



## Psychometric properties of the English Food Cravings Questionnaire-Trait-reduced (FCQ-T-r)



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### ABSTRACT

Food cravings have been implicated in the development and maintenance of a range of eating- and weight-related pathology. The rapid and accurate assessment of food cravings is thus critical in clinical and research settings. Existing measures of specific food cravings are often not suitable for capturing the multiple facets of the craving experience. A short version of the Food Cravings Questionnaire-Trait (FCQ-T), the most widely used measure of general food cravings, was recently developed in German and shown to be a one-factorial, internally reliable measure. Other recent studies validated an Italian and Spanish version of the FCQ-T-reduced (FCQ-T-r) and successfully replicated its basic psychometrics. This study sought to examine the psychometric properties of the English version of the FCQ-T-r. Undergraduate students ( $n = 610$ , 51.0% female, 53.9% white/Caucasian) completed a battery of questionnaires containing the FCQ-T-r and measures of specific food cravings, eating style, eating disorder symptoms, weight dissatisfaction, and impulsivity. Even though results of a confirmatory factor analysis suggested poor fit with a one-factorial model, the FCQ-T-r was found to be a one-factorial measure in both principal component and parallel analysis. The FCQ-T-r demonstrated excellent internal consistency reliability (Cronbach's  $\alpha = .94$ ), and scores were significantly and positively correlated with measures of specific food cravings, restrained eating, eating disorder symptoms, and impulsivity. More work is needed to confirm the factor structure of the English FCQ-T-r, but preliminary findings suggest that it constitutes a valid and reliable alternative to lengthier measures of general food cravings.

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### 1. Introduction

Food cravings are strong urges for specific foods that frequently result in consumption of the desired substance (Forman et al., 2007; Hormes & Rozin, 2010). A growing body of research points to a role of food cravings in the development and maintenance of eating- and weight-related pathology. For example, cravings can trigger binge eating episodes in bulimic patients and obese individuals, and interfere with the successful maintenance of weight loss (Bjoervell, Roennberg, & Roessner, 1985; Forman et al., 2007; Kales, 1990; Lowe, 2003; Lowe & Levine, 2005). Consequently, there has been a recent increase in efforts to develop interventions specifically targeting food cravings (Alberts, Mulken, Smeets, & Thewissen, 2010; Batra et al., 2013; Forman et al., 2007; Hamilton, Fawson, May, Andrade, & Kavanagh, 2013; Meule, Freund, Skirde,

Vögele, & Kübler, 2012; Rodriguez-Martin, Gomez-Quintana, Diaz-Martinez, & Molerio-Perez, 2013).

The accurate assessment of cravings for food or other substances is challenging due to the subjective and oftentimes fleeting nature of the craving experience (Andrade, May, & Kavanagh, 2012). A majority of the available self-report measures of food cravings quantify urges for specific foods or food groups. Commonly used measures of this kind include the Food Craving Inventory (White, Whisenhurst, Williamson, Greenway, & Netemeyer, 2002), Attitudes to Chocolate Questionnaire (Benton, Greenfield, & Morgan, 1998; Müller, Dettmer, & Macht, 2007), and Orientation to Chocolate Questionnaire (Cartwright & Stritzke, 2008). While useful in some research and clinical applications, these measures are not suitable for capturing the multiple dimensions of general food cravings.

The most widely used measures of general food cravings are the Food Cravings Questionnaires, which are designed to assess craving as either a state (FCQ-S) or trait (FCQ-T) (Cepeda-Benito, Gleaves, Williams, & Erath, 2000). The FCQ-T is unique in that it does not specify a particular food, but instead quantifies a number of different facets of the general craving experience, including its physiological, affective, and cognitive dimensions. While the FCQ-T is frequently used and has been adapted and translated widely (Cepeda-Benito, Gleaves, Fernandez, Vila,

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Williams, & Reynoso, 2000; Meule & Hormes, 2015; Meule, Lutz, Vögele, & Kübler, 2012; Nijis, Franken, & Muris, 2007; Noh et al., 2008; Rodriguez et al., 2007), its 39 items make it quite lengthy and administration in research and clinical settings is time consuming. Furthermore, difficulties with replicating its proposed nine-factor structure have been widely reported (Crowley et al., 2012, 2014; Meule, Lutz, et al., 2012; Rodriguez-Martin & Molerio-Perez, 2014; Rodriguez et al., 2007; Vander Wal, Johnston, & Dhurandhar, 2007).

