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# Validation of a Scale for the Assessment of Food Cravings among Smokers

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## Abstract

Weight gain associated with smoking cessation impedes attempts to quit smoking and may lead to obesity. One factor that might contribute to weight gain is cravings for sweet or rich foods. To date, no reliable measure exists for evaluating these cravings. The purpose of the current study was to validate an assessment of craving for sweet or rich foods for use among smokers. With a sample of 385 smokers enrolled in a clinical trial for smoking cessation, the study examined the factor structure, internal consistency, and convergent and predictive validity of the Questionnaire on Craving for Sweet or Rich Foods (QCSRF). A two-factor model best represented the data. Factor 1 contained six items assessing perceptions about the ability of sweet or rich foods to relieve negative affect and about self-control over eating. Factor 2 contained three items assessing the intensity of cravings. Both factors demonstrated high internal consistency and good convergent and predictive validity. These results suggest the QCSRF is a reliable and valid measure for examining cravings for sweet or rich foods among smokers.

### Keywords

food craving; sweet; rich; smoking; weight gain

## Introduction

People who quit smoking gain an average of 10 to 13 pounds within the first 1 to 2 years of quitting (Hudmon et al., 1999; Klesges et al. 1997). This weight gain often prevents successful attempts to quit smoking (Borrelli & Mermelstein, 1998; Meyers et al., 1997; Ockene et al., 2000) and may lead to obesity (Koh-Banerjee et al., 2003). Post-cessation weight gain has been attributed to several processes, including changes in metabolism related to a reduction in nicotine intake (Perkins, 1992) and an increase in the body weight set point among smokers who quit (Cabanac & Frankham, 2002; Perkins, 1993). Another primary contributing factor to weight gain after quitting smoking is eating more (Perkins, 1993). After smoking cessation, individuals may eat more calorie-dense foods (Grunberg, 1982; Hall et al., 1989) and more total calories per day (e.g, Hatsukami, LaBounty, Hughes, & Laine, 1993; Perkins, Epstein, & Pastor, 1990; Spring et al., 1991). Increases in caloric intake during smoking abstinence tend

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to occur in the presence of simultaneous cigarette and food cravings (Kos, Hasenfratz, & Battig, 1996), and in general, increased caloric consumption has been associated with food craving, particularly craving for sweet or rich foods (Mercer & Holder, 1997).

Research on food craving has been somewhat scarce (see Weingarten & Elston, 1990 for a review) and specific to studies involving bulimics (Waters, Hill, & Waller, 2001), menstruating (Cohen, Sherwin, & Fleming, 1987; Kurzer, 1997; Michener, Rozin, Freeman, & Gale, 1999) or pregnant women (Worthington-Roberts, Little, Lambert, & Wu, 1989), and "chocolate addicts" (Bruinsma & Taren, 1999; Macdiarmid & Hetherington, 1995). However, this limited literature on food craving among these specific populations bears many similarities to larger bodies of research on craving in other domains (Weingarten & Elston, 1990). Research on craving for cigarettes (Heishman, Singleton, & Moolchan, 2003; Shadel, Niaura, & Abrams, 2004; Willner, Hardman, & Eaton, 1995), alcohol (Sinha & O'Malley, 1999), and other drugs of abuse (Weinstein et al., 1998) is far more plentiful and provides a window into the areas of food craving that have yet to be explored.

One such topic that has been investigated only minimally in food craving research is its conceptualization. That is, does craving represent a unified construct, or does it have a multidimensional nature? A review of drug craving measures supports the idea that craving is best described and assessed in terms of multiple constructs (Sayette et al., 2000; Tiffany & Drobes, 1991). Accordingly, studies on cigarette and marijuana use have conceptualized craving with separate constructs relating to the intensity of desires or cravings, the anticipation of the immediate effects of fulfilling cravings or urges, and the intentions to satisfy these cravings (Heishman, Singleton, & Moolchan, 2003; Singleton et al., 2002; Tiffany, 1990). The Food Craving Questionnaire (FCQ; Cepeda-Benito, Gleaves, Williams, & Erath, 2000), used primarily in eating disorders research, also characterizes craving as multidimensional, with factors representing constructs similar to those used to conceptualize drug craving.

