Title

Confirmatory factor analysis of the Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R) in a United States sample of adults with overweight and obesity

Authors

Dochat, Cara
Afari, Niloofar
Wooldridge, Jennalee S
et al.

Publication Date

2020

DOI

10.1016/j.jcbs.2020.01.006

Peer reviewed

HHS Public Access

Author manuscript

J Contextual Behav Sci. Author manuscript; available in PMC 2021 January 01.

Published in final edited form as:

J Contextual Behav Sci. 2020 January ; 15: 189–196. doi:10.1016/j.jcbs.2020.01.006.

Confirmatory Factor Analysis of the Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R) in a United States Sample of Adults with Overweight and Obesity

Cara Dochat[1], **Niloofar Afari**[2,3,4], **Jennalee S. Wooldridge**[2,3], **Matthew S. Herbert**[2,3], **Marianna Gasperi**[3,4], **Jason Lillis**[5]

[1]San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology, San Diego, CA, USA

[2]VA San Diego Healthcare System, San Diego, CA, USA

[3]Department of Psychiatry, University of California, San Diego, La Jolla, CA, USA

[4]VA Center of Excellence for Stress and Mental Health (CESAMH), San Diego, CA, USA

[5]Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University/The Miriam Hospital Weight Control and Diabetes Research Center, Providence, Rhode Island, USA

Abstract

Objective—To examine the psychometric properties of the English language version of the 10-item Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R) in a United States (U.S.) sample of women and men with overweight/obesity (OW/OB).

Method—Adults with OW/OB seeking weight loss (N = 283; 59% women) completed the AAQW-R and other weight-related and psychosocial measures. Confirmatory factor analysis was used to examine single-factor, three-factor, and second-order factor structures of the AAQW-R, which were previously examined in a sample of Portuguese women. A chi-square difference test was used to compare the fit of a single-factor structure with three-factor and second-order factor structures. Internal reliability and convergent validity were examined for the total and three-factor subscale scores.

Results—The single-factor structure evidenced poor fit to the data whereas the three-factor structure evidenced acceptable fit. The second-order structure was assessed qualitatively due to limitations to statistical model specification. The internal reliability of the AAQW-R total score and each of the three subscales were in the good and acceptable ranges, respectively. Total and subscale scores demonstrated good convergent validity.

Corresponding Author: Niloofar Afari, PhD, 9500 Gilman Drive, 0737, La Jolla, CA 92093, Phone: 858-642-3387, nafari@ucsd.edu.

Declarations of interest: none

Discussion—Findings suggest that the English language version of the AAQW-R can be used to assess weight-related experiential avoidance in U.S. adult samples with OW/OB as a three-factor construct (food as control, weight as a barrier to living, weight stigma), with or without a total score. Additional research should confirm measurement invariance among various sociodemographic groups.

Keywords

experiential avoidance; obesity; weight loss; Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised; psychological flexibility; confirmatory factor analysis

Overweight and obesity (OW/OB) is a public health concern worldwide, with over half of the adult population estimated to have a body mass index (BMI) at or above 25 kg/m^2, and 40% of Americans estimated to be obese (Hales, Carroll, Fryar, & Ogden, 2016; World Health Organization, 2018). Adaptations of Acceptance and Commitment Therapy (ACT), henceforth referred to as acceptance-based treatments (ABTs), have been developed to enhance weight loss outcomes in the U.S. and abroad (Forman, Butryn, et al., 2013; Forman et al., 2016; Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013; Lillis, Hayes, Bunting, & Masuda, 2009; Lillis et al., 2016; Niemeier, Leahey, Reed, Brown, & Wing, 2012; Palmeira, Cunha, & Pinto-Gouveia, 2019; Pearson, Follette, & Hayes, 2012; Tapper et al., 2009). ABTs aim to increase clients' psychological flexibility, which is represented in the ACT model by six interrelated psychological and behavioral processes (i.e., acceptance, cognitive defusion, present moment awareness, self-as context, values identification, committed action toward values) (Hayes, Strosahl, & Wilson, 2009). One of those processes, acceptance, is defined as a willingness to experience internal stimuli (thoughts, feelings, bodily sensations) and external experiences (e.g., criticism from others), both desirable and undesirable, without attempts to avoid or modify them. Within an ABT, acceptance is presented as a skill to aid one in pursing behavior (and ultimately a lifestyle) aligned with personal values. The antithesis of acceptance is experiential avoidance (EA), which is defined as repeated attempts to change, control, or avoid unpleasant or undesirable thoughts, feelings, and bodily sensations, even when doing so has negative long-term consequences (Hayes et al., 2009). EA is maintained by negative reinforcement (i.e., short-term removal of aversive urges and feelings), but may paradoxically intensify those unwanted experiences and thwart values-driven behavior, such as health behavior change, in the longer-term (Chawla & Ostafin, 2007).

In the context of OW/OB, EA can manifest in a number of ways, such as avoidance of physical activity in an attempt to avoid unpleasant physical sensations, unpleasant thoughts about one's body shape or size, or fears of judgment from others; eating as a means to avoid or suppress unpleasant emotions; eating in response to cravings or food cues when not physically hungry rather than tolerating distressing cravings; and avoidance of people, places, and situations that remind one of his or her weight (Ciarrochi, Sahdra, Marshall, Parker, & Horwath, 2014; Forman & Butryn, 2015; Gregg, Lillis, & Schmidt, 2015). Thus, the goal of ABTs for OW/OB is to help clients develop the willingness to experience undesirable thoughts (e.g., "I'm fat") and feelings (e.g., negative affect, certain bodily sensations), and to behave in accordance with their personal values (e.g., engaging in

physical activity as means to living an active lifestyle) in spite of those internal experiences. Evidence suggests that EA is a significant treatment mechanism in ABTs for weight loss and related concerns (Niemeier et al., 2012; Palmeira et al., 2019; Schumacher, Godfrey, Forman, & Butryn, 2019). To assess EA in the domain of weight loss specifically, the Acceptance and Action Questionnaire for Weight-Related Difficulties (AAQW; Lillis & Hayes, 2007) was developed and validated in a weight loss-seeking sample of adults (N = 84; 90% women). The psychometric properties of the 22-item AAQW were acceptable and its single-factor structure was theoretically sound, but research in additional samples was needed to verify its factor structure. In response, Weineland, Lillis, and Dahl (2013) used the AAQW in a sample of bariatric patients (N = 39, 90% women), in which it evidenced a five-factor structure explaining 55% of the total variance and retained 20 of the original 22 items. The 22-item AAQW was then translated to Portuguese and administered to 249 nutrition treatment-seeking women with OW/OB (Cardoso, 2014). This study identified a three-factor structure explaining 51% of the total variance and which retained 15 of the original 22 items.