The Food Cravings Questionnaire-Trait-reduced (FCQ-T-r) was recently developed as a brief alternative to the 39-item FCQ-T (Meule, Hermann, & Kübler, 2014). The FCQ-T-r consists of the 15 items of the German version of the FCQ-T that demonstrated the highest item-total correlations and was found to have a one-factor structure, high internal consistency, and high half-year retest reliability in the initial validation studies assessing food cravings in large samples of German university students (Meule, Beck Teran, Berker, Gründel, Mayerhofer, & Platte, 2014; Meule, Hermann, et al., 2014). Scores on the FCQ-T-r were found to be weakly and positively correlated with body mass index (BMI) and impulsivity, and negatively associated with dieting success (Meule, Hermann, et al., 2014). Basic psychometric properties of the FCQ-T-r have since been replicated in an Italian obese sample and in Italian and Cuban non-clinical adult samples (Iani, Barbaranelli, & Lombardo, 2015; Innamorati et al., 2015; Rodriguez-Martin & Molerio-Perez, 2014). Furthermore, the FCQ-T-r is easily adaptable to assess cravings for a specific food (Meule & Hormes, 2015).

The present study was designed to evaluate the psychometric properties of the English version of the FCQ-T-r. Given findings from the existing validation studies it was expected that the English version of the FCQ-T-r would be a one-factorial instrument with high internal consistency and moderate to strong correlations with measures of eating disorder symptoms, and weak to moderate associations with indirect measures of eating behaviors such as BMI and impulsivity (Cepeda-Benito, Gleaves, Fernandez, et al., 2000; Cepeda-Benito, Gleaves, Williams et al., 2000; Franken & Muris, 2005; Innamorati et al., 2015; Meule, Hermann, et al., 2014; Meule, Lutz, et al., 2012; Moreno, Rodriguez, Fernandez, Tamez, & Cepeda-Benito, 2008).

**2. Materials and methods**

All methods were approved by the local Institutional Review Board.

**2.1. Participants**

Participants were 610 undergraduate students (51.0%, *n* = 309 female, mean age = 18.82 years, *SD* = 1.72, range: 17–39 years, mean BMI = 23.85 kg/m<sup>2</sup>, *SD* = 3.96, range: 14.52–44.30) at a large University in the Northeastern United States (U.S.), who completed an online

questionnaire in exchange for 1 h of research participation credit. Participants entered the laboratory in groups of up to 15 students at a time to complete a battery of questionnaires via the secure online server SurveyMonkey. The questionnaire contained several measures unrelated to the aims of the present study; however, given that questions about cravings and eating behaviors were posed at the beginning of the survey these other measures are unlikely to have had an effect on participants' responses.

**2.2. Measures**

**2.2.1. Demographics**

Participants indicated their age, gender, and race/ethnicity. Body mass index was calculated based on self-reported height and current weight.

**2.2.2. Food Cravings Questionnaire-Trait-reduced**

The 15 items of the proposed FCQ-T-r were available in English, given that the full version of the measure was previously validated in a sample of U.S. undergraduate students (Cepeda-Benito, Gleaves, Williams et al., 2000) (see Table 1 for all FCQ-T-r items). Participants were asked to indicate the extent to which they agree with the 15 items of the FCQ-T-r using a Likert-type scale ranging from 1 = “strongly disagree” to 5 = “strongly agree” (as opposed to the original 1 = “never/not applicable” to 6 = “always” scale), for possible total scores ranging from 15 to 75. We chose to adapt the 1–5 rating scale used in the administration of the state version of the FCQ (i.e., the FCQ-S), a measure designed to capture dynamic changes in the craving experience, for use with the FCQ-T-r in an effort to streamline administration of the measure, especially in studies that assess craving as both a state and trait construct (Cepeda-Benito, Gleaves, Williams et al., 2000).

**2.2.3. Food Craving Inventory**

Participants completed the two versions of the Food Craving Inventory (FCI), assessing (1) “subjective cravings” for 28 different foods (Cronbach's  $\alpha$  = .93 in the present sample), along with (2) frequency of consumption of the same 28 foods (i.e., “giving in” to cravings, Cronbach's  $\alpha$  = .95), using a rating scale ranging from 1 = “never” to 5 = “always/almost every day” (White et al., 2002). The FCI has been widely used and shown to be valid in diverse populations (White & Grilo, 2005). It was included in the present study in order to assess the convergent validity of the FCQ-T-r.

