



Empirical research

Assessment of the body Image-Acceptance and Action Questionnaire in a female residential eating disorder treatment facility



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ABSTRACT

Objective: The purpose of this study was to examine the psychometric properties of the Body Image-Acceptance and Action Questionnaire in a severe eating disorder population, as previous validation has occurred only with nonclinical samples.

Method: Data on body image psychological flexibility, general psychological flexibility, eating disorder severity, and other related constructs were gathered from 72 adolescent and 60 adult female, residential patients diagnosed with an eating disorder. Psychometrics were examined through the use of exploratory and confirmatory factor analyses, Cronbach's alpha, correlations, and hierarchical multiple regressions to assess model fit, reliability, and validity.

Results: The BI-AAQ demonstrated excellent convergent, discriminant, and incremental validity as well as excellent internal reliability, however, factor analyses resulted in overall poor model fit. Removal of item 6 from the BI-AAQ resulted in improved psychometric properties in all regards, yet still demonstrated overall poor model fit.

Discussion: This study suggests that the BI-AAQ is psychometrically sound in many areas and provides some clinical utility; however, it may be somewhat problematic when used in severe eating disorder populations. When using the measure in clinical settings, removal of item 6 is recommend. Recommendations for future measurement and utilization of body image flexibility are discussed.

1. Introduction

Eating disorders are a severe mental health condition that tend to be highly comorbid with other conditions (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011), follow a persistent course (Strober, Freeman, & Morrell, 1997), are difficult to treat (Fairburn et al., 1995; McIntosh et al., 2005), and are associated with high rates of mortality (Arcelus, Mitchell, Wales, & Nielsen, 2011) and suicide (Pompili, Mancinelli, Girardi, Ruberto, & Tatarelli, 2004). Body image is the psychological experience of one's physical appearance, comprising cognitive, affective, and behavioral dimensions (Cash, 2011). Body image disturbance is a diagnostic feature of both anorexia nervosa and bulimia nervosa (American Psychiatric Association, 2013) and comprises at least two main dimensions: perceptual distortions in body size and body dissatisfaction. Research has shown that body dissatisfaction in particular is a robust predictor of disordered eating (Brannan & Petrie, 2008; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004;

Johnson & Wardle, 2005; Stice & Shaw, 2002; Stice, 2002). Despite the importance of body image to disordered eating, however, nearly half of women in the United States experience negative evaluations related to their body size and shape (Cash & Henry, 1995), and up to 80% of adolescent girls are dissatisfied with their weight (Chamay-Weber, Narring, & Michaud, 2005); nevertheless, eating disorders remain relatively rare (Qian et al., 2013). This suggests that additional factors may play a role in the relationship between body image dissatisfaction and eating disorders.

According to Cash (2011), the cognitive-behavioral model of body image identifies three coping strategies in which individuals who experience distressing body-related cognitions and emotions commonly engage. These include: (1) *experiential avoidance*, or attempts to avoid distressing body image cognitions, emotions, and situations; (2) *appearance fixing*, or efforts aimed at correcting or concealing one's perceived physical flaws; and (3) *positive rational acceptance*, or behaviors such as self-care and positive self-talk that focus on the

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acceptance of one's experiences. Data from Cash, Santos, and Williams (2005) revealed that those who engaged in more body image experiential avoidance also experienced greater body image dissatisfaction and dysphoria and lower body image quality of life. Indeed, the attempt to escape, avoid, or otherwise change the frequency or content of unpleasant thoughts, emotions, or sensations, when such attempts result in additional problems for the individual, has been linked to a number of psychological disorders and pathological behaviors (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Therefore, rather than attempt to change the content of distressing body image related cognitions and emotions themselves, an alternative approach is to focus on the relationship with these experiences. *Body image flexibility* is the ability to openly experience body image dissatisfaction and related experiences in a way that promotes adaptive life functioning and values-consistent behavior (Sandoz, Wilson, Merwin, & Kellum, 2013).

Body image flexibility has been assessed using the Body Image Acceptance and Action Questionnaire (BI-AAQ; Sandoz et al., 2013). The BI-AAQ is a domain-specific measure of psychological flexibility, based on the more general measure of psychological flexibility, the Acceptance and Action Questionnaire II (AAQ-II; Bond et al., 2011). The BI-AAQ consists of 12 items measured on a 7-point Likert scale. Items assess the degree to which negative thoughts or feelings about the body are avoided and interfere with living in a manner consistent with one's chosen values. The measure includes statements such as: "Worrying about my weight makes it difficult for me to live a life that I value," "I shut down when I feel bad about my body shape or weight," and "Feeling fat causes problems in my life." It is worth noting that all the items of the BI-AAQ are the negatively worded, and items are reverse scored to produce a body image flexibility score. Because of this, the construct validity of the BI-AAQ generally, and as a measure of body image flexibility as opposed to body image inflexibility, has been criticized (Webb, Wood-Barcalow, & Tylka, 2015).

