



## 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.

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