Subsequently, Palmeira, Cunha, Pinto-Gouveia, Carvalho, and Lillis (2016) used multigroup confirmatory factor analysis to explore the two aforementioned factor structures in two comparison samples: (1) 215 women with normal weight (BMI < 25 kg/m^2), and (2) 210 women with OW/OB seeking weight loss treatment in Portugal. In addition, Palmeira et al. (2016) tested two other structures: (1) a three-factor structure with 10-items that resulted from removing items with low factor loadings and low item-total correlations from Cardoso's (2014) model; and (2) a 10-item second-order structure with the same three first-order factors and a global second-order factor (total score). Of the four structural models tested, Palmeira et al. (2016) concluded that the best fitting was the 10-item second-order factor structure (with three first-order factors and one global factor). That model had acceptable Root Mean Square Error of Approximation (RMSEA) at .066, 90% CI [.050, .082; p = .052], and Comparative Fit Index (CFI) was excellent at 0.996. This 10-item version was named 'AAQW-R' (Acceptance and Action Questionnaire for Weight-Related Difficulties - Revised). It evidenced good psychometric properties including construct validity, temporal stability, and sensitivity to change. AAQW-R total (r = .51) and subscale scores (rs = .40–.49) were positively correlated with BMI (moderate to low strength, respectively).

Since its publication, the AAQW-R has been used to assess weight-related EA as a total score as well as three sub-factors: (1) food as control, or the tendency to "use food as a coping mechanism to deal with negative emotions"; (2) weight as barrier to living, or the tendency to "move away from a valued life due to one's weight or body shape"; and (3) weight stigma, which contains items assessing "experiences of internalized stigma related to one's weight" (Palmeira et al., 2016; p. 196). Though Palmeira et al. (2016) followed best practices to establish the strong psychometric properties of the AAQW-R, both they and Cardoso (2014) conducted their analyses using the Portuguese language version of the measure. Different language versions of an instrument cannot be assumed to be psychometrically equivalent (Ercikan & Lyons-Thomas, 2013), and differences between cultures might produce variation in the best-fitting factor structure and psychometric performance of a measure (Chen, Sousa, & West, 2005). Therefore, measurement invariance of the 10-item English language version of the AAQW-R must be established before it can

be used in English-speaking individuals in the U.S. Additionally, 90%−100% of the validation samples in Lillis and Hayes (2007), Weineland et al. (2013), Cardoso (2014), and Palmeira et al. (2016) were women. Assessing the factor structure and psychometric properties of the AAQW-R in a mixed-sex sample is critical for ensuring its utility with male research participants and therapy clients.

The aim of the current study was to examine the factor structure and psychometric properties of the English language version of the 10-item AAQW-R in U.S. women and men with OW/OB using confirmatory factor analysis (CFA). We assessed a single-factor structure as hypothesized by Lillis & Hayes (2007) as well as the three-factor and second-order factor structures established by Palmeira et al. (2016). We also assessed internal consistency and construct validity of the total score and three sub-factors.

Methods

Participants and Procedures

Participants (N = 283) were adults with OW/OB seeking weight loss treatment. Sample 1 (n = 194) was a community sample of adults enrolled in a behavioral weight loss treatment study at a university weight control research center. Participants were recruited via newspaper ads and direct mailings. Sample 2 (n = 89) was comprised of U.S. military veterans who had recently completed the Veterans Health Administration Motivating Overweight/Obese Veterans Everywhere (MOVE!©) weight management program and were enrolled in an adjunctive treatment study for disinhibited eating. Data used in the current analyses were collected at baseline for both studies. All procedures were approved by respective Institutional Review Boards and research committees. All participants provided informed consent.

Measures

Sociodemographic variables and body mass index (BMI)—Participants self-reported sociodemographic information including age, sex, race/ethnicity, household income, education attainment, and marital status. Weight and height were measured during baseline assessments in the respective studies and used to calculate BMI (kg/m^2).

Weight-related experiential avoidance—The 22-item Acceptance and Action Questionnaire for Weight-Related Difficulties (AAQW; Lillis & Hayes, 2007) was used to assess weight-related EA in both samples. Of those 22 items, only 10 items were used in the present analyses. Those 10 items comprise the Acceptance and Action Questionnaire for Weight-Related Difficulties - Revised (AAQW-R; Palmeira et al., 2016). Respondents were instructed to rate how true six statements (items 2, 9, 10, 11, 13, 16) were from 1 (*never true)* to 7 (*always true),* and how valid or believable four statements (items 17, 19, 20, 21) are from 1 (*not at all believable*) to 7 (*completely believable*). In their CFA, Palmeira et al. (2016) established a second-order factor structure with a global second-order factor (total score) and three first-order factors (subscales). The three first-order factors were labeled (1) food as control (three items), (2) weight as a barrier to living (three items), and (3) weight stigma (four items). Example items include: “When I have negative feelings, I use food to

make myself feel better" (food as control); "I need to feel better about how I look in order to live the life I want to" (weight as a barrier to living); "I should be ashamed of my body" (weight stigma). Total and subscale scores are calculated by summing item responses. Higher scores indicate greater weight-related EA. Internal consistency of the AAQW-R total (α = .88), food as control (α = .77), weight as a barrier to living (α = .73), and weight stigma (α = .79) scale scores was acceptable in a large sample of women across the BMI range (Palmeira et al., 2016).

Weight self-stigma—The Weight Self-Stigma Questionnaire (WSSQ; Lillis, Luoma, Levin, & Hayes, 2010) was administered to both samples. The WSSQ is a 12-item self-report measure assessing multiple dimensions of weight-related self-stigma in individuals with OW/OB. Participants rate items (e.g., "I feel guilty because of my weight problems") on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating a greater degree of weight self-stigma. The WSSQ has demonstrated adequate construct validity and good internal consistency reliability for the total scale (α = .88; Lillis et al., 2010).

Psychological flexibility—The Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011) was administered to both samples. The AAQ-II is a 7-item self-report measure of general psychological flexibility. Respondents rate items (e.g., "I'm afraid of my feelings," "Emotions cause problems in my life") on 7-point scale from 1 (*never true*) to 7 (*always true*), with lower scores indicating greater levels of psychological flexibility. The AAQ-II has demonstrated adequate to good internal consistency reliability with a mean alpha coefficient of .84 (α ranged from .78–.88). Three- and 12-month test-retest reliability is .81, and .79, respectively (Bond et al., 2011).

Depression—In sample 1, the 4-item short form of the Patient-Reported Outcomes Measurement Information System (PROMIS) depression scale was used to assess depression symptoms (Cella et al., 2010). Respondents rate the frequency of depression symptoms in the past seven days on a 5-point scale from 1 (*never*) to 5 (*always*). PROMIS measures are developed using item response theory and have been used in a range of clinical populations, evidencing good psychometric properties. PROMIS measures were selected in sample 1 in an effort to increase standardization of psychological construct measurement across clinical studies consistent with the National Institutes of Health (NIH) PROMIS initiative goals. In sample 2, the 6-item depression subscale of the 18-item Brief Symptom Inventory (BSI-18; Derogatis, 2000) was used. Respondents rate the extent to which several symptoms have distressed or bothered them in the past seven days on a 5-point scale ranging from 0 (*not at all)* to 4 *(extremely)*. On both measures, item responses are summed to created total scores. Higher scores on both measures reflect greater severity of depression symptoms.

