded “false” to the item, resulting in a 0-5 scale. All items grouped by our intended content area are presented in Table 3.

2.1.3 Data Analysis Approach—Principal components analyses (PCA) were conducted on the 17 BQS-SAT importance ratings. The number of components retained was determined using scree test (Cattell, 1966), minimum average partial (MAP; Velicer, 1976), and parallel analysis (Horn, 1965). Parallel analysis and MAP have been found to be one of the most consistently accurate methods for determining the number of components to retain (Zwick, & Velicer, 1986).

For validation analyses, correlations with importance ratings were used. Number of barriers endorsed was not used as it would double the number of analyses and because endorsement

of most items were validated by Asher et al. (2003). Multiple regressions were not used because the purpose is to validate the individual scales, not to test hypotheses about common relationships. Alpha was set at .05 for each type of validity because it is important to detect each relationship and we are not testing theoretical hypotheses.

Construct validity was assessed by examining the correlations of BQS-SAT importance ratings with smoking rate and nicotine dependence. We expected that higher BQS-SAT scores would be positively correlated with nicotine dependence and cigarettes smoked per day since more barriers or more important barriers to smoking abstinence are likely to be perceived by people with greater tobacco involvement and difficulty refraining from smoking in various situations. Concurrent validation variables included smoking cessation self-efficacy, motivation to change smoking, smoking decisional balance, and positive smoking expectancies. We expected that higher BQS-SAT scores would be correlated with more positive expected effects of smoking (SEQ) and pros of smoking, and less self-efficacy about quitting smoking (Smoking Temptations Inventory) and less motivation to quit (Contemplation Ladder). We expected that those with more substance involvement, as measured by the ASI Severity Index, may have higher BQS-SAT scores particularly due to the importance of the four items about effects on sobriety. Discriminant validity was assessed using correlations with demographic variables as these would not theoretically be expected to correlate with BQS-SAT scores.

2.2 Results

2.2.1 Component Structure and Reliability—The PCA results found that the scree test, parallel analysis, and MAP test retained two components. All items loaded .40 or greater on the components and so were retained. The first component accounted for 38.7% of total item variance and consisted of 14 items measuring general barriers (including sobriety-related barriers). The second component accounted for 10.71% of total item variables and consisted of 3 items measuring weight concerns. The items and their component loadings are presented in Table 1.

BQS-SAT scores were calculated by taking the mean of the importance ratings. The BQS-SAT general barriers score ranged from 0 to 4.86 ($M = 2.53$; $SD = 1.19$) and the BQS-SAT weight concern score ranged from 0 to 5.00 ($M = 2.62$; $SD = 2.62$). The BQS-SAT scales yielded high internal consistency coefficients (Cronbach's α), as presented in Table 1. The mean of the number of barriers endorsed ranged from 0 to 14 ($M = 9.84$; $SD = 3.91$) for BQS-SAT general barriers, and 0 to 3 ($M = 2.27$, $SD = 1.11$) for BQS-SAT weight concerns.

2.2.2 Validation Analyses—Table 2 displays the mean and standard deviation of the validation variables, as well as the correlations between BQS-SAT scale scores and validation variables.

Construct validity: As seen in Table 2, BQS-SAT general barriers scale correlated significantly with FTND and cigarettes smoked per day before entering substance abuse treatment, indicating that higher dependence and smoking rate was associated with more importance of barriers. BQS-SAT weight concerns also correlated significantly with FTND.

Concurrent validity: BQS-SAT general barriers score was significantly positively correlated with positive effects of smoking, pros of smoking, and drug severity index, and was significantly negatively correlated with self-efficacy (Smoking Temptations Inventory) and with motivation (Smoking Contemplation Ladder). BQS-SAT weight concerns was positively correlated with pros of smoking and negatively correlated with self-efficacy.

Discriminant validity: BQS-SAT was not related to marital status or years of education. BQS-SAT general and weight concerns scores were higher for females, $M = 2.72 \pm 1.22$ (SD) for general barriers and $M = 3.31 \pm 1.68$ for weight concern barriers, than for males, $M = 2.29 \pm 1.13$ for general barriers and $M = 1.77 \pm 1.49$ for weight concerns. General barriers were higher for whites, $M = 2.63 \pm 1.19$, than non-whites, $M = 2.08 \pm 1.06$, and were greater with age.