Another well-researched aspect of cravings for tobacco and other drugs, which has shed some light on preliminary food craving research, involves the biochemical mechanisms hypothesized to underlie craving. Several neurological pathways have been implicated in drug use, craving, and addiction including those related to neurotransmitters such as dopamine, opioid peptides, serotonin, GABA, and glutamate (Koob, 2000). Like drug craving, craving for foods, especially those high in sugar and fat, may also involve the opioid reward system (e.g., Drewnowski, 1992, Mercer & Holder, 1997) and the serotoninergic system (Wurtman & Wurtman, 1995). In particular, changes in endogenous opioid activity may elicit food craving and result from food intake (Mercer & Holder, 1997), and certain levels of brain serotonin may trigger cravings for foods rich in carbohydrates and fats and result from satisfying these cravings (Wurtman & Wurtman, 1995).

The notion that the same biological processes and chemicals associated with cravings for substances of abuse are implicated in cravings for sweet or rich foods is of particular interest to researchers of smoking cessation and weight gain. Because both eating sweet, rich foods and smoking may affect levels of endogenous opioids and serotonin, cravings for sweet or rich foods and cigarette cravings may co-occur during attempts to quit smoking. Furthermore, satisfaction of either type of craving may alleviate the need to satisfy the other. Accordingly, several controlled studies have shown that food deprivation increases self-administration of nicotine (de la Garza & Johanson, 1987; Donny et al., 1998) and nicotine craving (Saules et al., 2004) and that smoking deprivation increases food consumption (Hatsukami, LaBounty, Hughes, & Laine, 1993), particularly that of sweet foods (Rodin, 1987). Hence, some smokers attempting cessation may experience cravings for sugary foods, which tend to be high in fat and calories and to lead to weight gain. Although research on the relationship between smoking cessation and sweet cravings is equivocal (e.g., Pomerleau, Garcia, Drewnowski, & Pomerleau,

1991), studies indicating that glucose may reduce cigarette cravings and withdrawal discomfort after quitting smoking (McRobbie & Hajek, 2004; West, 2001) support this idea.

Despite studies that point to a relationship between smoking and craving for sweet or rich foods, a standard scale for testing this relationship or these types of cravings has not been developed. Various measures of food craving have been created for specific use among eating-disordered and other populations (e.g., Gendall, Joyce, Sullivan, & Bulik, 1998), and scales have been designed to measure cravings very narrowly with lists of specific foods (Harvey, Wing, & Mullen, 1993; White et al., 2002) or very broadly with questions about food craving in general (Cepeda-Benito, Gleaves, Williams, & Erath, 2000). Still, no published scale exists to assess cravings for sweet or rich foods, despite evidence suggesting that foods from this category may be craved often, particularly among smokers, and may contribute largely to excess caloric intake and weight gain associated with quitting smoking.

Thus, the purpose of the current study was to refine and validate a self-report questionnaire for the assessment of craving for sweet or rich foods among smokers. To this end, this study examines the factor structure, internal consistency, and convergent and predictive validity of the Questionnaire on Cravings for Sweet or Rich Foods (QCSRF).

## Method

### Participants

The study sample included 385 daily smokers (48.1% female; 87.3% white) enrolled in a clinical trial comparing the effectiveness of the nicotine patch in combination with placebo or naltrexone for smoking cessation (O'Malley et al., 2006). Participants were eligible for the trial if they were at least 18 years of age, smoked an average of at least 20 cigarettes per day for at least one year, and had a baseline expired carbon monoxide (CO) level of at least 10 ppm. Participants were excluded for unstable medical or psychiatric problems, current alcohol dependence, or opiate use. The mean age of eligible participants was 45.95 (*SD* = 11.17), and the mean number of cigarettes smoked per day was 27.70 (*SD* = 10.30). On average, participants reported having smoked for 28.67 years (*SD* = 11.09).