Anxiety—In sample 1, the 4-item short form of the PROMIS anxiety scale was used to assess anxiety symptoms (Cella et al., 2010). Respondents rate the frequency of experiencing symptoms of anxiety in the past 7 days on a 5-point scale from 1 (*never*) to 5 (*always*). In sample 2, the 6-item anxiety subscale of the BSI-18 was used. Respondents rate the extent to which several symptoms have distressed or bothered them in the past seven

days on a 5-point scale ranging from 0 (*not at all)* to 4 *(extremely)*. On both measures, item responses are summed to created total scores. Higher scores on both measures reflect greater severity of anxiety symptoms.

Disinhibited eating—In sample 1, the 16-item disinhibition subscale of the EI was used to assess disinhibited eating. An example item includes, “I usually eat too much at social occasions, like parties and picnics.” The original validation of this scale indicates good internal consistency (α = .91; Stunkard & Messick, 1985). In sample 2, two measures were administered to assess disinhibited eating. The 13-item emotional eating scale of the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986) assesses eating in response to both diffuse emotions (e.g., “Do you have a desire to eat when you are approaching something unpleasant to happen?”) and clearly labeled emotions (e.g. “Do you have a desire to eat when you are anxious, worried, or tense?”). Respondents rate the how frequently they engage in each item on a 5-point scale from 1 (*never*) to 5 (*very often*). The subscale had excellent internal consistency (α = .94) in the original validation sample. The 16-item Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982) was used in Sample 2 and assesses the behavioral, cognitive, and emotional features of binge eating in adults with OW/OB. Respondents select one statement out of four response options which best describes their binge eating-related attitudes and behaviors, from 16 groups of questions. Each statement is weighted either 0, 1, 2, or 3, and weights are summed for a total score. An example item weighted 0 is, “I rarely eat so much food that I feel uncomfortably stuffed afterward.” An example item weighted 3 from the same group of statements is, “I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.” The subscale has good internal consistency in adults with OW/OB and binge eating (Burton, Abbott, Modini, & Touyz, 2016). Higher scores on all measures of disinhibited eating indicate a greater degree of disinhibited eating.

Obesity-related quality of life—This construct was assessed in sample 2 only, using the 18-item Obesity-Related Well Being Scale (ORWELL-97; Mannucci et al., 1999). The ORWELL-97 assesses physical impairment and psychosocial distress in various life domains due to overweight and obesity and is well-validated in individuals with OW/OB with good internal consistency (α = .83). Respondents rate the extent to which each item applies to themselves on a 4-point scale from 0 (*not at all*) to 3 (*much*). Items assessing life domain importance (e.g., “Is it important for you to live in a serene family environment?”) and obesity-related domain distress (e.g., “Does being overweight prompt discussions in your family?”) are multiplied, then summed for a total score. Higher scores indicate lower quality of life.

Weight, shape, and eating concern—Concerns related to weight, shape, and eating were assessed in sample 2 only, using the EDE Edition 16.0 structured clinical interview (Fairburn, Cooper, & O’Connor, 2008). The eating concern (5 items), shape concern (8 items), and weight concern (5 items) subscales assess specific eating disorder-related cognitions and behaviors, such as eating in secret and guilt about eating (eating concern), desire to have a flat stomach and discomfort seeing body (shape concern), and importance of weight and desire to lose weight (weight concern). Respondents report the extent to which or

frequency with which they have experienced thoughts or behaviors in the past four weeks, which is scored by the administrator on a Likert-type scale with varying anchor points. Subscales scores are calculated as means. Higher scores indicated greater concern.

Statistical Analyses

All analyses except for CFA were conducted using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA), with $\alpha \leq .05$. CFA was conducted using MPlus version 8 (Muthén & Muthén, 1998–2017).

Preliminary data analysis—Distributions of observed variables were assessed for univariate and multivariate normality. The Mahalanobis distance statistic was calculated to assess for multivariate outliers. Data were transformed to approximate normality when indicated, and these transformed variables were used to conduct CFA. Absence of multicollinearity among items and subscales, respectively, was determined by variance inflation factor (VIF) < |5| (Kline, 2005). Independent samples t-tests and chi-squared goodness-of-fit tests were used to examine whether sociodemographic variables (age, sex, race/ethnicity, household income, education status, marital status) and BMI differed by sample. Independent samples t-tests were also used to compare sample means for ABT-specific measures (AAQW-R, AAQ-II) administered in both samples.

Confirmatory factor analysis—CFA was conducted to test and compare the fit of a single-factor structure, three-factor structure, and second-order factor structure (3 first-order factors, 1 global factor) in the total sample ($N = 283$) using maximum likelihood estimation. A second-order factor structure is appropriate and more parsimonious than a first-order model with correlated factors when a single latent variable is hypothesized to account for strong relations among primary factors, as is true for weight-related EA and the three factors established by Palmeira et al. (2016). However, as Chen et al. (2005) note, if a second-order model with one global factor has only three first-order factors, the structural model (second-order portion) is saturated, or just-identified. A just-identified model is one for which the number of free parameters exactly equals the number of known values, making degrees of freedom equal to zero. For any just-identified model, parameters can be estimated but model fit indices cannot. Therefore, holistic model fit of the second-order factor structure examined by Palmeira et al. (2016) cannot be evaluated, nor can model fit of the second-order structure be statistically compared to model fit of the three-factor structure (see also Brown, 2014). Thus, we analyzed and report the parameter estimates of the second-order factor structure here to reproduce analyses reported by Palmeira et al. (2016), but cannot determine model fit using statistical analyses or descriptive fit indices.

Model fit was evaluated using the following indices: Chi-Square goodness-of-fit (χ^2), Comparative Fit Index (CFI > .90 acceptable, and > .95 desirable; Hu & Bentler, 1998), Tucker-Lewis Index (TLI > .90 acceptable, and > .95 desirable; Hu & Bentler, 1998), Root Mean Square Error of Approximation (RMSEA < .05 good fit; < .08 acceptable fit; < .10 poor fit; Brown, 2014; Kline, 2005) using a 90% confidence interval, and Standardized Root Mean Square Residual (SRMR < .05 good fit, and < .08 acceptable fit; Hu & Bentler, 1999). A chi-square difference test was used to compare the fit of a single-factor structure with the

three-factor structure. A statistically significant difference ($p < .05$) indicates better fit of the model with smaller chi-square value. Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were also used to compare models, where lower values indicate better model fit.

