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Investigating the factor structure of the Questionnaire on Smoking Urges-Brief (QSU-Brief)

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Abstract

This study was designed to investigate the proposed two-factor structure of the 10-item Questionnaire on Smoking Urges-Brief (QSU-Brief) and to provide evidence for the psychometric properties of this questionnaire using the seven-point scoring set from the original QSU study [Tiffany, S.T., Drobes, D.J. (1991). The development and initial validation of a questionnaire on smoking urges. *British Journal of Addiction 86*, 1467–1476.]. The study sample (*N* =576) was comprised of smokers presenting for treatment. Although an initial exploratory factor analysis appeared to replicate the original factor analytic findings of Cox et al. [Cox, L.S., Tiffany, S.T., Christen, A.G. (2001). Evaluation of the brief questionnaire of smoking urges (QSU-Brief) in laboratory and clinical settings. *Nicotine and Tobacco Research 3*, 7–16.], when subjected to confirmatory factor analyses, a five-item, two-factor model using the most robust items from the original QSU-Brief factor analysis was the best explanation of the data in the present study. Good internal consistency reliability estimates were also obtained with this model. These results suggest that this shortened form of the QSU-Brief can be used with the original seven-point scoring set as a reliable assessment of the dual nature of smoking urges in a treatment-seeking population.

Keywords

Tobacco; Smoking; Urge; Factor analysis; Psychometric properties

1. Introduction

Since its development over a decade ago, the Questionnaire on Smoking Urges (QSU; Tiffany & Drobes, 1991) has been used to assess smoking urges in the United States, France, Germany, and Spain (Bell, Taylor, Singleton, Henningfield, & Heishman, 1999; Cepeda-Benito, Henry, Gleaves, & Fernanadez, 2004; Guillin et al., 2000; Mueller, Mucha, Ackermann, & Pauli, 2001). This 32-item, self-report instrument was constructed to provide a psychometrically sound assessment for researchers attempting to measure multiple aspects of cigarette cravings. The QSU was originally designed to represent four distinct categories of smoking urges: "(1) desire to smoke; (2) anticipation of immediate positive outcome from smoking; (3) anticipation of immediate relief from nicotine withdrawal or relief from negative effect; (4) intention to smoke" (Tiffany & Drobes, 1991, p. 1468). Initial psychometric testing of this assessment revealed two factors with items distinct in content and scale correlates, verifying that the QSU could be used as a multidimensional measure of craving. The first factor was characterized by both desire and intention to smoke with an anticipation of pleasure from smoking, and the

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second was related to relief from nicotine withdrawal or negative affect with an urgent and overwhelming desire to smoke (Tiffany & Drobes, 1991).

Recent studies have reported difficulty confirming the original factor structure of the QSU proposed by Tiffany and Drobes (1991) using confirmatory factor analytic techniques. An alternative model, initially proposed by Kozlowski, Pilliteri, Sweeney, Whitfield, and Graham (1996) and later confirmed by Toll, McKee, Krishnan-Sarin, and O'Malley (2004), appeared to represent a better fit to the data in those studies. This alternative model used the six most robust items from each factor of the original QSU analysis to form two factors, one associated with desire and intention to smoke with an anticipation of pleasure from smoking and the other associated with relief of negative affect or withdrawal with an urgent desire to smoke. This model suggests that the scale is more psychometrically sound when fewer items are included. Indeed, shorter versions of the QSU have been developed, and these abbreviated assessments, designed to represent the two factors found in the original model, have been used as time-efficient means of appraising smoking urges.

