



Psychometric properties for the Children's Power of Food Scale in a diverse sample of pre-adolescent youth

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ARTICLE INFO

Article history:

Received 18 February 2014

Revised 31 July 2014

Accepted 1 September 2014

Keywords:

Psychometric

Adolescents

Appetitive responsiveness

Food environment

Obesity

ABSTRACT

Purpose: The Children's Power of Food Scale measures appetitive responsiveness across three domains, food available, food present, and food tasted but not eaten, and a total aggregate score. Although validated in adult populations it has not been tested in youth. The purpose was to establish psychometric properties for the Children's Power of Food Scale (C-PFS) for use in youth.

Methods: Six content experts were recruited to establish content validity (CVI). Reliability was established using 2-week test–retest procedures following lunch period in 47 ethnically diverse 10–14 year olds.

Results: CVI for the aggregate score was 0.87. Factor and aggregate score Cronbach's alphas were 0.61–0.89. Intra-class correlation factors scores were 0.28–0.68. Kappa (κ) ranged from 0.19 to 0.69 for individual questions.

Conclusions: The C-PFS may serve as a useful instrument to identify youth more vulnerable to food preoccupation and overconsumption given the obesogenic food environment. Factor 2, food present not tasted, should be interpreted with caution in English language learners.

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Childhood obesity has more than tripled over the last 30 years (CDC, 2011). Numerous factors are implicated in the development and persistence of obesity in childhood and adolescence. Modifiable factors such as parenting style, increasing sedentary behaviors, decreasing physical activity, and overconsumption of energy dense, non-nutritious food and sugar sweetened beverages are known contributors (Fogelholm, 2008; Gutin, Yin, Johnson, & Barbeau, 2008; Johnson, Mander, Jones, Emmett, & Jebb, 2008; Rhee, 2008; Vandewater, Shim, & Caplovitz, 2004; Welsh et al., 2005). Interventions are aimed at increasing healthy related behaviors such as eating more fruit and vegetables, decreasing screen time, eliminating sugar sweetened beverages, and increasing physical activity. Despite the limited long term impact of such interventions (Summerbell et al., 2012), national and state collaboratives using the 5 (servings of fruits and vegetables)–2 (hour limit to screen time)–1 (hour of physical activity)–0 (soda, sugar beverages) message continues to expand to schools, communities, work, and health settings (Pickering, 2011).

As the obesity epidemic continues, increasing attention is given to the potential effects the obesogenic food environment has on one's perception, preoccupation, and subsequent consumption of food (Lowe & Butryn, 2007). Historically, individuals were concerned predominantly with procuring and storing ample food supply to sustain themselves and avoid famine. The advent of the modern food industry, food distribution, marketing, and transportation has alleviated this burden in the much of the urbanized world (Popkin, 1993; Popkin, Adair, & Ng,

2012). Equally significant are the billions of dollars invested by the food industry for refining, processing, and perfecting foods that are laden with sugar, fat, and salt. Thus, making food hyperpalatable, inexpensive, and desirable to consume. The “food experience” associated with seeing, smelling, and consuming high caloric, hyperpalatable food has created a greater appetite for such foods as well as enhanced the novel state of eating for pleasure (i.e. hedonic eating) rather than for sustenance and homeostatic caloric needs.

The concept of hedonic hunger has emerged to describe a hunger to eat for the purposes of pleasure independently of the inherent caloric requirements necessary to maintain homeostasis (Lowe & Butryn, 2007). Although eating behaviors to some degree include a pleasurable dimension, recent studies support increased consumption of hyperpalatable food perpetuates the drive to eat such foods regardless of energy deficit (Avena & Gold, 2011; Blumenthal & Gold, 2010; Volkow, Wang, Fowler, Tomasi, & Baler, 2011). Further evidence supports that proximity of food may stimulate the appetite for hyperpalatable food, subsequent consumption of such foods, and for susceptible individuals making one's appetite more responsive to such foods (He et al., 2012; Thomas, Doshi, Crosby, & Lowe, 2011). Thus, the appetitive drive and response to food (i.e. appetitive responsiveness) for certain individuals result from both food proximity as well as palatability. Individuals, who are unable to mitigate the drive associated with hedonic hunger or mediate the intake of excess caloric intake may be at increased risk for disproportionate weight gain and the onset of obesity.

As a reflection of the current interest in hedonic hunger as a potential variable in the development of obesity a new psychometric instrument has been developed specifically to identify individuals who may

Financial disclosure or conflict of interest: None.

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be more susceptible. The Power of Food Scale (PFS) (Cappelleri et al., 2009) was developed to assess the psychological impact of the obesogenic food environment on an individual's thoughts and feelings about food and eating independent of homeostatic hunger. The intention of this study was to isolate and evaluate the individual's appetitive responsiveness from an individual's motivation to overeat that could be evaluated by other psychometric measures (e.g. Dutch Eating Behavior Questionnaire). The PFS aims to assess the drive to eat highly palatable food, but not to assess food intake or overeating per se. Factor analysis revealed a robust final model with 3 sub-scales and a summative scale. The factors represent appetitive responsiveness when food is (1) available but not present, (2) present but not tasted, and (3) present and initially tasted but not eaten. Higher scores demonstrate greater appetitive responsiveness and greater psychological control by the food environment. Normative scales have not been developed. Psychometric properties demonstrated good fit, factor loadings, reliability, and validity in adults (Cappelleri et al., 2009).