Internal reliability and convergent validity—Internal reliability was assessed using Cronbach's alpha (α > .80 good fit and > .70 acceptable fit; Lance, Butts, & Michels, 2006; Nunally, 1978). Convergent validity of AAQW-R total and subscale scores was assessed using Pearson correlation coefficients (Cohen, Cohen, West, & Aiken, 2003), where magnitude is described qualitatively using descriptors suggested by Hinkle, Wiersma, and Jurs (2003): r = |.00–.30| negligible; |.30–.50| low; |.50–.70| moderate; |.70–.90| high; |.90–1.00| very high. We expected moderate positive correlations between AAQW-R total and AAQ-II scores, and AAQW-R total and WSSQ scores. We expected moderate positive correlations between AAQW-R total and subscale scores and disinhibited eating (EI Disinhibition; DEBQ Emotional Eating; BES) and obesity-related quality of life (ORWELL-97). Further, AAQW-$R_{\text{food as control}}$ was expected to relate more strongly to measures of disinhibited eating than other AAQW-R subscales. AAQW-$R_{\text{weight as barrier}}$ was expected to relate more strongly to ORWELL-97 scores than other AAQW-R subscales.

We also expected moderate positive correlations between AAQW-R total and subscale scores and EDE weight concern, shape concern, and eating concern. AAQW-$R_{\text{weight as barrier}}$ was expected to relate more strongly to EDE weight concern than other AAQW-R subscales. AAQW-$R_{\text{food as control}}$ was expected to relate more strongly to EDE eating concern than other AAQW-R subscales. Finally, we expected low to moderate significant positive relationships between AAQW-R total and subscale scores and depression and anxiety symptom scores (PROMIS Depression; BSI-18 Depression; PROMIS Anxiety; BSI-18 Anxiety). In the sample of 425 women assessed by Palmeira et al. (2016), AAQW-R total (r = .51) and subscale scores (rs = .40–.49) were positively correlated with BMI (moderate to low strength, respectively). We anticipated similar results in our sample.

Results

Sociodemographic and descriptive statistics

Sample characteristics and comparisons are shown in Table 1. The entire sample (N = 283) was 41% male, middle-aged (M_{age} = 55.4 years, SD_{age} = 10.7), and predominately white, had higher income, and attained higher education. Average BMI was in the obese range (BMI ≥ 30 kg/m^2) (Centers for Disease Control and Prevention, 2017). Compared to sample 1 (n = 194), sample 2 (n = 89) included a significantly greater proportion of men, non-White individuals, individuals with lower incomes, and individuals with less than bachelor's-level education. Independent samples t-tests found significant inter-sample mean differences for AAQ-II, AAQW-R total, and AAQW-$R_{\text{food as control}}$ scores. Mean AAQ-II score was greater in sample 2, while AAQW-R total and AAQW-$R_{\text{food as control}}$ scores were greater in sample 1.

Preliminary data analysis

The distributions of four observed variables evidenced positive skew (skewness values > |3|). These distributions approximated normality following $\log_{10}$ transformations. Four cases were suspected to be multivariate outliers but were retained in additional analyses to maintain representativeness of the population and in order to best reproduce the procedures of Palmeira et al. (2016). Multicollinearity was not suspected based on VIF.

Confirmatory factor analyses

Model 1—A single-factor structure of the 10-item AAQW-R was tested first (Table 2). The chi-square goodness-of-fit test was significant, and values on three of four descriptive fit indices failed to meet threshold for acceptable fit (i.e., CFI > .90, TLI > .90, RMSEA < .05), indicating that the single-factor model did not fit the data well either statistically or descriptively. Model evaluation did not proceed.

Model 2—The 10-item three-factor structure proposed by Palmeira et al. (2016) was tested next. Three latent variables (food as control, weight as a barrier to living, weight stigma) were indicated by three, three, and four items, respectively. Inter-factor correlations were specified between the three latent variables. Overall model fit of this 3-factor structure was adequate (Table 2). The model did not fit well statistically (χ^2 [32, N = 283] = 91.74, p < .001) and one descriptive fit index showed borderline acceptable fit (RMSEA = .081). However, non-parsimony adjusted descriptive fit indices showed good model fit (CFI = .940, SRMR = .044). Given that chi-squared goodness-of-fit test is sensitive to sample size and is often significant for large samples, and descriptive fit indices yielded desirable values, model evaluation proceeded (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

All standardized factor loadings for the three-factor solution were large and statistically significant (ps < .001), including for the food as control factor (values ranged from .589 to .799), the weight as a barrier to living factor (values ranged from .608 to .773), and the weight stigma factor (values ranged from .563 to .802) (see factor loading values in Figure 1). Standardized inter-factor correlations were also large and statistically significant, suggesting that these three latent variables are strongly related: food as control and weight as a barrier (r = .790, p < .001); food as control and weight stigma (r = .707, p < .001); weight as a barrier and weight stigma (r = .875, p < .001). Model 2 was statistically superior to model 1 ($\Delta\chi^2_{0.95}$ [3, N = 183] = 60.668, p < 0.001) and showed lower AIC and BIC values, indicating a better fit to the data.

Model 3—Finally, the second-order structure ultimately reported by Palmeira et al. (2016) was evaluated. Model 3 introduces a global factor which is theorized to contribute to the three interrelated latent factors previously defined in model 2 (see structure in Figure 1). Because the second-order portion of model 3 is just-identified, model 3 parameter estimates and fit indices are identical to model 2. As shown in Table 2, models 2 and 3 are statistically equivalent (i.e., there are 0 degrees of freedom difference between them). However, standardized correlations between the theoretical second-order factor and first-order factors are novel and can be reported: food as control (r = .799, p < .001), weight as a barrier to living (r = .989, p < .001), weight stigma (r = .885, p < .001).

Reliability Statistics and Convergent Validity

Internal consistency of the AAQW-R total score (α = .86), AAQW-$R_{food\ as\ control}$ (α = .71), AAQW-$R_{weight\ as\ barrier\ to\ living}$ (α = .73) and AAQW-$R_{weight\ stigma}$ (α = .78) were good to acceptable in the total sample. Table 3 shows correlations between AAQW-R total and subscale scores and convergent validity measures. AAQW-R total score was moderately, positively correlated with AAQ-II score, as was AAQW-$R_{weight\ stigma}$. AAQW-$R_{weight\ as\ barrier}$ and AAQW-$R_{food\ as\ control}$ evidenced low positive correlations with AAQ-II. AAQW-R total and subscale scores were moderately to highly positively correlated with WSSQ scores. AAQW-R total score was moderately positively correlated with measures of disinhibited eating (EI Disinhibition, DEBQ Emotional Eating, and BES), as well as obesity-related quality of life (ORWELL-97). AAQW-$R_{food\ as\ control}$ showed the strongest relationship with disinhibited eating measures, and AAQW-$R_{weight\ as\ barrier}$ showed the strongest relationship with ORWELL-97, among the AAQW-R subscales. AAQW-R total score was moderately, positively correlated with EDE weight concern and shape concern subscales, and low positively correlated with EDE eating concern. AAQW-R subscale scores ranged from low to moderately positively related to EDE subscales, with AAQW-$R_{weight\ as\ barrier}$ showing the strongest relationship with EDE weight concern, and AAQW-$R_{food\ as\ control}$ showing the strongest relationship with EDE eating concern, among the AAQW-R subscales. AAQW-R total and subscale scores evidenced significant low to moderate, positive relationships with depression and anxiety symptoms.