Although each shortened form of the QSU has been identically named the "QSU-Brief" in separate studies, a large degree of inconsistency exists in its content, particularly in item selection and rating scales. Whereas two studies included a 10-item version of the QSU-Brief questionnaire (Cox, Tiffany, & Christen, 2001; Shadel, Niaura, & Abrams, 2001), five other studies used an 11-item version of the scale (Burton & Tiffany, 1997; Cepeda-Benito & Tiffany, 1996; Drobes & Tiffany, 1997; Elash, Tiffany, & Vrana, 1995; Tiffany, Cox, & Elash, 2000). Of these seven studies, two (i.e., Burton & Tiffany, 1997; Shadel et al., 2001) employed the seven-point scoring set used in the original QSU study (Tiffany & Drobes, 1991), while the other five studies used a 100-point scale. Seemingly, no standard has been declared with regard to the exact number of items to employ and the type of scoring set to use for the QSU-Brief. Moreover, to date, only one published study has systematically investigated the psychometric properties of the QSU-Brief, and the factor solutions reported in this publication were inconsistent, differing according to experimental condition and characteristics of study participants (Cox et al., 2001).

In the solitary published study on the QSU-Brief's psychometric attributes, Cox et al. (2001) administered the QSU-Brief questionnaire to evaluate cravings among 112 smokers enrolled in a smoking cessation program and 221 smokers in a laboratory setting, utilizing imagery procedures to create "urge" and "no urge" conditions in each group. Using maximum-likelihood factor analyses, the original two-factor structure of the QSU was generally maintained in both groups. Nonetheless, the number of items per factor diverged from the predicted model in both the laboratory and the clinical settings, as some items loaded on both factors and were hence, excluded. In order for the factor structure of the QSU-Brief to replicate the original model of the QSU, the first factor would include items 1, 3, 6, 7, and 10, and the second factor would include items 2, 4, 5, 8, and 9 (see Table 1 for a list of the items). However, in factor analyses on data from the laboratory participants, items 2 and 5 loaded on both factors, and in data obtained from the clinical setting, items 2, 3, 5, 7, and 10 loaded on both factors. The only items that were assigned to a factor in all four conditions tested were items 1, 4, 6, 8, and 9. The instability of the factor solutions presented in the Cox et al. (2001) study calls to question whether the QSU-Brief would be used more appropriately as a general craving measure or as the two-dimensional measure of smoking urges it has been assumed to reflect.

The goal of the present study was to further explore the factor structure of the QSU-Brief. This study used the seven-point scoring set from the original QSU study (Tiffany & Drobes, 1991), in lieu of using the 100-point scale utilized by Cox et al. (2001). Using a relatively large clinical sample, the current study was designed to: (1) augment the limited research on the QSU-Brief's psychometric attributes, (2) attempt to reconcile the conflicting findings reported

by Cox et al. (2001), and (3) provide evidence for the psychometric properties of the scale using a seven-point scoring set.

2. Methods

2.1. Participants

The sample was comprised of 576 treatment-seeking daily smokers who were screened for participation in smoking cessation clinical trials at a community mental health center. The QSU-Brief was administered to all participants before they attempted to quit smoking during their baseline assessment, as part of a larger battery of questionnaires. The sample was randomly divided into two subsamples of 288 participants. The gender composition was comparable for each subsample (subsample 1=44.8% female; subsample 2=49.3% female). Participants' mean age in the first subsample was 39.3 (*SD* =11.8), and the mean age in the second subsample was 39.0 (*SD* =12.5). The mean number of cigarettes smoked per day was 22.3 (*SD* =9.8) for the first subsample and 21.5 (*SD* =9.7) for the second subsample. The average number of years smoking in the first subsample was 16.1 (*SD* =11.8), and the mean number of years smoking in the second subsample was 16.5 (*SD* =12.2). All differences between the subsamples on these variables were nonsignificant by chi-square (for the categorical variable) or *t*-tests (for the continuous variables).

2.2. Materials

The 10-item QSU-Brief, as presented by Cox et al. (2001), is a self-report measure designed to assess urges and cravings to smoke, with higher scores indicating stronger urges. Like the longer version of the QSU (Tiffany & Drobes, 1991), the QSU-Brief asks respondents to indicate how strongly they agree or disagree with each item on the questionnaire using a scale from 1 (strongly disagree) to 7 (strongly agree). Factor analyses conducted by Cox et al. indicated that this brief assessment had a two-factor structure, and the scale showed very good reliability for each of these factors for both the lab setting (Cronbach's alpha=.92–.97) and the outpatient clinic setting (Cronbach's alpha=.78–.89).