### Materials

The Questionnaire on Craving for Sweet or Rich Foods (QCSRF) is a 14-item, self-report measure adapted from the Alcohol Urge Questionnaire (Bohn, Krahn, & Staehler, 1995) by M.J. Bohn and D. Krahn (personal communications), who originally developed these items to assess food cravings among alcohol dependent individuals whose reported cravings for sweet and rich foods increase after abstaining from alcohol. The QCSRF contains one question on craving sweet or rich foods "at this moment" and five questions on craving these foods "during the past week," which are rated on a seven-point scale from "none at all" to "more than ever." Eight additional questions assess current cravings and are formatted according to the Alcohol Urge Questionnaire (Bohn, Krahn, & Staehler, 1995), with cravings rated on a seven-point Likert-type scale from "strongly disagree" to "strongly agree".

The Weight Control Subscale of the Smoking Consequences Questionnaire-Adult (SCQ; Copeland, Brandon, & Quinn, 1995) is a 5-item subscale of the 55-item self-report SCQ that assesses nicotine expectancy factors (negative consequences, positive reinforcement, sensory satisfaction, negative reinforcement, negative affect reduction, and weight control). Subjects rate the likelihood of each item on a 10-point Likert scale from 0 to 9. The SCQ has been validated among current smokers, ex-smokers, and individuals entering smoking cessation treatment and has demonstrated good reliability (subscale coefficient alphas ranged from .83

to .96.) Scores on the Weight Control Subscale of the SCQ are consistently higher for women than men (Cepeda-Benito & Ferrer, 2000; Copeland, Brandon, & Quinn, 1995).

The Dieting and Bingeing Severity Scale (DBSS; Kurth, Krahn, Nairn, & Drewnowski, 1995) is a 25-item survey that classifies individuals according to the frequency and severity of dieting and bingeing behaviors. The DBSS has been validated with the Structured Clinical Interview for DSM-III-R (SCID) in a sample of college women and has demonstrated adequate reliability (Cronbach's alpha = .77). The DBSS is useful for identifying risk factors for developing eating disorders including binge eating, excessive weight control behaviors, and extreme concerns about eating and body weight/shape. Individuals with excessive concerns about weight and shape are identified according to their responses to the following three items: "I feel out of control when I eat"; "I am terrified of gaining weight"; and "I feel satisfied with the shape of my body". These items have the following descriptors: "never", "rarely", "sometimes", "often", "always". To meet criteria for excessive concerns, respondents need to endorse at least two of these questions as either "often" or "always" on the first two questions or "never" or "rarely" on the third question.

Basic demographic information (e.g., age, gender, and race) and smoking background were assessed at baseline. Smoking background included current smoking status as well as smoking history, such as number of cigarettes smoked per day, number of years smoked, number and length of quit attempts, and amount of weight gained in previous attempts to quit smoking. The Timeline Follow-back interview method (Sobell & Sobell, 1992, 2003) was used to obtain reports of daily cigarette use at baseline and during treatment. Carbon monoxide levels (CO) were also obtained to verify smoking abstinence.

### Procedure

The QCSRF, DBSS (Kurth, Krahn, Nairn, & Drewnowski, 1995), and the Weight Control Subscale of the SCQ (Copeland, Brandon, & Quinn, 1995) were administered, as parts of a larger battery of questionnaires, to all participants as baseline assessments before they attempted to quit smoking. At intake and at each of the six weekly appointments during treatment, weight, carbon monoxide levels (CO) and reports of daily cigarette use were obtained. The QCSRF was readministered at each of these appointments during treatment. During treatment, all subjects received 21 mg transdermal nicotine patches for six weeks, beginning on the day they were scheduled to quit smoking. In addition, subjects were randomized to receive either placebo naltrexone or one of three doses of active naltrexone beginning on the day after their quit date. Smoking abstinence during treatment was defined as no smoking, not even a puff, and was verified by an exhaled CO level of 10 ppm or less. Additional details about the study can be found in O'Malley et al. (2006).

Baseline data for the entire sample was used to investigate the factor structure and the convergent validity of the QCSRF. Predictive validity was tested only for those in the placebo naltrexone group (n = 90).