**2.2.4. Weight dissatisfaction**

A measure of weight dissatisfaction was derived in a manner comparable to prior studies by subtracting respondents' self-reported ideal weight from their current weight (in pounds) (Neighbors & Sobal,

**Table 1**  
Factor loadings (single factor solution), Cronbach's  $\alpha$  (item deletion), item-total correlation, and means for the 15 items of the Food Craving Questionnaire-Trait-reduced.

	Factor loading	Cronbach's $\alpha$ (item deletion)	Item-total correlation	<i>M</i> ( <i>SD</i> )
1. When I crave something, I know I won't be able to stop eating once I start.	.75	.94	.75***	2.39 (1.11)
2. If I eat what I am craving, I often lose control and eat too much.	.77	.93	.77***	2.54 (1.15)
3. Food cravings invariably make me think of ways to get what I want to eat.	.73	.94	.74***	2.72 (1.17)
4. I feel like I have food on my mind all the time.	.78	.93	.77***	2.37 (1.15)
5. I find myself preoccupied with food.	.78	.93	.77***	2.28 (1.10)
6. Whenever I have cravings, I find myself making plans to eat.	.72	.94	.74***	2.86 (1.24)
7. I crave foods when I feel bored, angry, or sad.	.67	.94	.69***	2.81 (1.21)
8. I have no willpower to resist my food craving.	.74	.94	.73***	2.12 (1.01)
9. Once I start eating, I have trouble stopping.	.76	.94	.75***	2.09 (1.01)
10. I can't stop thinking about eating no matter how hard I try.	.73	.94	.71***	1.86 (.94)
11. If I give in to a food craving all control is lost.	.75	.94	.73***	1.96 (.99)
12. Whenever I have a food craving, I keep on thinking about eating until I actually eat the food.	.75	.94	.75***	2.46 (1.16)
13. If I am craving something, thoughts of eating it consume me.	.78	.93	.78***	2.11 (1.03)
14. My emotions often make me want to eat.	.68	.94	.69***	2.39 (1.22)
15. It is hard for me to resist the temptation to eat appetizing foods that are in my reach.	.67	.94	.69***	2.86 (1.25)

\*\*\* *p* < .001.

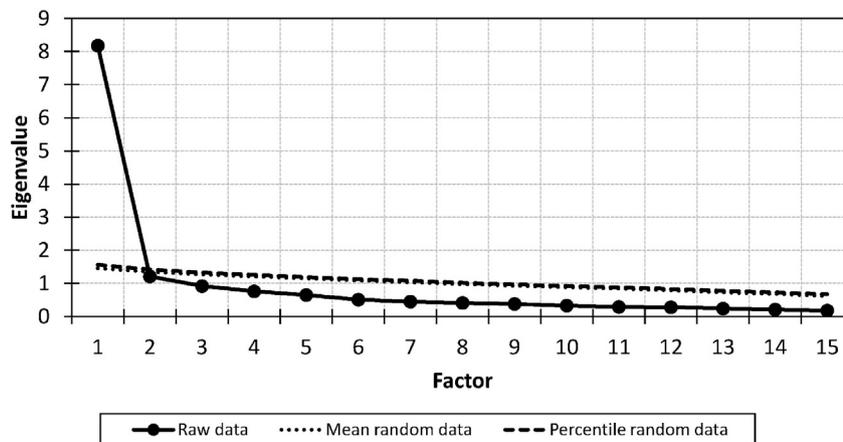


Fig. 1. Screeplot for the Principal Component Analysis and parallel analysis of the Food Cravings Questionnaire-Trait reduced.

2007). This discrepancy index has previously been validated as a measure of body weight dissatisfaction (Thompson & van Den Berg, 2002).

### 2.2.5. Dutch Eating Behavior Questionnaire

The Dutch Eating Behavior Questionnaire (DEBQ) is a widely used, well-validated 33-item self-report measure of eating style that quantifies (1) “restrained” (Cronbach’s  $\alpha = .93$ ), (2) “emotional” (Cronbach’s  $\alpha = .95$ ), and (3) “external” eating (Cronbach’s  $\alpha = .82$ ) (van Strien, Frijters, Bergers, & Defares, 1986; Wardle, 1987). The DEBQ was included here to determine if the positive correlations between scores on the FCQ-T-r and measures of restrained eating demonstrated previously could be replicated in the present sample of U.S. respondents (Meule, Hermann, et al., 2014).