2.3. Data analysis plan

The factor solutions presented by Cox et al. (2001) were not stable across the four conditions tested in that study. Consequently, in the present study it was decided to first conduct an exploratory factor analysis rather than a confirmatory factor analysis because it is inappropriate to conduct confirmatory factor analysis unless an established factor structure is stable and merits confirmation (Floyd & Widaman, 1995). Thus, an exploratory factor analysis was initially conducted on half of the sample, and then confirmatory factor analytic models were tested on the other half of the sample.

To split the sample, SPSS 11.0 for Windows (SPSS Inc., 2000) was used to randomly select 50% of the study sample. After splitting the sample, principal components analysis with promax rotation was conducted on the 10 items comprising the QSU-Brief using SPSS 11.0 on half of the sample (*n* =288). Confirmatory factor analyses were then calculated using SAS 8.0 for Windows (SAS Institute, Inc., 1999) on the other half of the sample (*n* =288).

The first model (i.e., Model 1) tested with confirmatory factor analysis in the current study evaluated the factor model that was determined from exploratory factor analysis. Because it was unknown whether this model would provide a good fit to the data, based on previous research two additional models were also assessed. Items 2 and 5 displayed multiple dual loadings in the original QSU-Brief study (Cox et al., 2001). Therefore, a two-factor model that excluded items 2 and 5 was tested. Model 2 contained five items in Factor 1 (i.e., items 1, 3, 6, 7, 10) and three items in Factor 2 (i.e., items 4, 8, 9). Last, consistent with the analysis of

Kozlowski et al. (1996) on the 32-item QSU, a two-factor model that included only the most robust items from the original QSU-Brief analysis was tested. In this instance, the model included only the items (i.e., items 1, 4, 6, 8, 9) that were assigned to factors in all four conditions in the original QSU-Brief study (Cox et al., 2001). Model 3 contained two items in Factor 1 (i.e., items 1, 6) and three items in Factor 2 (i.e., items 4, 8, 9). For Models 1 and 2, it was hypothesized that the first factor would be associated with a strong desire to smoke, with smoking perceived as rewarding, and the second factor would be related to relief of negative affect with an urgent desire to smoke. For Model 3, it was theorized that Factor 1 would be related to a strong desire to smoke, and Factor 2 would represent relief of negative affect with an urgent desire to smoke. The items that relate to the rewarding aspects of smoking from Factor 1 of the 10-item QSU-Brief were not included in Model 3, so this aspect of craving was not assessed with this model. Reliability data was estimated for the model that represented the best fit for the data.

For each of the confirmatory factor analytic models, both covariance and correlation matrices were calculated using the CALIS procedure and parameters were estimated using maximum likelihood. The covariance matrix was analyzed to evaluate all of the fit indices except the Root Mean Square Residual (RMSR), for which the correlation matrix was used. The following model fit indices were considered: the chi-square statistic (Hatcher, 1994a), the Goodness of Fit Index (GFI; Mulaik et al., 1989), the Non-Normed Fit Index (NNFI; Bentler & Bonett, 1980), the Comparative Fit Index (CFI; Bentler, 1990), the RMSR (Hu & Bentler, 1999), and the Root Mean Square Error of Approximation (RMSEA; Brown & Cudeck, 1993). To show a good fit for the model, the chi-square statistic should be non-significant (Floyd & Widaman, 1995). The GFI, NNFI, and CFI range between 0 and 1, with values closer to 1 indicating a better fit for the model. For these indices, values of .95 or higher are most desirable, and values of .90 or greater represent an acceptable model fit to the data (Hu & Bentler, 1999; McDonald & Ho, 2002). To demonstrate good fit, the RMSR should be less than .08 (Hu & Bentler, 1999). Regarding the RMSEA as a measure of good fit, Brown and Cudeck (1993) suggest that ideally the RMSEA should be less than .08, and Hu and Bentler (1999) posit a cutoff of close to .06 to show good fit.