AAQW-R total and subscale scores were significantly correlated with all convergent validity measures except BMI. Only AAQW-R total score and AAQW-$R_{weight\ stigma}$ were significantly correlated with BMI, and size of relationship was negligible.

Discussion

Weight-related EA is an important treatment target for ABTs addressing OW/OB and related concerns. Reliable and valid measurement of this construct is needed to examine process change in clinical research trials and clinical interventions. To this end, the 22-item AAQW was developed by Lillis & Hayes (2007), and refined using CFA by Palmeira et al. (2016) in a sample of Portuguese women with a Portuguese language version of the measure, which resulted in the 10-item AAQW-R. The present study examined the psychometric properties of the 10-item AAQW-R using the English language version in a sample of U.S. adults using CFA and other psychometric analyses. The three-factor structure established by Palmeira et al. (2016) was confirmed in the current study, with comparable internal consistency estimates. Convergent validity analyses showed patterns of association that were mostly as predicted.

Given strong inter-factor correlations in the three-factor model (model 2) and theory suggesting that a higher-order construct (weight-related EA) should account for these strong relationships, Palmeira et al. (2016) tested a second-order factor structure and we replicated these analyses (model 3). However, as noted above, we are unable to evaluate the second-order model fit holistically (Brown, 2014; Chen et al., 2005). Based on statistical and descriptive tests of fit available, we can only conclude that the three-factor model (model 2) is a good fit to the data. Nevertheless, given good internal reliability and convergent validity

of the total score, researchers and clinicians might consider using it in addition to subscale scores for conceptualizing weight-related EA. Thus, our findings suggest the 10-item AAQW-R can be used to assess weight-related EA as a collection of related sub-constructs (food as control, weight as a barrier to living, weight stigma), in U.S. adults with OW/OB, with or without a total score. From a functional contextual perspective, 'food as control' and 'weight as a barrier to living' can be conceptualized as behavioral manifestations of EA, and 'weight stigma' as a cognitive manifestation.

As expected, AAQW-R total score was moderately positively related to psychological flexibility, obesity-related quality of life, and disinhibited eating, and highly positively correlated with weight self-stigma, suggesting that the AAQW-R assesses aspects and outcomes of weight-related EA. The moderate relationship between AAQW-R total and AAQ-II further suggests that EA and psychological flexibility are related but distinct constructs. The pattern of relationships between AAQW-R subscales and measures of weight stigma, disinhibited eating, and obesity-related quality of life that were specifically designed for use with samples with OW/OB (i.e., WSSQ, BES, ORWELL-97), provides additional support for the validity of AAQW-R factors (subscales). For example, AAQW-$R_{\text{food as control}}$ was more strongly related to measures of disinhibited eating, emotional eating, and binge eating than AAQW-$R_{\text{weight as barrier}}$ and AAQW-$R_{\text{weight stigma}}$; AAQW-$R_{\text{weight as a barrier}}$ was more strongly related to obesity-related quality of life than AAQW-$R_{\text{food as control}}$ and AAQW-$R_{\text{weight stigma}}$.

Other convergent validity findings were consistent with our predictions. For example, the pattern of relationships between specific AAQW-R subscales and specific EDE scales were as predicted, however, the small differences in relative magnitude may not be practically significant (e.g., a difference of $r = .02$ in the association between EDE eating control and AAQW-$R_{\text{food as control}}$ compared to EDE eating control and AAQW-$R_{\text{weight as barrier}}$). Further, differences in qualitative descriptors for the magnitude of those relationships may not accurately reflect practical differences (e.g., characterizing $r = .47$ as low and $r = .51$ as moderate). Yet these concerns were unique to convergent relationships with EDE subscales. Given that the EDE was designed to diagnose eating disorders in clinical samples with varying BMI, its scales may not capture the constructs of interest in the present sample of adults with OW/OB seeking weight loss (Mannucci et al., 1997).

The relationships between AAQW-R total (and subscales) and depression measures were in the low-to-moderate ranges, as predicted. The moderate-sized relationships between AAQW-R total and depression measures were comparable to those between AAQW-R total and some eating-related measures that are expected to be more strongly related than depression (EDE subscales, DEBQ Emotional Eating). However, as noted previously, EDE subscales may be poor convergent validity measures for this population. Further, while greater EA is theorized to strongly related to emotional eating (Forman, Butryn, et al., 2013; Forman, Hoffman, et al., 2013), recent research has questioned the validity of self-report emotional eating measures (Bongers & Jansen, 2016). Taken together, findings suggest adequate convergent validity of the AAQW-R subscales and total score.

Inconsistent with prior findings, only AAQW-R total and AAQW-$R_{weight\ stigma}$ were significantly correlated with BMI in the present sample, compared to stronger, significant correlations between BMI and AAQW-R total (r = .51) and all subscales (rs = .40–.49) in Palmeira et al. (2016). This inconsistency may be due to sociodemographic and cultural group differences between study samples. Palmeira et al. (2016) included women (N = 425) across the BMI range from normal to obese (M_{BMI} = 26.39, SD_{BMI} = 6.31), whereas the current study included both men and women with OW/OB only (M_{BMI} = 35.65, SD_{BMI} = 5.53). Weight-related EA may not be linearly related to BMI among those with OW/OB only. For example, whether one perceives weight as a barrier may depend greatly on cognitions about weight regardless of absolute weight. Further, Wallace et al. (2019) found that on a national level, cultural factors explained more than 50% of the variance in BMI prevalence, where higher mean BMI was associated with greater cultural individualism, uncertainty avoidance, indulgence, and among men specifically, masculine orientation and power distance. In those analyses, the U.S. ranked substantially higher than Portugal on individualism, indulgence, and masculinity, whereas Portugal ranked notably higher on uncertainty avoidance. Given that intolerance of uncertainty and indulgence are constructs relevant to weight-related EA, this research highlights possible intercultural dimensions impacting both obesity prevalence as well as weight-related EA on a broader scale. These findings warrant further study as researchers and clinicians seek to conceptualize and treat weight-related EA internationally, among both men and women, of various racial/ethnic and sociodemographic identities. That said, the lack of significant association between BMI and AAQW-R scores in the present study may suggest that weight-related EA can be targeted by ABTs and effectively treated irrespective of weight or weight change.