## Results

### Factor Analysis

A principal components analysis with varimax rotation was performed on the 14 items comprising the QCSRF using SPSS 11.0 for Windows (SPSS, Inc., 2000). Rotation was used to enhance the scientific utility and interpretability of the component solution (Tabachnick & Fidell, 1996). This analysis revealed three factors with eigenvalues greater than 1, accounting for 66.1% of the total variance. However, the scree plot demonstrated a break in slope between components 2 and 3, suggesting a two-factor solution (Zwick & Velicer, 1986). In addition,

the third component accounted for only 7.5% of the variance and included only two items with meaningful loadings. Therefore, a second principal components analysis was conducted with varimax rotation that forced a two-factor solution.

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, 1994). Factor 1 contained six items, and Factor 2 contained three items. These items and their loadings are displayed in Table 1.

The content of the items from each factor was examined and used to develop factor interpretations and subscale/factor names. Factor 1 appeared to assess perceptions about the ability of sweet or rich foods to relieve negative affect and about levels of self-control over eating. Therefore, this factor was named "Relief/Control." Higher scores on this factor represented higher expectations that food would relieve negative affect and lower expectations that one would have control over eating. Factor 2 measured the intensity of desire for sweet or rich food in the past week; therefore, this factor was named "Intensity." Higher scores on these items related to more intense urges.

## Reliability

In order to evaluate the degree of homogeneity or consistency of the items within the scale for each factor, alpha reliability coefficients were calculated. Internal-consistency reliability of the QCSRF was good for both the Relief/Control Factor (coefficient alpha = .87) and the Intensity Factor (coefficient alpha = .90; DeVellis, 1991).

## Convergent Validity

Research suggests that individuals who engage in weight control efforts or who are concerned about controlling their weight experience food cravings more often than individuals who are not concerned about controlling their weight (Gendall et al., 1997; Lafay et al., 2001; Pelchat, 1997). Therefore, we compared QCSRF scores to scores on the Weight Control Subscale of the SCQ (Copeland, Brandon, & Quinn, 1995) and on the Dieting and Bingeing Severity Scale (Kurth et al, 1995) in order to examine convergent validity (the evidence of similarity between two related constructs; DeVellis, 1991).

For the SCQ, we first classified participants into two groups based on their SCQ Weight Control subscale scores: those who smoked for weight control (i.e., weight-control smokers; the top third of the sample) and those who did not (i.e., non-weight-control smokers; the bottom third of the sample). Then, QCSRF scores were analyzed using independent samples t-tests for each factor. For the Relief/Control Factor, there was a significant difference between the groups, $t$ (256) = −3.56, $p < .05$, with weight-control smokers having higher scores ($M$ = 8.71, $SD$ = 4.37) as compared to non-weight-control smokers ($M$ = 6.85, $SD$ = 4.01). For the Intensity Factor, there was also a significant difference between groups, $t$ (257) = −2.83, $p < .05$, with weight-control smokers again having higher scores (M = 12.89, SD = 7.16) as compared to the non-weight-control group ($M$ = 10.52, $SD$ = 6.21). These results support the idea that food cravings are experienced more in individuals who smoke for weight control and provide evidence of good convergent validity for both factors of the QCSRF.

We then classified individuals according to whether or not they had excessive concerns about weight and body shape based on DBSS scores. Individuals who met DBSS criteria for excessive weight concern had higher Relief/Control Factor scores ($M$ = 14.51, $SD$ = 8.72) and higher Intensity Factor scores ($M$ = 9.00, $SD$ = 5.03) than those who did not meet these criteria ($M$ = 11.07, $SD$ = 6.14), $t$ (372) = −3.32, p < .05), and ($M$ = 7.51, $SD$ = 4.07), $t$ (370) = −2.24, $p < .05$), for each of these factors respectively. Similarly, those who indicated on the DBSS that

