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The Eating Habits Confidence Survey: Reliability and Validity in Overweight and Obese Postmenopausal Women

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Background and Purpose: Psychometric properties of the Eating Habits Confidence Survey (EC) were evaluated in a sample of 86 overweight and obese postmenopausal women. Methods: Inter-item correlations and coefficient alphas of the total and subscale scores were conducted. Correlations of the EC to the Eating Self-Efficacy Scale (ESES), Eating Behavior Inventory (EBI), and Binge Eating Scale (BES) were examined as approaches to concurrent and contrast validity. Results: Cronbach's alphas were adequate for total (.83) and subscale (.64–.80) scores. Only the EC subscale "sticking to it" correlated with the other eating scales. This correlation demonstrates concurrent validity with the other scales that reflected persistence in healthy eating, and contrast validity with them in that the other scales measured different issues under the rubric of eating self-efficacy and behaviors. Conclusions: Thus, the EC performed well among a different demographic than those used during its development. This inexpensive and easily administered survey manifests credible validity and reliability. Nevertheless, evidence for its validity and reliability needs to be accrued when it is used in diverse populations.

Keywords: eating; psychometrics; scale; women; postmenopausal; behavior

Obesity rates have reached epidemic proportions throughout the world. The implications for nursing are numerous because obesity is known to have physical, psychological, and financial sequelae (Dietz & Robinson, 2005; Faith, Scanlon, Birch, Francis, & Sherry, 2004; Gottesman, 2003).

Physiologically, obesity is a result of a consistent prolonged imbalance between energy intake and expenditure (Powers & Howley, 2004). As such, much obesity research focuses on eating and/or exercise behaviors. Instruments are a necessity to measure these behaviors, whether looking for associations, assessing the effect of an intervention, or evaluating change across time.

The Eating Habits Confidence Survey (EC) is an instrument that has been used, in some form, to measure eating behaviors in a wide array of populations. However, according to J. F. Sallis (personal communication, March 21, 2008), psychometric properties of the EC have not been reported in the literature. In fact, use of the full EC has only been reported in one study of parents and psychometric properties of the scale were not reported (White et al., 2004). The sticking to it subscale has been used with rural Midwestern adults (Nothwehr & Peterson, 2005) and adult, low income, African American women (Nothwehr & Stump, 2002). Investigators studying preadolescent girls (Ievers-Landis et al., 2003), adolescents (Hagler,

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Norman, Radick, Calfas, & Sallis, 2005; Zabinski et al., 2006), African American adults (Resnicow et al., 2001; Resnicow, McCarty, & Baranowski, 2003), and older rural women (Walker, Pullen, Hertzog, Boeckner, & Hageman, 2006) have adapted the EC for use.

The purpose of this study was to explore the psychometric properties of the EC in a sample of overweight and obese postmenopausal women ($N = 86$). The internal consistency and reliability of the EC and its subscales were assessed and the construct validity and predictive capability of the EC were explored.

BACKGROUND

The Self-Efficacy for Eating Behaviors Scale

Self-efficacy theory provides the theoretical underpinning for this scale. This theory purports that engagement in a behavior is dependent on one's self-efficacy (or confidence) in his or her ability to perform that behavior (Bandura, 1997). Developed by Sallis, Pinski, Grossman, Patterson, and Nader (1988), the Self-Efficacy for Eating Behaviors Scale (SEEBS) is a 61-item scale that asks users to rate how confident they are in their ability to motivate themselves to perform certain eating behaviors consistently for at least 6 months. Participants were asked to report how sure they were that they could perform various behaviors on a 5-point Likert-type scale from 1 (*I know I cannot*) to 5 (*I know I can*), with the additional option to mark, "Does not apply." The items are based on specific behaviors that are common when people are trying to eat a low-sodium, low-fat diet. Example items are "Avoid adding salt at the table" and "Eat poultry and fish instead of red meat at dinner." These items were generated through interviews with 40, mostly female ($n = 32$), Anglo ($n = 20$) participants, about 36 (± 7) years of age, who were actively trying to make changes in their diet ($n = 11$), exercise ($n = 4$), or both ($n = 25$). This scale was developed for use in a study of family health behavior change in a sample of younger (≤ 45 years) adults, with children (ages 8–16 years) living in the household, and who were attempting to change eating behaviors.