Strengths and Limitations

This is the only study of which we are aware to validate the English language version of the 10-item AAQW-R. All participants were weight loss-seeking adults with OW/OB, the population for which this measure was designed. Our sample also included a greater proportion of males and non-White individuals than previous validation samples. Despite inter-sample differences in mean AAQ-II, AAQW-R and AAQW-$R_{food\ as\ control}$ scores, the three-factor structure fit the data well when samples were combined. Our findings in the context of sample heterogeneity (i.e., men and women; veterans and civilians; variation in racial and ethnic identity) strengthens our conclusions. The current study also has limitations. Given sociodemographic differences between samples 1 and 2, multigroup CFA would have been ideal for demonstrating cross-sample measurement invariance; however, the sample size prevented us from conducting this analysis. Due to the cross-sectional nature of the data, we were not able to assess test-retest reliability and sensitivity to change. Further, we examined the 10-item AAQW-R by administering the 22-item AAQW, then using only the 10 items relevant to the revised measure in the present analyses. Schwarz (1999) advises that, due to item-order effects, examining a subset of items administered in the context of a longer instrument may produce different results than would administering the items on their own. Future studies should aim to replicate these findings using the 10-item AAQW-R administered without additional items interspersed.

Future Directions

Current results suggest that the three-factor structure adequately represents the construct of weight-related EA as measured by the AAQW-R among weight loss-seeking adults with OW/OB broadly. However, inter-sample differences in mean AAQ-II and AAQW-R scores in the current study highlight a need for continued research to confirm the present factor structure and explore the construct of weight-related EA in various samples. Future studies should seek to explicitly establish measurement invariance among sociodemographic groups (e.g., gender, race/ethnicity, veteran status) using structural equation modeling methods of multigroup analyses (Kline, 2016). Studies should also examine bivariate relationships between demographic variables and AAQW-R total and subscales. Finally, given that theory suggests that weight-related EA should be conceptualized using a total score, future research might explore alternate factor structures (e.g., bifactor model) of the AAQW-R.

Conclusions

Results provide support for using the 10-item English-language version of the AAQW-R as a three-factor measure of weight-related EA, with or without a total score, in U.S. samples of adults with OW/OB. Given the importance of using domain-specific measures of EA for examining process change in ABTs, the AAQW-R may be an appropriate choice for researchers and clinicians examining weight-related EA. Longitudinal studies in U.S. samples are necessary to establish test-retest reliability and sensitivity to change. Nevertheless, the AAQW-R appears to be an acceptable measure of food as control, weight as a barrier to living, and weight stigma among weight loss treatment-seeking adults in the U.S.

Acknowledgments

Funding: This project was partially supported by Veterans Affairs Rehabilitation R&D grant I01RX000381 (registered at http://www.clinicaltrials.gov; NCT01757847) and by the National Institute of Diabetes, Digestive, & Kidney Diseases grant 1K23DK097143 (registered at http://www.clinicaltrials.gov; NCT02156752). Dr. Wooldridge is supported by the VA office of academic affiliates Advanced Fellowship on Women's Health.

References

Bond FW, Hayes SC, Baer RA, Carpenter KM, Guenole N, Orcutt HK, … Zettle RD (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire–II: A revised measure of psychological inflexibility and experiential avoidance. Behavior Therapy, 42, 676–688. [PubMed: 22035996]

Bongers P, & Jansen A (2016). Emotional eating is not what you think it is and emotional eating scales do not measure what you think they measure. Frontiers in Psychology, 7, 1–11. doi:10.3389/fpsyg.2016.01932 [PubMed: 26858668]

Brown TA (2014). Confirmatory Factor Analysis for Applied Research (2nd ed.). New York: Guilford.

Burton AL, Abbott MJ, Modini M, & Touyz S (2016). Psychometric evaluation of self-report measures of binge-eating symptoms and related psychopathology: A systematic review of the literature. International Journal of Eating Disorders, 49, 123–140. [PubMed: 26311621]

Cardoso SM (2014). A inflexibilidade psicológica na obesidade: estudo das propriedades psicométricas do AAQ-W. (Master's Thesis), Universidade de Coimbra, Retrieved from https://estudogeral.sib.uc.pt/jspui/bitstream/10316/27350/1/TESE%20-%20Sara%20Cardoso.pdf

Cella D, Riley W, Stone A, Rothrock N, Reeve B, Yount S, … Choi S (2010). The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult

self-reported health outcome item banks: 2005–2008. Journal of Clinical Epidemiology, 63, 1179–1194. [PubMed: 20685078]

Centers for Disease Control and Prevention (CDC). (2017, 8 29). About Adult BMI. >Retrieved August 23, 2019 from https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html.

Chawla N, & Ostafin B (2007). Experiential avoidance as a functional dimensional approach to psychopathology: An empirical review. Journal of Clinical Psychology, 63, 871–890. doi:10.1002/jclp.20400 [PubMed: 17674402]

Chen FF, Sousa KH, & West SG (2005). Teacher's corner: Testing measurement invariance of second-order factor models. Structural Equation Modeling, 12, 471–492.

Ciarrochi J, Sahdra B, Marshall S, Parker P, & Horwath C (2014). Psychological flexibility is not a single dimension: The distinctive flexibility profiles of underweight, overweight, and obese people. Journal of Contextual Behavioral Science, 3, 236–247

Cohen J, Cohen P, West SG, & Aiken LS (2003). Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Mahwah, NJ: Erlbaum.

Derogatis L (2000). Brief Symptom Inventory (BSI-18) Administration, Scoring and Procedures Manual. Minneapolis: Pearson.

Ercikan K, & Lyons-Thomas J (2013). Adapting tests for use in other languages and cultures In Geisinger KF (Ed.), APA Handbook of Testing and Assessment in Psychology: Vol. 3. Testing and Assessment in School Psychology and Education (pp. 545–569). Washington, DC: American Psychological Association.

Fairburn CG, Cooper Z, & O'Connor M (2008). Eating Disorder Examination (Edition 16.0D). In Fairburn CG (Ed.), Cognitive Behavior Therapy and Eating Disorders (pp. 265–308). New York, NY: Guilford.

Forman EM, & Butryn ML (2015). A new look at the science of weight control: How acceptance and commitment strategies can address the challenge of self-regulation. Appetite, 84, 171–180. [PubMed: 25445199]

Forman EM, Butryn ML, Juarascio AS, Bradley LE, Lowe MR, Herbert JD, & Shaw JA (2013). The mind your health project: A randomized controlled trial of an innovative behavioral treatment for obesity. Obesity, 21, 1119–1126. [PubMed: 23666772]

Forman EM, Butryn ML, Manasse SM, Crosby RD, Goldstein SP, Wyckoff EP, & Thomas JG (2016). Acceptance-based versus standard behavioral treatment for obesity: Results from the mind your health randomized controlled trial. Obesity, 24, 2050–2056. [PubMed: 27670400]

Forman EM, Hoffman KL, Juarascio AS, Butryn ML, & Herbert JD (2013). Comparison of acceptance-based and standard cognitive-based coping strategies for craving sweets in overweight and obese women. Eating Behaviors, 14, 64–68. [PubMed: 23265404]

Gregg JA, Lillis J, & Schmidt EM (2015). A functional contextual approach to obesity and related problems. Current Opinion in Psychology, 2, 82–86.

