



The Weight-Related Eating Questionnaire offers a concise alternative to the Three-Factor Eating Questionnaire for measuring eating behaviors related to weight loss^{☆,☆☆,☆☆☆}



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ABSTRACT

Objective: During a one-year weight loss trial, we compared the Three-Factor Eating Questionnaire (TFEQ), a valid 51-item measure of restraint, disinhibition, and hunger subscales, with the newer 16-item Weight-Related Eating Questionnaire (WREQ) measuring routine and compensatory restraint and external and emotional eating.

Methods: Both questionnaires were administered to women with overweight or obesity ($n = 186$, mean \pm SD, age 50 ± 10.6 y, BMI 34 ± 4.2 kg/m²) at five time points. Completion rates were 100% at baseline and Month 1, 94% at Month 3, 83% at Month 6, and 76% at Month 12. Confirmatory factor analysis was conducted on baseline WREQ data and correlations were calculated between TFEQ and WREQ subscales. Multilevel models evaluated the relationship between each subscale and weight change over time.

Results: Factor analysis revealed a WREQ structure consistent with previous research, and corresponding subscales on the TFEQ and WREQ were correlated. Lower baseline TFEQ restraint predicted greater weight loss ($p < 0.01$) and TFEQ disinhibition and WREQ external and emotional eating scores were negatively related ($p < 0.001$). Thus, with one baseline administration, only TFEQ restraint was significantly related to weight change, but multiple administrations showed relationships between all TFEQ and WREQ subscales and weight change.

Conclusions: The WREQ offers a shorter alternative to the TFEQ when repeatedly assessing eating behaviors related to weight change.

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1. Introduction

The high prevalence of overweight and obesity in the United States (Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016) indicates that many individuals have a history of energy imbalance that is likely related to eating behaviors. The cognitive and behavioral factors that drive energy intake are key components of energy balance regulation and have been shown to associate with weight change (Filiatrault, Chaput, Drapeau, & Tremblay, 2014; Teixeira, Going, Sardinha, & Lohman, 2005). Multiple questionnaires that measure eating behaviors, however, show inconsistent findings as to which factors have the greatest impact on weight and weight change, especially over the longer term (Bryant, King, & Blundell, 2007; Johnson, Pratt, & Wardle, 2012). Additionally, these questionnaires are often only administered once, precluding the

investigation of behavior change over time and the relationship of that change to body weight. In order to support effective interventions, it is important to determine reliable measures of the eating behaviors and attitudes that influence weight change. In this study, two eating behavior questionnaires were administered repeatedly during a one-year weight loss trial (Rolls, Roe, James, & Sanchez, 2017) in order to identify correlates of weight change.

The Three-Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985) is a well-validated measure of three eating-related constructs: dietary restraint, disinhibition, and susceptibility to hunger. Dietary restraint refers to the tendency to consciously restrict food intake as a means of controlling weight, disinhibition refers to a tendency to overeat in response to negative emotional states or the presence of highly palatable foods, and the hunger subscale assesses susceptibility to feelings of hunger. Extensive research has been conducted with the TFEQ in relation to body weight (Bryant et al., 2007; Dykes, Brunner, Martikainen, & Wardle, 2004; Hays & Roberts, 2008; Thomas, Bond, Phelan, Hill, & Wing, 2014; Urbanek, Metzgar, Hsiao, Piehowski, & Nickols-Richardson, 2015), although it has often examined only baseline levels or baseline and post-intervention. Some studies have reported that a greater increase in restraint during intervention relates to greater weight loss (Urbanek et al., 2015) and a decrease in restraint is a risk factor for weight regain (Thomas et al., 2014), but others have found that higher restraint at baseline correlates with weight gain (Drapeau et al., 2003; Stice, Cameron, Killen, Hayward, & Taylor, 1999). Higher disinhibition, more consistently than restraint, has been correlated with increased risk of weight gain and poorer weight loss outcomes (Bryant, Caudwell, Hopkins, King, & Blundell, 2012; Hays & Roberts, 2008; JaKa et al., 2015). The hunger subscale has received little attention in the literature and is rarely found to associate with weight change (Bryant et al., 2007).