3.0 Study 2: Confirmation of the BQS-SAT Factor Structure and Predicting Smoking Treatment Outcome

3.1 Material and Methods

3.1.1 Participants—Participants were 340 smokers in residential SUD treatment participating in a larger study (Rohsenow, Tidey, Martin, Colby, & Monti, 2014) who had smoked 10 or more cigarettes per day for the past 6 months (excluding times when in restricted environment or ill), who were medically eligible for nicotine patch and not involved in any smoking cessation treatment. Exclusionary criteria included current use of any smoking cessation treatment or medication, psychosis, or medical exclusions for nicotine patch. Participants did not need to be motivated to quit smoking to participate. In the study, all received smoking counseling (4 weeks of brief advice, same as in Rohsenow et al., 2015) and transdermal nicotine replacement for 8 weeks, with half randomized to contingency management for smoking cessation and half to noncontingent payments. The research procedures were approved by the Institutional Review Board of Brown University.

The sample consisted of 229 (77%) men and 111 (33%) women. Participants ranged in age from 19 to 62 years ($M = 37$, $SD = 10.04$). The majority of participants (86%) were White, 10% were Black, 4% were of other races, and 8% identified as Hispanic. The average education of the sample was 12.0 years ($SD = 2.1$, range = 5 to 22 years). Using the SCID-IV, 230 (76%) met lifetime diagnostic criteria for alcohol abuse or dependence, 60% met criteria for cocaine abuse or dependence, 40% for marijuana abuse or dependence, and 49% for opiate abuse or dependence.

3.1.2 Procedure and Instruments—The BQS-SAT, smoking TLFB, other smoking measures, SCID, and demographics were completed at baseline (TLFB for 6 months). At each follow-up at 1 and 3 months after the baseline assessment, a TLFB interview assessed daily data on smoking for the previous 30 days. Reports of complete abstinence from smoking were considered confirmed if CO < 4 ppm (using EC50 Micro III Smokerlyzer® by Bedfont) and salivary cotinine level < 15 ng/ml (sent out to a laboratory). Participants were paid \$35 and \$40 for completing the in-person 1 and 3 month follow-up assessments. Most ($n = 320$; 94%) were interviewed at the 1-month follow-up and 85% at the 3 month

follow-up. Those that were lost to follow-up were coded as smoking for 7-day point prevalence abstinence at 1 and 3 months. Seven-day point-prevalence smoking abstinence was confirmed at 1 and 3 months for 9% and 4% of participants, respectively.

3.1.3 Data Analysis Approach—To confirm the component structure found in Study 1, PCA was conducted on importance ratings from Study 2 using the same methods as Study 1. Predictive validity was assessed by examining relationships between the two BQS-SAT importance scores and confirmed smoking point-prevalence abstinence, average cigarettes smoked per day, and percent of smoking days at the 1 and 3 month follow-up using the following regression methods. Logistic regressions were used to assess BQS-SAT importance scores as predictors (second step) of smoking point-prevalence abstinence at each follow-up time after first entering pretreatment number of cigarettes per day on the first step as a covariate (four regressions). Hierarchical multiple regressions predicting average cigarettes per day and percent smoking days at each follow up entered BQS-SAT importance scores as predictors on the second step after entering the pretreatment value of the same smoking variable on the first step as a covariate (four regressions for each BQS-SAT score).

3.2 Results

3.2.1 Component Structure, Reliability and Means—Scree test retained one component while parallel analysis and MAP retained the same two components as in study 1. All items loaded .40 or greater on the component. The BQS-SAT general barriers component accounted for 35.15% of total item variance, and BQS-SAT weight concern component accounted for 12.71% of total item variance. The items and their component loadings are presented in Table 1.

Total BQS-SAT scale scores were calculated by taking the mean of the importance ratings. The number of barriers endorsed was scored for descriptive purposes. The importance ratings for both the BQS-SAT general barriers factor and the weight concern factor yielded high internal consistency (Table 1). The BQS-SAT general importance score ranged from 0 to 5 ($M = 2.01$; $SD = 1.23$) and the BQS-SAT weight concern score ranged from 0 to 5.00 ($M = 1.77$; $SD = 1.98$). The mean of the number of barriers endorsed ranged from 0 to 14 ($M = 7.15$; $SD = 3.58$) for BQS-SAT general barriers, and 0 to 3 ($M = 1.34$, $SD = 1.36$) for BQS-SAT weight concerns. See Table 3 for means of the importance ratings and percentage endorsed for each item separately, averaged across all 524 participants in both studies.