Gormally J, Black S, Daston S, & Rardin D (1982). The assessment of binge eating severity among obese persons. Addictive Behaviors, 7, 47–55. [PubMed: 7080884]

Hales CM, Carroll MD, Fryar CD, & Ogden CL (2016). Prevalence of obesity among adults and youth: United States, 2015–2016. Hyattsville, MD.

Hayes SC, Strosahl KD, & Wilson KG (2009). Acceptance and Commitment Therapy. Washington, DC: American Psychological Association.

Hinkle DE, Wiersma W, & Jurs SG (2003). Applied Statistics for the Behavioral Sciences (5th ed.). Boston: Houghton Mifflin College Division.

Hu L. t., & Bentler PM (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. Psychological Methods, 3, 424–453.

Hu L. t., & Bentler PM (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6, 1–55.

Kline RB (2005). Principles and Practice of Structural Equation Modeling (2nd ed.). New York: Guilford.

Kline RB (2016). Methodology in the Social Sciences Principles and Practice of Structural Equation Modeling (4th ed.). New York, NY, US: Guilford.

Lance CE, Butts MM, & Michels LC (2006). The sources of four commonly reported cutoff criteria: What did they really say? Organizational Research Methods, 9, 202–220.

Lillis J, & Hayes SC (2007). Measuring avoidance and inflexibility in weight related problems. International Journal of Behavioral Consultation and Therapy, 4, 30–40.

Lillis J, Hayes SC, Bunting K, & Masuda A (2009). Teaching acceptance and mindfulness to improve the lives of the obese: A preliminary test of a theoretical model. Annals of Behavioral Medicine, 37, 58–69. [PubMed: 19252962]

Lillis J, Luoma JB, Levin ME, & Hayes SC (2010). Measuring weight self-stigma: the weight self-stigma questionnaire. Obesity, 18, 971–976. [PubMed: 19834462]

Lillis J, Niemeier HM, Thomas JG, Unick J, Ross KM, Leahey TM, … Wing RR (2016). A randomized trial of an acceptance-based behavioral intervention for weight loss in people with high internal disinhibition. Obesity, 24, 2509–2514. [PubMed: 27804255]

Mannucci E, Ricca V, Di Bernardo M, Moretti S, Cabras PL, & Rotella CM (1997). Psychometric properties of EDE 12.0 D in obese adult patients without binge eating disorder. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 2, 144–149.

Muthén LK and Muthén BO (1998–2017). Mplus User's Guide (8th ed.). Los Angeles, CA: Muthén & Muthén

Niemeier HM, Leahey T, Reed KP, Brown RA, & Wing RR (2012). An acceptance-based behavioral intervention for weight loss: A pilot study. Behavior Therapy, 43, 427–435. [PubMed: 22440077]

Nunally JC (1978). Psychometric Theory (2nd ed). New York: McGraw-Hill.

Ong CW, Lee EB, Levin ME, & Twohig MP (2019). A Review of AAQ Variants and Other Context-Specific Measures of Psychological Flexibility. Journal of Contextual Behavioral Science, 12, 329–346.

Palmeira L, Cunha M, & Pinto-Gouveia J (2019). Processes of change in quality of life, weight self-stigma, body mass index and emotional eating after an acceptance-, mindfulness-and compassion-based group intervention (Kg-Free) for women with overweight and obesity. Journal of Health Psychology, 24, 1056–1069. [PubMed: 28810375]

Palmeira L, Cunha M, Pinto-Gouveia J, Carvalho S, & Lillis J (2016). New developments in the assessment of weight-related experiential avoidance (AAQW-Revised). Journal of Contextual Behavioral Science, 5, 193–200.

Pearson AN, Follette VM, & Hayes SC (2012). A pilot study of acceptance and commitment therapy as a workshop intervention for body dissatisfaction and disordered eating attitudes. Cognitive and Behavioral Practice, 19, 181–197.

Schermelleh-Engel K, Moosbrugger H, & Müller H (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. Methods of Psychological Research Online, 8, 23–74.

Schumacher LM, Godfrey KM, Forman EM, & Butryn ML (2019). Change in domain-specific but not general psychological flexibility relates to greater weight loss in acceptance-based behavioral treatment for obesity. Journal of Contextual Behavioral Science, 12, 59–65.

Schwarz N (1999). Self-reports: How the questions shape the answers. American Psychologist, 54, 93–105.

Stunkard AJ, & Messick S (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research, 29, 71–83. [PubMed: 3981480]

Tapper K, Shaw C, Ilsley J, Hill AJ, Bond FW, & Moore L (2009). Exploratory randomised controlled trial of a mindfulness-based weight loss intervention for women. Appetite, 52, 396–404. [PubMed: 19101598]

Van Strien T, Frijters JE, Bergers GP, & Defares PB (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. International Journal of Eating Disorders, 5, 295–315.

Wallace C, Vandevijvere S, Lee A, Jaacks LM, Schachner M, & Swinburn B (2019). Dimensions of national culture associated with different trajectories of male and female mean body mass index in countries over 25 years. Obesity Reviews, Online Supplement, 1–10. [PubMed: 30230172]

Weineland S, Lillis J, & Dahl J (2013). Measuring experiential avoidance in a bariatric surgery population: Psychometric properties of AAQ-W. Obesity Research & Cinical Practice, 7, 464–475.

World Health Organization. (2018, 2 16). Obesity and Overweight. Retrieved August 23, 2019 from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

Highlights

- Weight-related experiential avoidance is measured using AAQW-R
- Its three-factor structure is confirmed in United States English-speaking sample
- Internal reliability and convergent validity were established
- Factors include food as control, weight as a barrier to living, weight stigma
- English AAQW-R can be used as a three-factor measure, with or without a total score