they had ever exercised for weight control reported more intense food cravings ($M$ = 8.13, $SD$ = 4.15), as indicated by higher Intensity Factor scores, than those who had never exercised for weight control ($M$ = 6.89, $SD$ = 4.23), $t$ (370) = −2.75, $p < .05$). Those whose DBSS responses indicated that they had ever had an eating binge reported higher Relief/Control Factor scores ($M$ = 12.86, $SD$ = 7.79) than those who had never had one ($M$ = 10.92, $SD$ = 5.90), $t$ (372) = −2.64, $p < .05$). Accordingly, DBSS reports of more frequent dieting were also associated with higher Relief/Control Factor scores ($r$ (374) = .11, $p < .05$) and higher Intensity Factor scores ($r$ (372) = .11, $p < .05$).

## Predictive Validity

In order to examine predictive validity, we analyzed how QCSRF scores related to weight gain and to success at quitting smoking using data from the participants in the placebo group. First, because smoking cessation is associated with weight gain (Hudmon et al., 1999; Klesges et al. 1997), which could be related in part to eating in response to cravings, we investigated the convergence of the QCSRF with weight gain. When we examined weight gain reported during prior attempts at smoking cessation, we found that higher Intensity Factor scores at baseline (i.e., week 0) were associated with the reported amount of weight gained in previous quit attempts ($r$ (289) = .16, $p < .05$). We then examined the relationship between weight gain from baseline to week 6 for successful quitters in the placebo group only (n = 35) and the QCSRF, using area under the curve scores. When attempting to detect relationships between repeated measures and another variable, the “area under the curve” (AUC) can be calculated to account for multiple time points. One advantage of using this method is that multiple comparisons, which represent problems for statistical analyses, are not needed. Using a standard method, we computed the AUC for all QCSRF time points (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). We then used a median split to classify subjects with regard to weight gain (i.e., participants that gained 5 pounds or less and those that gained over 5 pounds) and compared these two groups. These analyses did not show a relationship between AUC for the Relief/Control Factor. However, participants who gained less weight over the course of the study treatment had somewhat higher AUC scores on the Intensity Factor ($M$ = 322.00, $SD$ = 145.87) than those who gained more weight ($M$ = 245.75, $SD$ = 146.58), $t$ (29) = 1.45, $p$ = .16), although this effect was non-significant. The lack of significant relationships between the QCSRF factors and weight gain may have been due to the restricted range of weight gain during the initial weeks of quitting (week 6 weight change: $M$ = 4.40, $SD$ = 3.89) and the small sample size.

We then examined whether or not QCSRF scores would differ for participants who successfully abstained from smoking over the first week of treatment (n = 60) compared to participants who were unsuccessful in maintaining smoking abstinence during this period (n = 26). For the Relief/Control Factor, participants who quit smoking during the first week had significantly lower scores ($M$ = 11.05; $SD$ = 5.87) than those who reported smoking ($M$ = 14.23; $SD$ = 8.49), $t$ (84) = −2.01, $p < .05$). Similarly, there was a trend for participants who reported quitting to have lower Intensity Factor scores ($M$ = 7.42; $SD$ = 4.13) than those who smoked ($M$ = 9.08; $SD$ = 4.69), $t$ (84) = −1.64, $p$ = .10). These findings indicate that scores on both factors of the QCSRF are associated with quitting smoking, showing evidence of good predictive validity for the measure.

## Gender Differences

Research has shown that women, more often than men, experience food cravings in general (Lafay, et al., 2001) and cravings for sweets more than savory foods (Pelchat, 1997; Weingarten & Elson, 1991; Zellner et al., 1999). Although these studies included samples from the general population, which tends to consist of only a minority of smokers, we hypothesized that females in our smoking sample would also exhibit stronger cravings than male smokers. To test this

prediction, we compared scores between women and men on the two factors of the QCSRF. As expected, women exhibited higher Intensity Factor scores ($M$ = 8.14, $SD$ = 4.67) than men ($M$ = 7.25, $SD$ = 3.69), $t$ (374) = −2.05, $p < .05$. However, women and men did not differ significantly in Relief/Control Factor scores.