3.2.2 Predictive Validity—Seven-day confirmed point prevalence smoking abstinence at 1 month was significantly related to BQS-SAT general importance score (OR = 0.64, 95% CI .44, .92, Wald $\chi^2(1) = 5.73$, $p < .05$) and BQS-SAT general number of barriers endorsed (OR = 0.87, 95% CI .79, .97, Wald $\chi^2(1) = 5.86$, $p < .05$) but not BQS-SAT weight concerns importance score (OR=.87, 95% CI .70, 1.07, Wald $\chi^2(1) = 1.74$, $p = .19$) or BQS-SAT weight concerns number of barriers (OR=.83, 95% CI .62, 1.11, Wald $\chi^2(1) = 1.61$, $p = .20$). Smoking abstinence at 3 months was not related to general importance score (OR = 0.67, 95% CI .40, 1.11, Wald $\chi^2(1) = 2.42$, $p = .12$) general number of barriers endorsed (OR = 0.89, 95% CI .75, 1.03, Wald $\chi^2(1) = 2.26$, $p = .13$), weight concerns importance (OR = .82,

95% CI.62, 1.14, Wald $\chi^2(1)=1.29$, $p=.26$) or weight concerns number of barriers endorsed (OR =.82, 95% CI.54, 1.24, Wald $\chi^2(1)=.89$, $p=.34$).

Table 4 presents results of the multiple regressions predicting cigarettes per day and smoking frequency at 1 and 3 month follow-ups. The BQS-SAT general importance score significantly predicted percentage of smoking days and number of cigarettes per day at 1 month follow-up and 3 month follow-up except for number of cigarettes smoked per day at 3 month follow-up. The BQS-SAT weight concerns importance score significantly predicted the percentage of smoking days average number of cigarettes smoked per day at 1 month follow-up.

4.0 Discussion

The expanded BQS-SAT, a measure of the perceived importance of barriers to quitting smoking in substance abuse treatment, shows excellent psychometric properties in two large groups of smokers with SUD undergoing residential substance treatment. The study supports and confirmed a two component factor structure including general barriers to smoking cessation and barriers related to weight gain during smoking cessation. The one-factor solution of the briefer measure in Asher et al. (2003) could have been due to having only one weight control item and a much smaller sample. Both factors demonstrated good internal consistency, and construct and concurrent validity.

Somewhat surprisingly, the four items of the BQS-SAT that query barriers related specifically to substance abuse treatment success (e.g., “quitting smoking during sobriety would make it harder to stay sober”) did not constitute their own factor in either of the two samples. This perhaps suggests that these barriers, while being important and endorsed by 50-72% of the smokers, are not perceived as qualitatively different from the other barriers to quitting in this population. On the other hand, the three weight concern items constituted a separate factor that was unique from general barriers to quitting smoking, suggesting that these concerns are qualitatively different. The factor loadings of weight concern items were high in both studies with a majority of participants endorsing all three items to be barriers to quitting. This highlights the importance of assessing and addressing this barrier in order to encourage quit attempts in those with SUDs.

The construct, concurrent, and discriminant validity of the importance scores were supported using various measures. The BQS-SAT general barriers score was positively correlated with nicotine dependence and cigarettes per day prior to treatment in participants undergoing SUD treatment. This indicates that those individuals with higher pre-treatment levels of nicotine dependence and heavier smokers tended to report barriers to quitting smoking as more important than those who smoke fewer cigarettes and are less dependent on nicotine. This may create a cyclical relationship in which those who perceive barriers to quitting as particularly important continue to smoke at higher rates and become more dependent on nicotine thereby reducing the likelihood of quitting and increasing the importance of barriers to doing so. Higher general barriers scores were found in individuals with higher scores on the positive smoking effects scale, more pros of smoking, lower self-efficacy for quitting, and lower motivation to quit smoking, suggesting that more pleasure from smoking is

associated with greater difficulty with barriers, leading to less confidence that one could quit, culminating in less motivation to try to make changes. The importance of weight as a barrier showed most of these same correlations. This pattern of results demonstrates that the self-reported importance of perceived barriers to quitting smoking is related to other variables that are associated with decreased smoking treatment success.

Older participants, women, and Whites rated barriers to quitting smoking as more important than younger, male and non-White smokers, and the importance of weight as a barrier was greater for women and older smokers. Among smokers in the general population, women are less likely than men to successfully quit (Perkins, 2008). Our results suggest that such a trend among women in treatment for substance use disorders may be due to women perceiving various barriers to quitting, including but not limited to weight issues, as being more important than men do. Furthermore, recent data in the general population shows that older smokers are less likely to initiate cessation attempts (Weinberger et al., 2014), possibly due to these barriers being perceived as more difficult to overcome. Research involving heavy drinking smokers indicated that Whites endorsed higher motives to smoke than Blacks, which is likely related to increased barriers to quitting (Bacio et al., 2014). Future research may uncover barriers to cessation that are specific to these subpopulations.