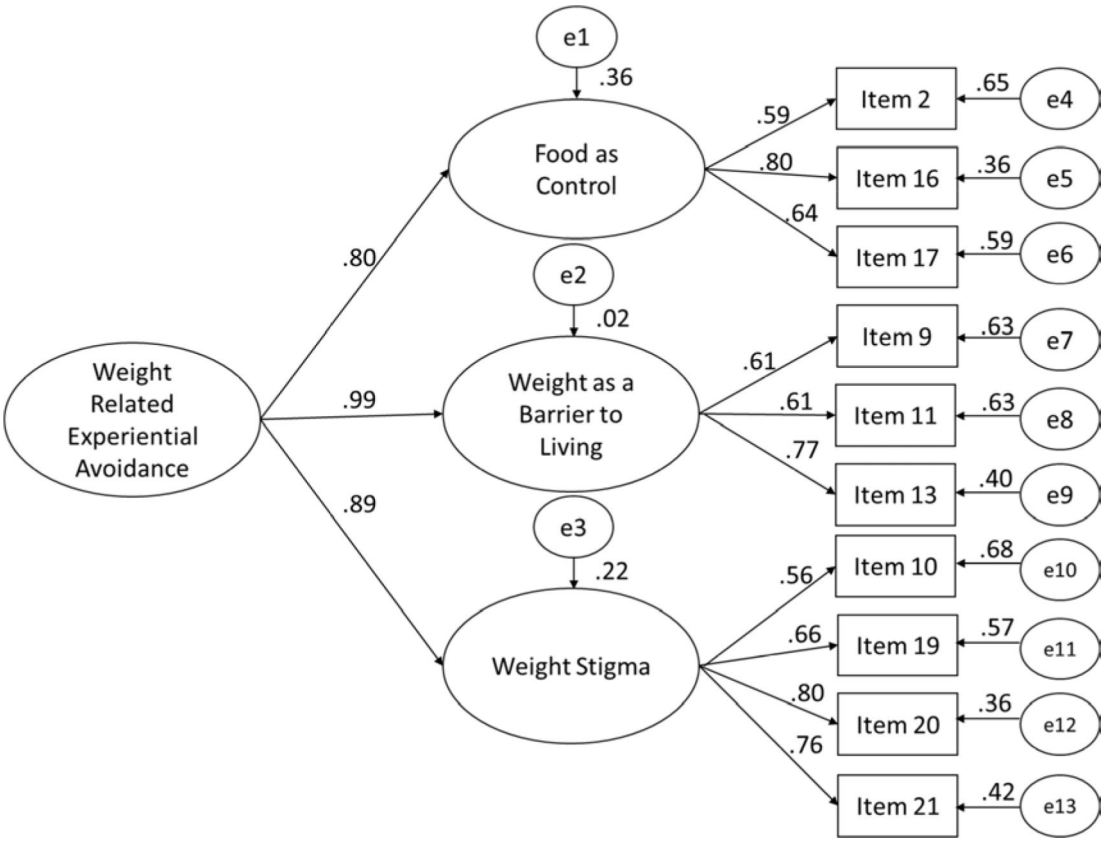

Figure 1. Confirmatory Factor Analysis of Model 3 of the AAQW-R.

Standardized path coefficients are shown. All paths are statistically significant, $p < .001$.

Table 1

Sociodemographic and Clinical Characteristics for Total Sample, Sample 1 (Community sample), and Sample 2 (Veteran sample)

Measure	Total (N = 283)	Sample 1 (n = 194)	Sample 2 (n = 89)	t/χ^2	p
Demographics					
Age, M (SD)	55.4 (10.7)	54.9 (10.9)	56.6 (10.1)	1.29	.20
Male	41%	24.7%	76.4%	67.32	< .001***
Annual Income less than $50K	30.7%	20.6%	52.8%	27.58	< .001***
Education less than Bachelors	39.2%	29.9%	59.6%	22.21	< .001***
Ethnicity				37.08	< .001***
White	79.9%	89.7%	58.4%		
Black	8.8%	4.1%	19.1%		
Hispanic/Latino	6.0%	3.1%	12.4%		
Native American	2.1%	0.5%	5.6%		
Asian	1.1%	0.5%	2.2%		
Pacific Islander	0.4%	0.0%	1.1%		
Other	1.8%	2.1%	1.1%		
BMI, M (SD)	35.65 (5.53)	35.00 (4.56)	37.08 (7.03)	2.56	.01**
Measures					
AAQ-II, M (SD)	18.30 (9.00)	17.55 (8.08)	19.94 (10.58)	2.09	.04*
AAQW-R total, M (SD)	34.17 (11.47)	35.23 (11.31)	31.87 (11.56)	−2.31	.02*
AAQW-R food as control, M (SD)	12.09 (4.05)	12.70 (3.93)	10.76 (4.00)	−3.85	< .001***
AAQW-R weight as barrier, M (SD)	11.93 (4.31)	12.26 (4.32)	11.21 (4.23)	−1.90	.06
AAQW-R weight stigma, M (SD)	10.16 (5.13)	10.27 (5.12)	9.90 (5.16)	−0.57	.57

Note. M = mean; SD = standard deviation; AAQ-II = Acceptance and Action Questionnaire; AAQW-R = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised.

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 2

Goodness-of-fit statistics for comparative models (N = *283*)

Models	Chi-square	Df	CFI	TLI	RMSEA [90% CI]	SRMR	AIC	BIC
1. 1 factor (10 items)	152.14***	35	.883	.850	.109 [.091, .127]	.057	6456.42	6265.79
2. 3 factors (10 items)	91.742***	32	.940	.916	.081 [.062, .101]	.044	6102.03	6222.33
3. 2nd order (10 items)	91.742***	32	.940	.916	.081 [.062, .101]	.044	6102.03	6222.33

Note. Df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; SRMR = Standardized Root Mean-Square Residual; AIC = Akaike Information Criterion; BIC = Bayesian Information Criteria.

*** $p < .001$.

Table 3

Correlations between AAQW-R total and subscale scores and convergent validity measures

Construct Measure	α	AAQW-R Total	AAQW-R Food as Control	AAQW-R Weight as a Barrier	AAQW-R Weight Stigma
Psychological Flexibility					
AAQ-II (*N* = 283)	.93	.60***	.46***	.47***	.58***
Weight Self-Stigma					
WSSQ Total (*N* = 283)	.89	.76***	.58***	.62***	.73***
Disinhibited Eating					
EI Disinhibition (*n* = 194)	.76	.61***	.63***	.39***	.54***
DEBQ Emotional Eating (*n* = 89)	.97	.55***	.66***	.37***	.41***
BES (*n* = 89)	.89	.63***	.68***	.48***	.50***
Obesity-Related Quality of Life					
ORWELL-97 Total (*n* = 89)	.86	.68***	.42***	.71***	.62***
Weight, Shape, Eating Concern					
EDE Weight Concern (*n* = 88)	.56	.51***	.45***	.48***	.40***
EDE Shape Concern (*n* = 88)	.84	.57***	.39***	.58***	.49***
EDE Eating Concern (*n* = 88)	.71	.47***	.45***	.43***	.35***
Depression					
PROMIS Depression (*n* = 194)	.92	.55***	.41***	.41***	.55***
BSI-18 Depression (*n* = 89)	.86	.56***	.46***	.46***	.47***
Anxiety					
PROMIS Anxiety (*n* = 194)	.87	.53***	.39***	.39***	.55***
BSI-18 Anxiety (*n* = 89)	.90	.48***	.37***	.44***	.42***
BMI (*N* = 283)	–	.14*	.07	.10	.18*

Note. M = mean; SD = standard deviation; AAQ-II = Acceptance and Action Questionnaire; AAQW-R = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised; WSSQ = Weight Self-Stigma Questionnaire; ORWELL-97 = Obesity-Related Well Being Scale; EDE = Eating Disorder Examination; EI = Eating Inventory; DEBQ = Dutch Eating Behavior Questionnaire; BES = Binge Eating Scale; AAQ-II = Acceptance and Action Questionnaire II; PROMIS = Patient-Reported Outcomes Measurement Information System; BSI-18 = Brief Symptom Inventory.

*$p < .05$

**$p < .01$

***$p < .001$.