Psychometric testing was conducted by the developers on a sample consisting primarily of undergraduate college students (mean age 21.3 $\pm$ 6.5 years). Factor analysis of these items yielded five subscales: resisting relapse (18 items), reducing calories (15 items), reducing salt (9 items), reducing fat (10 items), and behavioral skills (9 items). Test–retest reliabilities, after 1–2 weeks, of the subscales ranged from .43 to .64. Internal consistency alpha coefficients ranged from .85 to .93 for the subscales. Intercorrelations between the subscales ranged from .35 to .69. Concurrent criterion-related validity was assessed by correlating scores on the SEEBS with the "not heart healthy/heart healthy dietary index," a measure calculated from reported diet behaviors that were assessed simultaneously via a food frequency questionnaire. All factors significantly correlated ($-.24$ to $-.43$, $p < .001$) with the "not heart healthy/heart healthy diet index" scores. Specificity was assessed through participants' reports of attempts to make specific diet behavior changes. The SEEBS factors showed strong relationships to diet behavior change attempts. Construct validity of the SEEBS was tested by correlating its scores to scores on the Multidimensional Health Locus of Control (MHLC) scale, which measures beliefs of responsibility for one's health in three subscales: "internal," "chance," and "powerful others." Correlations between the SEEBS subscales and MHLC "internal" subscale were significant. Correlations to the "chance" subscale were much lower, although correlations

to the "powerful others" subscale were very low and mostly not significant. Females tended to score higher on the SEEBS; age was positively and significantly correlated (.16–.29) to SEEBS factors (Sallis et al., 1988).

The Eating Habits Confidence Survey

Sallis (1996a, 1996b) released the EC as an abbreviated form of the SEEBS because the EC is a shorter and more practical version for users. It is a 20-item scale scored on the same 5-point Likert-type scale as the SEEBS. Items were selected from the original scale that were most relevant to the project, targeting salt and fat intake (J. F. Sallis, personal communication, March 21, 2008). Five items were selected from each of four of the original five subscales: "sticking to it" (originally called resisting relapse), "reducing calories," "reducing salt," and "reducing fat." A mean score of responses on each subscale of the EC is calculated for a mean score that is between 1 and 5. Any items left blank or marked "Does not apply" are coded as missing data. Psychometric properties of this scale have not been evaluated by the authors or reported in the literature (J. F. Sallis, personal communication, March 21, 2008).

METHODS

Data Source and Study Design

The data used for this study were collected as part of a larger randomized clinical trial of weight loss in overweight and obese postmenopausal women. The parent study was approved by the institutional review board at the University of Central Florida.

Sample

A convenience sample of overweight (body mass index [BMI] 25.0–29.9) or obese (BMI $\geq$ 30.0) postmenopausal (1 year without menses) women, who were otherwise generally healthy, nonsmokers, and only used alcohol minimally were recruited. A sample of 86 women (M_{age} = 57.5 $\pm$ 3.88) with BMIs that ranged from 25.0 to 41.9 (M = 31.87 $\pm$ 4.28) were enrolled. The women were mostly White (87.2%), married (67.4%), not Hispanic or Latino (86.9%), and living with someone (77.9%). Full demographic information is presented in Table 1.

Measures

The measures used in this study were height (m) at baseline (T1) only, weight (kg; and the calculated BMI), demographics, EC, Eating Behavior Inventory (EBI), Binge Eating Scale (BES), and Eating Self-Efficacy Scale (ESES).