BQS-SAT general barriers importance score significantly predicted point-prevalence of smoking, percent of smoking days, and cigarettes smoked per day at 1 month after smoking treatment started, as well as percentage of smoking days at 3 month follow up. The BQS-SAT weight concerns score predicted the percentage of smoking days at 1 month. Thus, overall the BQS-SAT predicts whether any smoking will occur, frequency of smoking, and heaviness of smoking up to at least a month after smoking treatment. This measure would therefore be heuristic for identifying smokers with SUD who will fare less well with smoking treatment during SUD treatment, and suggests that interventions addressing specific endorsed perceived barriers would be warranted as has been done adapting motivational interviewing for smoking cessation (Rohsenow et al., 2014; Rohsenow, Martin, Monti, Colby, Day, Abrams, Sirota, Swift, 2015).

The research presented is not without limitation. First, the validation of the survey instrument was conducted among participants enrolled in a research study, which may affect generalizability to adults with SUD. Second, this study used a convenience sample of participants, which were most likely local to the specific area which limits the generalizability of the findings.

5.0 Conclusions

Overall, the BQS-SAT appears to be a reliable and valid instrument for assessing the importance of various barriers to quitting smoking, and that the measure has ability to predict post-treatment smoking over the short term. This valid measure can be used by clinicians and service providers in SUD treatment settings to help identify the self-rated most important perceived barriers to quitting smoking in individuals with substance use disorders. The clinician can then provide corrective information for some of these barriers (such as the misconception that smoking cessation will harm sobriety), consider adding

methods targeted at other barriers (e.g., expected difficulty with withdrawal or weight gain), and add coping skills to address yet others (e.g., alternative ways to handle or avoid social smoking situations). Targeted interventions aimed at reducing these barriers may lead to increased smoking cessation rates in this difficult to treat population.

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Highlights

- The Barriers to Quitting Smoking in Substance Abuse Treatment was developed in two studies.
- We examined psychometric properties with smokers with substance use disorders.
- Factor structure was supported and replicated with excellent internal consistency reliability.
- Barriers predicted smoking at 1 month and 3 months after smoking treatment.
- Addressing barriers with corrective information in smoking treatment is important.

Table 1

Principal Components Analysis Component Solution and Internal Consistency Reliability for the Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT)

Item	Study 1 Loading	Study 2 Loading
<i>General Barriers Factor</i>		
If I quit smoking my urges to smoke will be so strong I won't be able to stand it.	.76	.65
If I quit smoking, my urges to drink or use drugs will be so strong I won't be able to stand it.	.75	.74
Quitting smoking during sobriety would make it harder to stay sober.	.73	.68
I need to smoke to lift me up when I'm feeling down.	.68	.63
If I quit smoking I won't be able to sleep.	.67	.53
I smoke cigarettes to cope with my urges to drink or use drugs. *	.67	.61
When I don't smoke, I feel restless and I can't concentrate.	.66	.69
If I quit smoking, I'll feel tense and irritable.	.58	.69
It's too hard to quit smoking while I'm quitting other substances. *	.56	.62
I don't have the willpower to quit smoking.	.54	.62
Smoking gives me a lift when I'm feeling tired.	.54	.44
If I quit smoking, I would feel anxious.	.52	.57
I couldn't give up that first cigarette of the day. *	.42	.63
It's hard to quit because so many others around me are smoking. *	.42	.46
<i>Coefficient Alpha for General Barriers factor</i>		
	.89	.88
<i>Weight Concerns Factor</i>		
If I quit smoking I would eat more. *	.89	.92
If I quit smoking, I would gain weight.	.86	.93
If I quit smoking, I would feel hungry more often. *	.80	.88
<i>Coefficient Alpha for Weight Concerns factor</i>		
	.87	.92

* Indicates new item added to BQS-SAT.

Table 2

Correlations of BQS-SAT factors scored for importance with discriminant, construct and concurrent validation variables in Study 1 (n = 184)

Type of Validity and Validation Measure	Measure M (SD)	General Barriers	Weight Concerns
		r or t(df)	r or t(df)
<i>Discriminant Validity</i>			
Mean age (years)	35.7 (8.1)	.18 **	.19 **
% White	83%	2.32 (182) *	1.96 (1.81)
% male	45%	2.39 (182) **	6.49 (1.81) **
% Married or cohabiting	11%	1.69 (182)	1.78 (1.82)
Education in years	12.0 (1.7)	-.01	-.02
<i>Construct Validity</i>			
FTND	5.39 (2.29)	.35 **	.15 *
Cigarettes /day prior treatment	23.58 (11.18)	.20 **	.05
<i>Concurrent Validity</i>			
Self-efficacy: Positive/Social	1.89 (.78)	-.40 **	-.10
Self-efficacy: Negative Affect	1.53 (.62)	.34 **	-.17 *
Self-efficacy: Habitual/Addictive	2.29 (.77)	-.48 **	-.26 **
Smoking Effects Questionnaire – Positive expectancy scale	2.99 (.99)	.47 **	.35 **
Smoking Contemplation Ladder	5.05(1.41)	-.28 **	-.05
Decisional Balance – Pros of smoking	3.18 (.87)	.58 **	.30 **
Drug Severity Index	.24 (.08)	.22 **	.08