3. Results

3.1. Exploratory factor analysis

Principal components analysis with promax rotation was performed on the 10 items comprising the QSU-Brief. Rotation was used to enhance the scientific utility and interpretability of the component solution (Tabachnick & Fidell, 1996). This analysis revealed two factors with eigenvalues greater than 1, accounting for 74.9% of the total variance. In addition, the scree plot demonstrated a break in slope between components 2 and 3. Therefore, a two-factor solution was selected (Zwick & Velicer, 1986).

To demonstrate good simple structure, only items that loaded over .40 on one factor and less than .40 on all other factors were assigned to factors (Hatcher, 1994b). Factor 1 contained six items, and Factor 2 contained four items. These items and their loadings are displayed in Table 1.

3.2. Confirmatory factor analysis

As presented in Table 2, the fit indices for Models 1 and 2 showed an inadequate fit, and Model 3 showed a very good fit for the data. The chi-square for this model was nonsignificant [$\chi^2(4, N=288)=6.85$, $p > .05$]. Each of the indices that should approach “unity” (i.e., the GFI, NNFI, and CFI) appeared adequate in Model 3. In addition, both the RMSR and the RMSEA values

in this model indicated an acceptable fit. Therefore, Model 3 was considered the best explanation of the data.

Table 3 shows the standardized factor loadings and *t* values for Model 3. The factor structure coefficient for each item ranged from .60 to .99. To assess convergence of manifest indicators on a common factor, *t* tests were conducted on the factor loadings. When a *t* value is greater than 2.0, it is considered meaningful (Jöreskog & Sörbom, 1993). Since, all *t* values in Model 3 were above 2.0, this suggests that all items are likely measuring a common construct.

The correlation between the two factors in Model 3 was .56. A confidence interval test can be used in confirmatory factor analysis to assess discrimination between two factors. With this test, a confidence interval of plus or minus two standard errors around the correlation between the factors is calculated. Good discrimination is demonstrated if this interval does not include 1.0 (Hatcher, 1994a). In Model 3, the confidence interval was .47 to .66. Thus, as the confidence interval does not include 1.0, the two-factor structure measured with this model demonstrated good discrimination between the factors, indicating that the two factors of interest are distinct constructs.

3.3. Reliability

Internal consistency was measured to evaluate the degree of homogeneity or consistency of the items within the scale. For Model 3, reliability of the items was shown to be good for both Factor 1 (i.e., items 1 and 6; Coefficient alpha=.91) and Factor 2 (i.e., items 4, 8, and 9; Coefficient alpha=.80).

4. Discussion

The present study is the first to investigate the factor structure of the QSU-Brief reported by Cox et al. (2001). Additionally, it is the first psychometric investigation of the QSU-Brief to utilize the seven-point Likert-type scoring set from the original Tiffany and Drobes (1991) study of the QSU. Using a sample of smokers presenting for treatment in clinical trials for smoking cessation, the QSU-Brief was evaluated using both exploratory and confirmatory factor analytic techniques. When the 10-item version of the QSU-Brief was initially examined using principal components analysis, the outcome revealed a two-factor structure that supported the results of Cox et al. (2001). However, when later tested using confirmatory factor analysis, the initial model found using principal components analysis showed an overall inadequate fit to the data. Due to the fact that items 2 and 5 displayed multiple dual loadings in the initial analyses of Cox et al. (2001), a model that excluded items 2 and 5 was tested, and this model also showed a poor fit. Only the third model, which included solely the most robust items from the original QSU-Brief analysis (Cox et al., 2001), showed a good fit to the data. This model also demonstrated good reliability in the present study. In accordance with the results of Cox et al. (2001), the first factor represented an intention or desire to smoke, and the second factor related to relief of negative affect with an urgent desire to smoke. The items from Factor 1 of the 10-item QSU-Brief that relate to the rewarding aspects of smoking were not included in Model 3, so this aspect of craving was not captured by this model.