The EBI (O'Neil et al., 1979; O'Neil & Rieder, 2005) comprises 26 items that assess the use of behaviors such as self-monitoring of food intake, shopping patterns, and meal planning habits, demonstrated to be conducive to weight loss. Participants use a 5-point Likert-type scale from 1 (*never or hardly ever*) to 5 (*always or almost always*) according to how frequently they enact each behavior (O'Neil et al., 1979; O'Neil & Rieder, 2005). Higher scores are thought to be indicative of participant behavior that is conducive to weight loss or weight management. Internal consistency reliability of .75 in our previous work (Dennis & Goldberg, 1996) was consistent with known split-half reliability of .20

TABLE 1. Demographics

	n	%
Marital status		
Single	4	4.7
Married	58	67.4
Divorced	19	22.1
Widowed	5	5.8
Living arrangements		
Alone	19	22.1
With someone	67	77.9
Ethnicity		
Hispanic or Latino	12	14.0
Not Hispanic or Latino	74	86.0
Race		
Asian	1	1.2
Black or African American	5	5.8
White	75	87.2
More than one race	5	5.8

and test–retest reliability of .74 (O'Neil et al., 1979), and our construct validity estimates through hypothesis testing were consistent with discriminant validity between treated versus untreated obese subjects, and with measures of social desirability demonstrated during scale development. In our previous studies, higher scores were associated with greater weight loss in Navy men (Dennis, Pane, Adams, & Qi, 1999) and postmenopausal women (Qi & Dennis, 2000).

The BES (Gormally, Black, Daston, & Rardin, 1982) is a relevant measure of binge eating indicators: eating what is subjectively perceived as a large amount of food, and feelings such as guilt and fear of being unable to stop. It consists of 16 multiple-choice items with four possible responses that measure binge eating behaviors and cognitions. Higher scores on the BES indicate the presence of more problematic binge eating thoughts or behaviors (Gormally et al., 1982). Helping women overcome problems with binge eating may facilitate weight loss, interact with self-efficacy, and decrease depression (Cargill, Clark, Pera, Niaura, & Abrams, 1999; Linde et al., 2004). Internal consistency reliability and a contrasted groups approach to construct validity of this measure were demonstrated when it was developed (Gormally et al., 1982).

The ESES (Glynn & Ruderman, 1986) reflects difficulty in dealing with emotional and situational factors that precipitate problematic eating behaviors. Responses are made on a 7-point Likert-type scale from 1 (*no difficulty controlling eating*) to 7 (*most difficulty controlling eating*) and higher scores on the ESES represent more difficulty with controlling overeating. Each subscale (negative affect [NA] or socially acceptable circumstances [SAC]) on the 25-item questionnaire demonstrated internal consistency (.85–.94) and test–retest reliability (.70), as well as construct and predictive validity in developmental

studies (Glynn & Ruderman, 1986). In our previous work with moderately obese women, internal consistency reliability was .96 for the NA subscale and .89 for the social situations subscale (Dennis & Goldberg, 1996). In this study, the three eating scales were selected in supporting construct validity because they measure eating behaviors that are often correlated with overweight and obesity.

Procedures

Data from all women ($N = 86$) were used to analyze psychometric properties at T1, but only women ($n = 71$) who provided complete body weight and survey data at T1 and postintervention (T2) were included in the assessment of criterion validity with weight loss. Reliability estimates for the EC were drawn from T1, which includes the 86 women enrolled in the study. The coefficient alpha and a split-half coefficient, expressed as a Spearman-Brown corrected correlation, were calculated. For the split-half coefficient, the scale was split such that the two halves would be as equivalent as possible. In splitting items, sequencing of items and content were taken into account. This resulted in alternating items, sequentially, into each half, such that each half contained at least two items from each subscale (sticking to it, reducing calories, reducing salt, and reducing fat). The first half included item numbers 1, 3, 5, 7, 9, 11, 13, 15, 17, and 19, whereas the other half included item numbers 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20 (Sallis, 1996a). Item analysis was conducted to assess item correlation with the total scale scores and with each of the four subscales. Concurrent/discriminant validity were assessed by correlating EC scores at T1 and T2 with scores on the three other eating scales at the same time. Concurrent reliability and specificity were assessed by correlating scores on the EC and the EC subscales with weight and BMI at T1. Finally, the abilities of the EC and the other eating scales to predict weight and BMI at T1 and T2 were assessed by running multiple regression analyses. Statistical Package for the Social Sciences, Version 16.0, was used in this data analysis.