The 15 item, self-administered PFS has been adapted for use in children (Lowe, 2006). The Children's Power of Food Scale (C-PFS) retained the 15-item, self-administered questionnaire structure. Wording was modified to enhance understanding in the younger age group and to reflect the developmental level of a school age child, 8–13 years of age. Each item is scored on a 5 point Likert-type scale with response from "I don't agree at all" to "I strongly agree". It retains the adult version's 3 factors and resultant summative score. Higher scores are suggestive of children with greater appetitive and psychological responsiveness to the modern food abundant environment, an indicator of hedonic hunger (Lowe & Butryn, 2007). The purpose of this study was to determine reliability and validity of the Children's Power of Food Scale for use in school aged children. The university institutional review board (IRB) approved this study prior to any procedures.

1. Methods

1.1. Content validity procedures

Content validity was sought using techniques outlined by Waltz, Strickland, and Lenz (Waltz, Strickland, & Lenz (2005)). This approach ensured that the collection of items in the C-PFS was representative of hedonic hunger in a food abundant environment and was developmentally appropriate for school aged children. Child development experts were asked to rate each question in terms of how appropriate each question was for this age group with respect to literacy and comprehension. Pediatric obesity experts were asked to follow the same procedure, but to rate how well each question represented the 3 factors and summative instrument as a valid measure of hedonic hunger in a food abundant environment. Reviewers used a Likert rating scale with a score of 1 (not at all representative) to 4 (very representative) for each of the 15 questions.

1.2. Reliability procedures

Reliability was established using test–re-test methods outlined by Altman (Altman (1999)). Following approval from the IRB and school principal, letters of invitation were sent to parents of middle school (grades 6–8) students in an ethnically diverse city in northern Vermont, U.S.A. The letter detailed the intent of the study, what was asked of their child, and dates of administration. Parents who did not want their child to participate were asked to return a "decline to participate" form. This was deemed as passive consent by the IRB as no identifying or sensitive information was collected (i.e. name, gender, or age).

Data were purposefully collected following lunch period to minimize the chance that responses were related to homeostatic hunger. Prior to administration the investigator explained the study purpose, what was being asked of participants, that no grading was involved, and that participation was voluntary. Following verbal assent the C-

PFS was administered to participants in three adjoining classrooms in one setting by the investigator. Teachers were present for administration of the C-PFS. Pre-adolescents who declined to participate were asked to stay seated and work on schoolwork until data collection was complete. An alpha-numeric code was assigned to each participant to ensure anonymity and allow for appropriate test–retest statistical procedures. To identify those participants whose homeostatic hunger might influence their responses two questions were asked (1.) Did you eat lunch today? and (2.) Are you still hungry? in addition to the C-PFS. Demographic data that were requested were as follows. Do your parents speak English to you? If your parents don't speak English what language do they speak? What country were you born in? What grade are you in?

Procedures were repeated 16 (vs. 14) days following the initial administration of the C-PFS to accommodate the school's schedule. A school administrator secured the master code list. The investigator secured all C-PFSs in a separate location. At no time did the investigator or the school have access to both the master list and the C-PFS. SAS 9.3 (SAS Institute, 2012) was used for data handling and analysis. Confidence intervals were computed at the level of 95%.

2. Results

2.1. Content validity

Content validity was determined using content validity index outlined by Waltz, Strickland, and Lenz (Waltz et al. (2005)). Six experts were recruited to determine content validity. Three experts currently practicing at a large academic medical center's pediatric obesity clinic agreed to evaluate the C-PFS as a measure of appetitive responsiveness for pre-adolescents. Similarly, two child development academics recruited from a university education department and one practicing child development specialist agreed to rate the C-PFS for developmental appropriateness for middle school children. A coefficient of 0 indicates lack of agreement, and a coefficient of 1.0 indicates perfect agreement among experts (Waltz et al., 2005). CVI of 0.80 or higher is recommended for new measures (Davis, 1992) and in instances with more than six content experts (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003). Experts rated each item using a 4-point scale (not relevant, somewhat relevant, quite relevant, and highly relevant). CVI was computed by averaging the C-PFS item ratings according to expert panel (Polit & Beck, 2006; Rubio et al., 2003). CVI for the aggregate scale was 0.80 and 0.93 for the pediatric obesity and developmental experts, respectively. Table 1 provides the CVI for the aggregate C-PFS and each factor subscale calculated according to expert panel. Using the same statistical procedures, the CVI was computed at 0.87 for the aggregate scale when all 6 expert ratings were pooled.

2.2. Reliability

A middle school team of 6–8th grades was recruited for this study. Fifty participants were eligible to participate in this study. Forty-six of 50 participants independently completed both surveys used for analysis. Two students were absent on either data collection day. One student chose not to complete the survey on initial testing. Data from one foreign born student were not included because he was observed receiving help from another student during instrument completion. Three participants demonstrated possible response bias (e.g. one child selected "I don't agree at all" for each item during on initial testing then selected "I strongly agree" for all items on re-testing). All three were included in the final analysis since such responses can be indicative of how children may answer surveys. No parent declined participation. The final sample number for reliability statistics was 46 with an overall response rate of 92%. On initial administration participants completed the C-PFS in 12–20 minutes with the majority finishing within 15 minutes.

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