### 2.2.6. Eating Attitudes Test

The Eating Attitudes Test (EAT-26) captures symptoms typically associated with disordered eating via three subscales assessing (1) “dieting” (Cronbach’s  $\alpha = .87$ ), (2) “bulimia and food preoccupation” (Cronbach’s  $\alpha = .78$ ) and (3) “oral control” (Cronbach’s  $\alpha = .62$ ) (Garner & Garfinkel, 1979; Garner, Olmstead, Bohr, & Garfinkel, 1982). The EAT-26 was included in the present study to assess whether the finding of a significant positive correlation between scores on the German version of the FCQ-T-r and eating disorder symptoms could be replicated in the present sample (Meule, Hermann, et al., 2014).

### 2.2.7. Barratt Impulsiveness Scale

The Barratt Impulsiveness Scale (BIS-11) is a widely used, valid and reliable measure of (1) difficulties with attention or concentration (i.e., “attentional” impulsivity, Cronbach’s  $\alpha = .67$ ), (2) tendencies to act without thinking (i.e., “motor” impulsivity, Cronbach’s  $\alpha = .69$ ), and (3) a lack of future orientation or forethought (i.e., “non-planning” impulsivity, Cronbach’s  $\alpha = .71$ ) (Patton, Stanford, & Barratt, 1995). The German FCQ-T-r was previously shown to be positively associated with attentional impulsiveness (Meule, Hermann, et al., 2014).

### 2.3. Statistical analyses

Percent of missing responses on the FCQ-T-r ranged from 2.5% (item 1) to 3.9% (item 3).<sup>2</sup> Missing FCQ-T-r values were replaced with series means. The 15 items of the FCQ-T-r were initially subjected to confirmatory factor analysis (CFA) using SPSS AMOS version 22 to examine the extent to which the English version of the FCQ-T-r fits the hypothesized single-factor structure. Results of the CFA suggested overall poor model

<sup>2</sup> Missing data are likely due to the voluntary nature of responses and the fact that study participants were explicitly informed that they could skip any questions that they did not want to answer.

fit [ $\chi^2_{(90)} = 1268.22, p < .001$ , non-normed fit = .80, comparative fit index = .81, adjusted goodness of fit index = .67, root mean square error of approximation = .15]. Thus, the factor structure of the FCQ-T-r items was explored using principal component analysis using the same sample of respondents included in the CFA. Of note, the present sample size of 610 respondents far exceeds the commonly accepted subjects-to-variables ratio of no less than 5:1 for determining appropriate sample sizes for factor analysis (Costello & Osborne, 2005; Gorsuch, 1983). The Kaiser-Meyer-Olkin measure of sampling adequacy was .94 and the Bartlett’s test of sphericity was statistically significant [ $\chi^2_{(105)} = 6125.17, p < .001$ ], supporting the suitability of the data for factor analysis. We applied parallel analysis to confirm the number of factors extracted using the FACTOR software (Baglin, 2014; Horn, 1965). Associations between the FCQ-T-r and BMI, weight dissatisfaction and scores on the FCI, DEBQ, EAT-26, and BIS-11 were assessed via Pearson’s correlation coefficients. In light of research that suggests differences in the nature, prevalence, and correlates of cravings between men and women (Hormes, Orloff, & Timko, 2014) and differences by race/ethnicity in many measures of eating behavior and body image (Gluck & Geliebter, 2002), differences in scores on the FCQ-T-r by gender and race/ethnicity (“white” vs. “non-white”) were examined using independent samples *t*-tests. Based on research linking body weight to food cravings specifically in women, we also controlled for gender in analyses of the association between BMI and FCQ-T-r scores.

### 3. Results

Participants self-identified (in overlapping percentages) as white/Caucasian (53.9%,  $n = 329$ ), African-American (17.0%,  $n = 104$ ), Asian (15.9%,  $n = 97$ ), Hispanic/Latino (16.2%,  $n = 99$ ), American-Indian or Alaskan Native (0.8%,  $n = 5$ ), Native Hawaiian or Pacific Islander (0.2%,  $n = 1$ ) or “other” (3.3%,  $n = 20$ ). Both male and female participants on average reported BMIs in the upper range of normal [ $M = 24.17, SD = 3.91$  vs.  $M = 23.50, SD = 3.94; t_{(545)} = -1.98, p = .05, d = .29$ ]. About one third of both male (37.1%,  $n = 102$ ) and female respondents (29.8%,  $n = 81$ ) indicated being overweight (i.e.,  $BMI \geq 25.0 \text{ kg/m}^2$ ), with no significant gender differences in prevalence ( $\chi^2 = 3.28, p = .09, \phi = .08$ ).