## Discussion

The goal of the current study was to refine and validate a food craving measure, the Questionnaire on Craving for Sweet or Rich Foods (QCSRF), for use among smokers. Psychometric analyses revealed two factors, one measuring perceptions about the ability of sweet or rich food to relieve negative affect and about self-control over eating and the other assessing the intensity of urges. The emergence of these two factors is consistent with research on craving for various drugs (Heishman, Singleton, & Moolchan, 2003; Singleton et al., 2002; Tiffany, 1990) and with findings from a measure of food craving used in research on bulimia (Cepeda-Benito, Gleaves, Williams, & Erath, 2000). In addition, the QCSRF demonstrated high internal consistency, and evidence was found for good convergent validity with measures of weight control and measures of dieting and bingeing behavior. Gender differences consistent with previous research (Lafay et al., 2001; Pelchat, 1997; Weingarten & Elson, 1991; Zellner et al., 1999) also emerged for the Intensity Factor of the QCSRF.

Good predictive validity was also demonstrated by showing an association between QCSRF scores and quitting smoking and past weight gain, but not with weight gained during the current quit attempt. Despite the significant association of QCSRF scores and weight gain during previous quit attempts, reports of craving during treatment did not significantly predict weight gain during treatment. Although this may be due to the restricted range of weight gain and the small sample size of the placebo group, this finding is in line with other research that shows a variable relationship between smoking cessation and weight gain (e.g., Filozof, Fernandez-Pinilla, & Fernandez-Cruz, 2004). The failure to find a closer correspondence between food cravings and weight gain is perhaps not surprising because individuals may engage in a range of behaviors that may ultimately influence how much weight they gain, for example, eating in response to craving, restricting food intake, or increasing exercise. Moreover, individuals with high food craving may resume smoking either to directly suppress weight gain or because the combined effort to resist eating and smoking diminishes their ability to succeed at smoking cessation by depleting their self-control resources (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Perkins, 1994; Perkins et al., 2001). Consistent with the hypothesis that food craving will predict smoking cessation failure, our study found that those who were unable to successfully maintain abstinence from smoking in the first week had higher food craving scores than those who were successful. These findings suggest that the QCSRF may provide a tool for investigating how food cravings and strategies to limit weight gain influence weight gain and the ability to quit smoking. This research could help identify and intervene with those smokers for whom cravings are a significant barrier to smoking cessation.

The present study had several limitations. First, many of the effect sizes of the indices of reliability and validity were small. However, smoking cessation research has clearly shown that small effects are often clinically relevant. For instance, a recent review of over 100 clinical trials of Nicotine Replacement Therapy revealed a small (Odds Ratio = 1.77; CI = 1.66–1.88) but clinically relevant effect (Silagey, Lancaster, Stead, Mant, & Fowler, 2004). Second, the sample for the study was limited to participants enrolled in a smoking cessation clinical trial and all received nicotine patches; additional validation of the scale using a sample of smokers not actively trying to quit or smokers who quit without the use of a medication may be beneficial. Third, because this was a preliminary investigation of the QCSRF and naltrexone treatment may have affected food cravings (Zimmerman et al., 1997), we limited some of our analyses to the placebo group. Future studies should test the reliability of the QCSRF at multiple

points in time prior to quitting smoking as well as compare QCSRF scores of smokers before and after cessation attempts and at various follow-ups.