RESULTS

Descriptive Statistics

The overweight or obese postmenopausal women were primarily White, married, and living with someone. At T1, the women were 164 ± 7 cm tall and weighed 85.29 ± 12.28 kg. Their BMI was 31.87 ± 4.28 kg/m^2. At T2, they weighed 78.35 ± 11.82 kg with a BMI of 29.23 ± 3.91 kg/m^2.

Internal Consistency Reliability

Two internal consistency estimates of reliability were computed for the EC: a coefficient alpha and a split-half coefficient expressed as a Spearman–Brown corrected correlation. Value for the coefficient alpha (.83) and the split-half coefficient (.84) were nearly identical, indicating satisfactory reliability in this population.

Item Analysis

Item analyses were conducted on the 20 items to assess eating habits confidence. Initially, each of the 20 items was correlated with the total score for EC. All the correlations were .30 or greater except for three items: item 4—"Stick to your low fat, low salt foods when

DISCUSSION

This psychometric analysis of the EC is the first of its kind reported in any population. Therefore, assumption of equivocal psychometric properties of the EC in other populations should be made with caution.

The EC showed strong internal consistency and internal reliability in this population. Although item analysis suggested possible removal of three items from the scale, their strong correlations with their appropriate subscale demonstrates their conceptual fit.

It was predicted that the EC would positively associate with the EBI because higher scores on both represent "appropriate" eating behaviors. The EC was expected to correspond in a negative direction with the ESES and BE because higher scores on these two scales represent "inappropriate" eating behaviors. It was also assumed that the EC would show a relationship with weight and BMI because of eating behaviors having an influence on body weight.

The weak relationship between scores on the EC and body weight was not surprising because body weight does not take into account height or body type. As such, a very tall, lean individual may have the same weight as a much shorter, overweight, or obese individual. Because of the interindividual variability in height, BMI is considered a more accurate measure of overweight and obesity (Garrow & Webster, 1985; National Heart, Lung, and Blood Institute, 2010). It was interesting, however, to see that the EC score correlated following the 6-month intervention, during which participants were exposed to strategies to help improve their eating habits. This suggests that participant self-efficacy for eating behaviors may have increased. Because participants learned about and successfully implemented healthy eating behaviors resulting in desired weight loss, it appears they became more confident in their ability to continue these healthy eating behaviors to lose weight. This also demonstrates the underpinning of the EC in self-efficacy theory.

As predicted, the EC correlated positively but not significantly with scores on the EBI and in a negative direction with scores on the ESES and BES. Lack of significant correlations between the EC and the other eating scales used in this study suggest that each scale is measuring a different realm of eating behaviors, even though all of them reflect issues related to overweight and obesity. However, the correlation of the sticking to it subscale of the EC with each of the other scales and subscales suggests a similarity of the types of behaviors contained within each scale. The correlations were not surprising and each presented in the expected direction.

Because the significant regression models contained all four scales, most or all of these scales measure eating behaviors that correspond to weight and BMI status. Multiple regression analyses using only the EC scores showed that the behaviors contained in the EC did not cover the entire realm of possible eating behaviors that may contribute to weight or BMI status. Further research is needed to evaluate the predictive accuracy of each of these scales individually and in conjunction with the others in this population. In this sample, it appears that the ESES did not contribute significantly to predictive accuracy and may not measure a contributing factor to weight or BMI in this population.

The EC demonstrated strong internal consistency and reliability in this sample of overweight and obese postmenopausal women. All of the items belong on its respective subscale as well as the total scale, either by statistical or conceptual fit. The 20-item EC is a useful and less burdensome option than the 63-item SEEBS, although future research should also address whether it performs as well as the SEEBS. Easing subject load and completion time makes the EC a more viable option in the clinical and research setting.

The encouraging psychometric properties demonstrated here suggest the EC may be a useful instrument in many populations. Power analyses should also be conducted in future studies. In conclusion, the psychometric properties of the EC need to be evaluated and reported with each use to support or refute its use and appropriateness with a wide range of study populations.

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