Principal component analysis of the 15 items of the FCQ-T-r revealed the presence of two components with eigenvalues above 1, with the first contributing 54.5% of the 62.6% of the total variance accounted for by the two components. However, parallel analysis confirmed the hypothesized single-factor structure of the proposed FCQ-T-r (Fig. 1). Factor loadings for the single-factor solution, Cronbach’s  $\alpha$  for item deletions, item-total correlations, and means and standard deviations for individual items are presented in Table 1. Factor loadings ranged from .67 to .78 and item-total correlations were all significant at

$p < .001$ . Of note, none of the factor loadings on factor 2 in the two-factor solution were higher than .43. Internal consistency of the FCQ-T-r was excellent (Cronbach's  $\alpha = .94$ ).

Scores on the FCQ-T-r were significantly correlated with BMI only when controlling for gender ( $r = .09, p = .05$  and Table 2). There was no significant association between FCQ-T-r scores and age ( $r = -.03, p = .45$ ). Scores on the FCQ-T-r were significantly and positively correlated with measures of eating behavior and impulsivity, with moderate to high correlations with scores on the three DEBQ subscales, moderate correlations with scores on the EAT-26 "dieting" and "bulimia and food preoccupation" subscales, weak correlation with weight dissatisfaction, and moderate correlations with the FCI "subjective cravings" and "consumption" ratings and scores on the Barratt Impulsiveness "attentional," "motor" and "non-planning" subscales (Table 2).

Women's scores on the FCQ-T-r were significantly higher than those of male respondents [ $M = 38.32, SD = 12.28$  vs.  $M = 33.06, SD = 11.83$ ;  $t_{(602)} = 5.36, p < .001, d = .44$ ]. There were no significant differences in scores on the FCQ-T-r between participants who self-identified as white/Caucasian ( $M = 36.00, SD = 12.40$ ) versus those who did not [ $M = 35.60, SD = 12.23$ ;  $t_{(608)} = .40, p = .69, d = .03$ ].

**4. Discussion**

The goal of the present study was to evaluate the psychometric properties of the English version of the FCQ-T-r, a short form of the widely used FCQ-T that was previously validated in German, Italian, and Spanish (Iani et al., 2015; Innamorati et al., 2015; Meule, Hermann, et al., 2014; Rodriguez-Martin & Molerio-Perez, 2014). Findings regarding the factor structure of the English FCQ-T-r were somewhat inconsistent, with CFA indicating poor fit with a one-factorial model, but visual inspection of the PCA screeplot and results from the parallel analysis clearly suggesting the presence of a single factor, comparable to what has been reported for the European versions of the scale. Considering these mixed findings we decided to examine the psychometric properties of a one-factorial English FCQ-T-r in order to facilitate comparisons with the existing German, Italian, and Spanish versions of the measure. More work is needed to establish with more certainty the factor structure of the English FCQ-T-r and explore possible reasons for the poor CFA model fit, including the lack of variability in body weight in the present sample, which included relatively few respondents with BMIs in the overweight and obese range.

Internal consistency of the English FCQ-T-r was high and significant positive associations with the two forms of the FCI, a measure of specific food cravings, suggest good convergent validity. We were able to replicate key results from prior studies using both the FCQ-T and FCQ-T-r, including significant moderate to strong associations between craving

scores and measures of eating disorder pathology, restrained eating, dieting, and impulsivity, and significantly higher craving scores in women, compared to men (Cepeda-Benito, Fernandez, & Moreno, 2003; Franken & Muris, 2005; Innamorati et al., 2015; Meule, Hermann, et al., 2014; Meule, Lutz, et al., 2012; Van den Eynde et al., 2012). The moderate to strong correlation between scores on the FCQ-T-r and the DEBQ external eating subscale scores are noteworthy given the fact that the FCQ-T has been found to be a good predictor of cue-induced craving (Meule, Skirde, Freud, Vögele, & Kübler, 2012). The finding of a moderately strong association between scores on the FCQ-T-r and the BIS-11 is similarly consistent with prior studies suggesting a relationship between impulsivity – and attentional impulsivity in particular – and measures of food craving, attentional bias towards food-related cues, and overeating (Hou et al., 2011; Meule, 2013).