Thus, the current results seemed initially supportive of the factor structures reported by Cox et al. (2001). However, when subjected to confirmatory factor analysis, which allows for a more stringent analysis of the data, the evidence presented in the present study revealed that the data was best explained by a shortened form of the QSU-Brief. These results echo the findings of both Kozlowski et al. (1996) and Toll et al. (2004), in which the initial factor solution of the 32-item QSU presented by Tiffany and Drobes (1991) was not validated using confirmatory factor analysis. Instead, a model that included a shortened form of the QSU using only the most robust items from the initial factor analysis was found to fit the data best.

Accordingly, in the present study, confirmatory factor analysis revealed that only the model using the most robust items from the initial factor analysis by Cox et al. (2001) fit the data. It appears that it is only the most robust items of both the QSU and the QSU-Brief that are amenable to confirmatory factor analytic techniques.

Cox et al. (2001) briefly discussed the possibility that the QSU-Brief might be used as a global craving measure. While this type of measure might be possible, the results of the Cox et al. study, the present study, and almost all of the studies analyzing the factor structure of the 32-item version of the QSU found evidence for a multidimensional nature of craving (Davies, Wilner, & Morgan, 2000; Tiffany & Drobes, 1991; Toll et al., 2004). Indeed, even the study that argued for a unidimensional factor structure for the QSU (i.e., Kozlowski et al., 1996) provided evidence for a two-factor structure for the scale. In the current study, the two factors appear to represent two distinct constructs as evidenced by the fact that the confidence interval test demonstrated good discrimination between the factors. This suggests that this shortened form of the QSU-Brief is made up of two distinct factors characterized by intention and desire to smoke in the first factor and relief of negative affect with an urgent desire to smoke in the second factor.

Regarding whether or not multiple aspects of craving should be assessed, there is growing evidence that such measurement provides a more thorough assessment of the nature of cravings, as differential outcomes across the two factors of the QSU have been demonstrated in several studies. For example, Eissenberg, Adams, Riggins, and Likness (1999) examined the relationship between tobacco use and gender and found that women reported significantly lower scores than men in a gender by time interaction for Factor 2 of the QSU. Since gender is an important topic in nicotine and tobacco research (Piper, Fox, Welsch, Fiore, & Baker, 2001), this is a potentially important finding, which would not have been possible without a multifactorial assessment of urges. In an investigation of the effects of alcohol consumption on craving to smoke, Burton and Tiffany (1997) found that in comparison to placebo subjects, subjects drinking alcohol reported significantly greater urges to smoke on only Factor 2 of the QSU, with no effects found for Factor 1. As heavy drinking is prevalent among smokers (Shiffman & Balabanis, 1996), this may be an important finding, which again relied on a multifactorial evaluation of tobacco craving. Clearly, an evaluation of both factors of the QSU made for a more thorough examination of cravings in the studies reviewed above, and important differences were found between the factors. These differences may be relevant clinically, as treatments may need to be tailored to address multiple aspects of craving. The QSU-Brief is a relatively new instrument, so there are no studies yet which show differential outcomes across factors like those described for the QSU. However, given the fact that several studies found differences across QSU factors, it is likely that such differences will be apparent for the QSU-Brief, and it will be important for future studies to determine if such differences are present.

There are limitations to making comparisons between the current study and the original QSU-Brief study (Cox et al., 2001). First, the sample in the present study can probably best be compared to the outpatient clinic setting in Study 2 of Cox et al. (2001), given that these were smokers presenting for treatment, whereas their Study 1 used laboratory participants. Second, it may be inequitable to directly compare the results of the current study to those presented by Cox et al. (2001), due to the discrepancy in the scoring sets between the studies. Instead, it might be better to view them as two distinct questionnaires.

In conclusion, it is apparent from the present results that a shortened form of the QSU-Brief can be used with the original seven-point scoring set as a reliable assessment of the dual nature of urges originally proposed by Tiffany and Drobes (1991). Taken together with the results of Kozlowski et al. (1996) and Toll et al. (2004), these findings provide evidence that only the most robust items from the QSU and QSU-Brief are amenable to confirmatory factor analysis.

Furthermore, the shortened form of each of these two questionnaires using these robust items may provide a superior format of each scale both clinically and psychometrically. In light of the present findings, it will be important for future studies to confirm the two-factor structure of the five-item QSU-Brief presented in this study using both the seven-point and 100-point scoring sets, and it will also be essential for future studies to assess the predictive validity of the scale.