Currently, the TFEQ is the standard for measuring eating behaviors. However, research aimed at identifying problematic eating behaviors has been hampered by the participant burden produced by repeatedly administering the 51-item TFEQ. The Weight-Related Eating Questionnaire (WREQ; Schembre, Greene, & Melanson, 2009) is a shorter, 16-item instrument that incorporates new findings in eating behavior research since the development of the TFEQ. The WREQ combines existing items from the TFEQ and the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986) with several new questions in order to assess two types of restraint (routine and compensatory) and two types of disinhibition (external and emotional). External and emotional eating, while combined in the construct of disinhibition in the TFEQ, are separately assessed in the DEBQ and have been found to have independent associations with body weight (Wardle, 1987). Thus, the WREQ aims to combine the strengths of both questionnaires.

At present, data validating the WREQ are limited. A single administration of the instrument has been shown to distinguish the four subscales across different age groups and ethnicities, although most of these studies were conducted in college-aged samples (Byrd-Bredbenner, Quick, Koenings, Martin-Biggers, & Kattelman, 2016; Schembre & Geller, 2011; Schembre, Nigg, & Albright, 2011). It has also been administered in short-term weight loss studies (Bouhaidar et al., 2013) twice within a short time range, but results from these longitudinal analyses were not reported. Therefore, the utility of the WREQ in identifying eating behaviors related to weight loss has not been demonstrated in the longer term.

The present study explores whether the WREQ provides a valid alternative to the TFEQ, particularly in the context of a longer-term weight loss intervention. To provide additional validation for the WREQ, the first aim was to evaluate its psychometric properties in the previously untested setting of a year-long weight loss trial. The

second aim was to use multilevel models to investigate how longitudinally measured TFEQ and WREQ scores were related to changes in body weight across the trial.

2. Methods

2.1. Study design

The Portion-Control Strategies Trial was a randomized controlled trial that investigated the effects of two portion-control interventions and standard dietary advice for weight loss. The trial examined weight change over a one-year period in women with obesity and overweight. An overview of trial participants and design is presented below. Further details of the trial design and main outcome data are presented elsewhere (Rolls et al., 2017).

2.2. Participants

Eligible participants were women aged 20–65 y with a body mass index (BMI) of 28–45 kg/m². Potential participants were excluded if they had blood pressure >160/100 mm Hg, reported a weight change >4.5 kg in the past three months, had a medical condition that prevented participation or that limited physical activity, were following a special diet or weight-loss program, were pregnant or lactating, scored >19 on the 26-item Eating Attitudes Test (Garner, Olmsted, Bohr, & Garfinkel, 1982), or > 25 on the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). To be enrolled in the trial, potential participants were required to complete three daily food and activity diaries and a two-week run-in period.

A total of 186 women with overweight and obesity were enrolled in the trial. Participants had mean (\pm SEM) age of 50 \pm 0.35 y, mean BMI of 34 \pm 0.14 kg/m², and were predominantly white (98%). At baseline, participants reported a mean of 2.1 \pm 0.2 attempts at weight loss in the previous year, thus they were experienced dieters. Table 1 provides additional demographic information. Participants provided signed informed consent and were financially compensated for their time. The trial protocol was reviewed and approved by the Office for Research Protections at The Pennsylvania State University.

Table 1
Baseline characteristics of women in The Portion-Control Strategies Trial.

Characteristic	(n = 186)
Age (y)	50.0 (10.6)
Body weight (kg)	91.2 (12.7)
Body mass index (kg/m ²)	34.0 (4.2)
Weight loss attempts in past year, n	2.1 (2.5)
Race, n (%)	
White	184 (98%)
African-American	2 (1%)
More than one race	1 (1%)
Ethnicity, n (%)	
Not Hispanic	184 (99%)
Hispanic	2 (1%)
Education, n (%)	
High school graduate	27 (15%)
Some college education	56 (30%)
College degree	57 (31%)
Professional or graduate degree	25 (27%)
Employment, n (%)	
Employed full-time	114 (61%)
Employed part-time	32 (17%)
Not employed	40 (22%)

Values are mean (SD) unless otherwise noted.

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