In spite of evidence for good psychometric properties of the English version of the FCQ-T-r the current study has some limitations that must be noted. As was discussed in the initial validation study, the items included in the FCQ-T-r primarily capture the cognitive and behavioral aspects of the craving experience while largely ignoring its affective dimensions (Meule, Hermann, et al., 2014). The FCQ-T-r may thus not be ideal for use in studies that are specifically focused on examining the role of affective states in craving. More work is needed to examine the utility of the FCQ-T-r and researchers considering using the scale should carefully weigh the advantages of the more rapid administration of the short form of the measure against the disadvantages of losing potentially important information regarding the complex interplay of physiological, cognitive, affective and behavioral factors in the etiology of cravings.

The absence of a significant correlation between scores on the FCQ-T-r and self-reported BMI in the present study (unless controlling for gender) is surprising and inconsistent with prior research that has fairly consistently found craving to be significantly and positively associated with BMI. It is possible that an absence of a significant association between FCQ-T-r scores and BMI was due to the relatively young age of the present sample, with 81.3% ( $n = 469$ ) of respondents indicating being younger than 20. This assumption is supported by research suggesting that BMI is only a meaningful indicator of weight status in children and adolescents under the age of 20 if compared to a reference standard that accounts for the individual's age and sex (Must & Anderson, 2006). Of note, previous studies examining the psychometric properties of the FCQ-T-r in German, Italian, and Spanish were conducted using samples of older students and/or adults (Iani et al., 2015; Innamorati et al., 2015; Meule, Hermann, et al., 2014; Rodriguez-Martin & Molerio-Perez, 2014). Participants in the present sample were on average of normal weight and the proportion of respondents with BMIs in the overweight or obese range was lower than that observed in the general population, which may also account for the

**Table 2**

Descriptive statistics of and correlations between age, body mass index (BMI), weight dissatisfaction, scores on the Dutch Eating Behavior Questionnaire (DEBQ), Eating Attitudes Test (EAT-26), Food Craving Inventory (FCI), Barratt Impulsiveness Scale (BIS-11) subscales, and Food Cravings Questionnaire-Trait-Reduced (FCQ-T-r).

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. FCQ-T-r	35.81	12.31													
2. BMI	23.85	3.96	.07												
3. DEBQ emotional	2.23	.86	.60***	.09											
4. DEBQ external	2.93	.67	.52***	-.01	.58***										
5. DEBQ restraint	2.45	.92	.38***	.33***	.51***	.32***									
6. EAT-26 dieting	.48	.54	.29***	.24***	.26***	.12**	.60***								
7. EAT-26 bulimia	.20	.41	.37***	.08	.34***	.18***	.26***	.57***							
8. EAT-26 oral control	.38	.42	.05	-.12**	.12**	.06	.09*	.37***	.43***						
9. Weight dissatisfaction	7.22	19.73	.13***	.68***	.19***	.05	.40***	.37***	.12**	-.07					
10. FCI cravings	2.30	.69	.41***	-.10*	.34***	.33***	.10*	.01	.16***	-.02	-.09*				
11. FCI consumption	1.96	.74	.38***	-.12**	.26***	.32***	.08	-.004	.17***	.02	-.10*	.75***			
12. BIS-11 attentional	2.17	.47	.31***	.01	.28***	.29***	.06	.08	.21***	.06	-.06	.18**	.14**		
13. BIS-11 motor	2.04	.41	.20***	.02	.22***	.14***	.04	.05	.16***	.01	.03	.18***	.09*	.52***	
14. BIS-11 non-planning	2.32	.44	.16***	.03	.12**	.02	-.04	-.05	.09*	-.09*	-.03	.08	.08	.41***	.32***

\*  $p \leq .05$ .  
 \*\*  $p \leq .01$ .  
 \*\*\*  $p \leq .001$ .

absence of a significant positive correlation between FCQ-T-r scores and BMI. More research is needed to examine potential reasons for this discrepancy and should utilize a sample that is more representative of the general population in terms of age and body weight, as well as objective measures of height and weight, instead of relying on self-report to calculate BMI.

The FCQ-T-r represents a potentially useful tool in the rapid assessment of general food cravings. It must be noted, however, that the FCQ-T-r does not address many of the other problems associated with the assessment of cravings, including the subjective and fleeting nature of the craving experience. Future studies should examine the extent to which administration of the FCQ-T-r (or the FCQ-S) via ecological momentary assessment and similar methods may be a feasible way to begin to address these concerns.

In spite of these limitations our findings suggest that the FCQ-T-r constitutes a brief, valid and reliable alternative to lengthier measures of general food cravings. Its suitability for use in clinical and research settings and more diverse populations, including clinical samples, should be examined further in future studies.

#### Conflict of interest

The authors declare no conflicts of interest.

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