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References

Bell SL, Taylor RC, Singleton EG, Henningfield JE, Heishman SJ. Smoking after nicotine deprivation enhances cognitive performance and decreases tobacco craving in drug abusers. Nicotine and Tobacco Research 1999;1:45–52. [PubMed: 11072387]

Bentler PM. Comparative fit indexes in structural models. Psychological Bulletin 1990;107:238–246. [PubMed: 2320703]

Bentler PM, Bonett DG. Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin 1980;88:588–606.

Brown, MW.; Cudeck, R. Alternative ways of assessing model fit. In: Bollen, KA.; Long, JS., editors. Testing structural equation models. Newbury Park, CA: Sage; 1993. p. 136-162.

Burton SM, Tiffany ST. The effect of alcohol consumption on craving to smoke. Addiction 1997;92:15–26. [PubMed: 9060194]

Cepeda-Benito A, Henry KC, Gleaves DH, Fernandez MC. Cross-cultural investigation of the questionnaire of smoking urges in American and Spanish smokers. Assessment 2004;11:152–159. [PubMed: 15171463]

Cepeda-Benito A, Tiffany ST. The use of a dual-task procedure for the assessment of cognitive effort associated with cigarette craving. Psychopharmacology 1996;127:155–163. [PubMed: 8888382]

Cox LS, Tiffany ST, Christen AG. Evaluation of the brief questionnaire of smoking urges (QSU-Brief) in laboratory and clinical settings. Nicotine and Tobacco Research 2001;3:7–16. [PubMed: 11260806]

Davies GM, Willner P, Morgan MJ. Smoking-related cues elicit craving in tobacco “chippers”: A replication and validation of the two-factor structure of the Questionnaire of Smoking Urges. Psychopharmacology 2000;152:334–342. [PubMed: 11105944]

Drobes DJ, Tiffany ST. Induction of smoking urge through imaginal and in vivo procedures: Physiological and self-report manifestations. Journal of Abnormal Psychology 1997;106:15–25. [PubMed: 9103714]

Eissenberg T, Adams C, Riggins EC, Likness M. Smokers’ sex and the effects of tobacco cigarettes: Subject-rated and physiological measures. Nicotine and Tobacco Research 1999;1:317–324. [PubMed: 11072428]

Elash CA, Tiffany ST, Vrana SR. Manipulation of smoking urges and affect through a brief-imagery procedure: Self-report, psychophysiological, and startle probe responses. Experimental and Clinical Psychopharmacology 1995;3:156–162.

Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. Psychological Assessment 1995;7:286–299.

Guillin O, Krebs MO, Bourdel MO, Olie JP, Loo H, Poirer MF. Validation de la traduction francaise et de la structure factorielle du Questionnaire sur l’urgence a fumer de Tiffany et Drobes (QSU). [Validation of the French translation and factorial structure of the Tiffany and Drobes Smoking Urge Questionnaire (QSU).]. Encephale 2000;26:27–31. [PubMed: 11217535]

Hatcher, L. A step-by-step approach to using the SAS system for factor analysis and structural equation modeling. Cary, NC: SAS Institute Inc.; 1994a.

Hatcher, L. A step-by-step approach to using the SAS system for univariate and multivariate statistics. Cary, NC: SAS Institute Inc.; 1994b.

Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional versus new alternatives. Structural Equation Modeling 1999;6:1–55.

Jöreskog, KG.; Sörbom, D. LISREL 8 User's reference guide. Chicago: Scientific Software; 1993.

Kozlowski LT, Pillitteri JL, Sweeney CT, Whitfield KE, Graham JW. Asking questions about urges or cravings for cigarettes. Psychology of Addictive Behavior 1996;10:248–260.