* $p < .05$

** $< .01$

Table 3

Item-specific responses to the BQS-SAT: Percentage of smokers endorsing each barrier and mean importance rating for each barrier by content type averaged across both studies (n = 524)

Item	% Endorsed	Importance M (SD)
Affective Effects Related to Nicotine Withdrawal		
If I quit smoking, I'll feel tense and irritable.	85	3.33 (1.74)
If I quit smoking I would feel anxious.	80	3.08 (1.85)
When I don't smoke I feel restless and I can't concentrate.	64	2.25 (1.96)
I need to smoke to lift me up when I'm feeling down.	47	1.65 (1.97)
Physical Effects Related to Nicotine Withdrawal		
Smoking gives me a lift when I'm feeling tired.	37	1.11 (1.66)
If I quit smoking I won't be able to sleep.	32	1.12 (1.80)
If I quit smoking my urges to smoke will be so strong I won't be able to stand it.	56	2.05 (2.02)
Difficulty Quitting		
It's hard to quit because so many others around me are smoking.*	78	2.99 (1.90)
I couldn't give up that first cigarette of the day.*	74	3.13 (2.07)
I don't have the willpower to quit smoking.	50	1.88 (2.06)
Expected Effects of Smoking Cessation on Sobriety		
It's too hard to quit smoking while I'm quitting other substances.*	72	2.93 (2.08)
Quitting smoking during substance abuse treatment would make it harder to stay sober.	50	1.97 (2.17)
If I quit smoking my urges to drink or use drugs will be so strong I won't be able to stand it.	36	1.31 (1.93)
I smoke cigarettes to cope with my urges to drink or use drugs.*	50	1.88 (2.11)
Weight Concerns		
If I quit smoking I would eat more.*	58	2.17 (2.14)
If I quit smoking I would feel hungry more often.*	55	2.02 (2.11)
If I quit smoking, I would gain weight.	54	2.01 (2.13)

* Indicates new item added to BQS-SAT.

Table 4

Multiple regression analysis of pretreatment smoking and BQS-SAT General Importance Score (upper panel) or BQS-SAT Weight Concerns Importance Score (lower panel) predicting 1 and 3 month post-treatment quantity and frequency of smoking.

Smoking outcome variable	F	β	R ²
<i>General Importance Score as Predictor</i>			
1 Month percent smoking days ^a	7.61		.05 ^{***}
Pretreatment percent smoking days	1.25	-.06	
BQS-SAT general	14.01	.21 ^{***}	
3 Month percent smoking day ^b	3.47		.03
Pretreatment percent smoking days	1.75	-.08	
BQS-SAT general	5.24	.13 [*]	
1 Month cigarettes smoked/day ^a	9.21		.06 ^{***}
Pretreatment cigarettes smoked/day	7.32	.15 ^{**}	
BQS-SAT general	8.03	.16 ^{**}	
3 Month cigarettes smoked/day ^b	12.73		.08 ^{***}
Pretreatment cigarettes smoked/day	20.99	.26 ^{***}	
BQS-SAT general	1.76	.08	
<i>Weight Concerns Importance Score as Predictor</i>			
1 Month percent smoking days ^a	3.92		.02 [*]
Pretreatment percent smoking days	1.08	-.06	
BQS-SAT weight concerns	6.67	.14 ^{**}	
3 Month percent smoking days ^b	1.48		.01
Pretreatment percent smoking days	1.63	-.07	
BQS-SAT weight concerns	1.27	.07	
1 Month cigarettes smoked/day ^a	6.07		.04 ^{**}
Pretreatment cigarettes smoked/day	10.25	.18 ^{**}	
BQS-SAT weight concerns	1.94	.08	
3 Month cigarettes smoked/day ^b	12.23		.08 ^{***}
Pretreatment cigarettes smoked/day	23.66	.28 ^{***}	
BQS-SAT weight concerns	.64	.05	

Note.

^a n=320.

^b n=290.

* $p < .05$

**
 p .01

 p .001

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