A fourth limitation involves the questionnaire wording, specifically the terms “sweet or rich foods.” This wording was initially chosen because food craving research shows that sugary and fatty foods (e.g., chocolate) are those most frequently craved (Hill & Heaton-Brown, 1994), especially in the United States (Zellner et al., 1999). However, use of the word “or” makes it impossible to know the types of foods and their macronutrient composition. This is particularly important given that the serotonin effect of carbohydrate intake may only occur in the absence of protein (Wurtman & Wurtman, 1995). Also, the terms “cravings,” “sweet,” and “rich” were not defined for the subjects in the study, despite multiple possible interpretations of their meanings. However, these terms were used in all QCSRF questions, so any errors of interpretation were likely constant across conditions. Fifth, the QCSRF only measures cravings for foods classified as sweet or rich, whereas urges for other foods may also contribute to weight gain in smokers attempting to quit. For example, while women in studies primarily consisting of nonsmokers tend to crave sweet more than savory foods, the opposite may be true for men (Pelchat, 1997; Weingarten & Elson, 1991; Zellner et al., 1999). Although one study in smokers found increases in snacking without a shift in preference for sweet foods after one day of abstinence from smoking (Gilbert & Pope, 1982), commonalities in research on the biochemical pathways involved in smoking and food intake and cravings, as well as some controlled studies (e.g., McRobbie & Hajek, 2004; Perkins, Epstein, Sexton, & Pastor, 1990; Rodin, 1987; West, 2001), support the link between smoking and sweet or rich foods, in particular, as opposed to other types of foods. Moreover, many studies examine associations between drug dependency and cravings for sweets and not other types of foods (Mercer & Holder, 1997). Future work using this scale may benefit from: 1) including a more comprehensive measure of cravings (e.g., a specific food listing) or additional categories such as salty foods, and 2) providing definitions of “cravings,” “sweet” and “rich” to participants before they complete the assessment.

The current study investigated the psychometric properties of the QCSRF using a sample of smokers and provides evidence for its potential use as a valuable tool in studies of smokers and smoking cessation. Specifically, it could be used to expand upon past research on increases in caloric intake or weight gain after quitting smoking and to examine how medications may modify this relationship. Additionally, it would be interesting to examine correlations between QCSRF scores and scores on measures of craving for cigarettes and of withdrawal symptoms post-quit (e.g., QSU; Tiffany & Drobes, 1991; Minnesota Nicotine Withdrawal Scale; Hughes, 1992). Future research could also investigate the relationship between QCSRF scores and success with smoking cessation and how this relationship may be mediated by weight gain, weight concern, and the satisfaction of cravings for sweet or rich food.

The focus of the current study was to examine sweet or rich food cravings among smokers and hence was limited to a smoking sample. However, research in multiple domains suggests that food craving, particularly for sugar and fat, may play a significant role in a variety of psychological and physiological disorders including eating and mood disorders (Yanovski, 2003) as well as obesity (Delahanty et al., 2002) and diabetes (Strachan et al., 2004). Accordingly, the QCSRF could be used to investigate other non-smoking populations, particularly those with eating, metabolic, and other weight-related disorders.

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**Table 1**

Rotated Two-Factor Matrix for the Questionnaire on Craving for Sweet or Rich Foods (N=375)

| Item | Relief/Control Factor | Intensity Factor |
|---|---|---|
| 1. Rate the intensity of desire for sweet or rich food you feel at this moment. | *.54* | *.56* |
| 2. Rate your strongest desire for sweet or rich food during the past week. | .09 | **.88** |
| 3. Rate how intense your desire for sweet or rich food was, overall, during the past week. | .23 | **.87** |
| 4. To what extent have you thought about sweet or rich food? | .29 | **.84** |
| 5. When you have smelled sweet or rich food or seen someone eating or advertisements for food, how much have you been able to taste it? | *.45* | *.57* |
| 6. When you have passed by a grocery or other food store, how much do you feel a "need" to eat sweet or rich food? | *.51* | *.63* |
| 7. Having something sweet and rich to eat would make me feel less depressed. | **.62** | .32 |
| 8. I could easily control how much sweet and rich food I ate right now. | *−.32* | *−.38* |
| 9. I crave something sweet and rich to eat right now. | **.77** | .33 |
| 10. I would not enjoy having something sweet and rich right now. | *−.15* | *.34* |
| 11. Having something sweet and rich to eat would make me happier now. | **.81** | .21 |
| 12. I have an urge for something sweet and rich to eat. | **.78** | .27 |
| 13. I would be less irritable now if I could have something sweet and rich to eat. | **.83** | .15 |
| 14. I would not be able to control how much rich and sweet food I ate if I had something here to eat. | **.54** | .28 |

*Note*. Varimax rotation method was used. Bold items were assigned to factors. Italicized items loaded on both factors and were not assigned.