McDonald RP, Ho M-H, R. Principles and practice in reporting structural equation analyses. Psychological Methods 2002;7:64–82. [PubMed: 11928891]

Mueller V, Mucha RF, Ackermann K, Pauli P. Die Erfassung des Cravings bei Rauchern mit einer deutschen Version des "Questionnaire on Smoking Urges" (QSU-G). [The assessment of craving in smokers with a German version of the "Questionnaire on Smoking Urges" (QSU-G).]. Zeitschrift fur Klinische Psychologie 2001;30:164–171.

Mulaik SA, James LR, Van Alstine J, Bennett N, Lind S, Stilwell CD. Evaluation of goodness-of-fit indices for structural equation models. Psychological Bulletin 1989;105:430–445.

Piper ME, Fox BJ, Welsch SK, Fiore MC, Baker TB. Gender and racial/ethnic differences in tobacco dependence treatment: A commentary and research recommendations. Nicotine and Tobacco Research 2001;3:291–297. [PubMed: 11767718]

SAS Institute, Inc. The SAS System for Windows, Version 8.0. Cary, NC: SAS Institute, Inc; 1999.

Shadel WG, Niaura R, Abrams DB. Does completing a craving questionnaire promote increased smoking craving? An experimental investigation. Psychology of Addictive Behaviors 2001;15:265–267. [PubMed: 11563807]

Shiffman S, Balabanis M. Do drinking and smoking go together? Alcohol Health and Research World 1996;20:107–110.

SPSS, Inc. SPSS for Windows, Release 11.0.0. Chicago: SPSS, Inc; 2000.

Tabachnick, BG.; Fidell, LS. Using multivariate statistics. 3. Northridge, CA: Harper Collins Publishers; 1996.

Tiffany ST, Cox LS, Elash CA. Effects of tranSDermal nicotine patches on abstinence-induced and cue-elicited craving in cigarette smokers. Journal of Consulting and Clinical Psychology 2000;68:223–240.

Tiffany ST, Drobes DJ. The development and initial validation of a questionnaire on smoking urges. British Journal of Addiction 1991;86:1467–1476. [PubMed: 1777741]

Toll BA, McKee SA, Krishnan-Sarin S, O'Malley SS. Revisiting the factor structure of the Questionnaire on Smoking Urges. Psychological Assessment 2004;16:391–395. [PubMed: 15584799]

Zwick WR, Velicer WF. Comparison of five rules for determining the number of components to retain. Psychological Bulletin 1986;99:432–442.

Table 1

Rotated two-factor matrix for the QSU-Brief (N =288)

Item	Factor 1	Factor 2
1. I have a desire for a cigarette right now.	.95	−.11
2. Nothing would be better than smoking a cigarette right now.	.61	.32
3. If it were possible, I probably would smoke right now.	.98	−.20
4. I could control things better right now if I could smoke.	.07	.83
5. All I want right now is a cigarette.	.39	.60
6. I have an urge for a cigarette.	.82	.09
7. A cigarette would taste good right now.	.72	.21
8. I would do almost anything for a cigarette right now.	.04	.89
9. Smoking would make me less depressed.	−.28	1.00
10. I am going to smoke as soon as possible.	.82	−.07

Note. Promax rotation method was used.

Table 2

Fit indices for the confirmatory factor models of the QSU-Brief

Model	χ^2	*df*	*p*	GFI	NNFI	CFI	RMSR	RMSEA
1	224.76	34	<.05	.86	.88	.91	.07	.14
2	190.61	19	<.05	.87	.82	.88	.10	.18
3	6.85	4	>.05	.99	.99	1.00	.02	.05

Note: GFI = Goodness of Fit Index; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index; RMSR = Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation. *N* =288 for chi-squares.

Table 3

Factors, items, item factor loadings, and t values for confirmatory factor analysis of the QSU-Brief (Model 3; *n* =288)

Factor and item	Loading	*t*
Factor 1 — Intention/Desire to Smoke		
I have a desire for a cigarette right now.	.85	15.55
I have an urge for a cigarette.	.99	18.69
Factor 2 — Relief of Negative Affect and Urgent Desire to Smoke		
I could control things better right now if I could smoke.	.85	15.72
I would do almost anything for a cigarette right now.	.81	14.98
Smoking would make me less depressed.	.60	10.36