The BI-AAQ was originally developed and validated using three nonclinical samples of undergraduate psychology students (Sandoz et al., 2013). Using a sample of 182 participants, the final 12 items loaded on a single factor with loadings above .60. The BI-AAQ demonstrated excellent internal consistency ($\alpha=.92$), good convergent validity, and incremental validity in the prediction of disordered eating. A second study examined test administrations over a two-week period, resulting in good test-retest reliability ($N=234, r=.80$). At each administration, internal consistency was excellent ($\alpha=.92$ and $.93$, respectively). However, during the second administration, item 6 ("If I start to feel fat, I try to think of something else") had an item-total correlation of .39, compared to correlations of .62 or above for the other items. Finally, a third study was conducted in order to replicate the results of study one using a sample of 288 participants. Internal consistency was excellent ($\alpha=.93$), and findings related to factor structure and concurrent and incremental validity were replicated. In addition, the BI-AAQ was able to discriminate those participants who were classified as at-risk for eating disorders.

Further validation of the BI-AAQ was provided by Timko, Juarascio, Martin, Faherty, and Kalodner (2014) in three consecutive studies with nonclinical female samples. In studies 1 and 2 ($N=109$ and $N=272$, respectively), women who identified as dieting to lose weight had significantly lower body image flexibility and higher levels of body dissatisfaction, drive for thinness, internalization of the thin ideal, and bulimia symptoms than those who were either dieting to maintain weight or not dieting. The BI-AAQ partially mediated the relationship between body dissatisfaction and disordered eating in both studies. Internal consistency in the full sample was excellent ($\alpha=.91$), and the BI-AAQ was positively correlated with the AAQ-II ($r=.55$; in this study the BI-AAQ was not reverse scored, resulting in a measure of body image experiential avoidance). Incremental validity was demonstrated in all three studies, as the BI-AAQ accounted for variability above and beyond body dissatisfaction and general psychological

flexibility after controlling for BMI (studies 1 and 2) and above and beyond body dissatisfaction, BMI, and the Body Image Avoidance Questionnaire (BIAQ; Rosen, Srebnik, Saltzberg, & Wendt, 1991) (study 3; $N=163$) in the prediction of bulimic symptoms and drive for thinness. Also in a nonclinical female sample, the BI-AAQ fully mediated the relationship between body image evaluation and experientially avoidant body image coping strategies (Mancuso, 2016).

The BI-AAQ was translated and adapted into Portuguese by Ferreira, Pinto-Gouveia, and Duarte (2011), who validated their version on a Portuguese community sample of 679 males and females. The single factor structure resulted in an overall good fit with the data. The Portuguese BI-AAQ demonstrated convergent and divergent validity and excellent internal consistency ($\alpha=.95$). Test-retest reliability over a 3- to 4-week period was excellent ($N=62, r=.82$). Using a clinical sample of 46 patients recruited from a hospital and private clinics in Portugal, the BI-AAQ successfully discriminated individuals with diagnosed eating disorders from a subsample of 51 selected from the original sample. Further psychometrics in the clinical sample were not reported. Combining the clinical sample with the full nonclinical sample ($N=725$), BI-AAQ scores predicted drive for thinness after controlling for BMI and body image dissatisfaction. In addition, BI-AAQ was a significant moderator of the relationship between body image dissatisfaction and drive for thinness, with those low in body image flexibility showing a greater drive for thinness when body image dissatisfaction was high than those with medium or high body image flexibility (Ferreira et al., 2011).

The BI-AAQ was also used in a naturalistic study of 88 women in residential eating disorder treatment (Butryn et al., 2013). The authors found that lower scores on the BI-AAQ were significantly related to higher eating disorder symptomatology at pre-treatment, and changes in BI-AAQ scores from pre- to post-treatment were significantly associated with changes in eating disorder symptoms from pre to post. This study provides evidence for the predictive validity of the BI-AAQ in a clinical sample.

Both the original BI-AAQ and the Portuguese version have shown strong internal consistency, test-retest reliability, convergent and discriminant validity, and incremental validity within nonclinical student or community samples. The two studies that used the BI-AAQ in clinical samples (Butryn et al., 2013; Ferreira et al., 2011), while helping to establish its predictive validity, have not reported psychometric data supporting factor structure or reliability and have not provided robust evidence of construct validity. Although disordered eating occurs in subclinical populations and can cause functional impairments for these individuals (Chamay-Weber et al., 2005; Sandoz et al., 2013), it would be useful to further validate the BI-AAQ in a clinical sample. Given the high prevalence of body dissatisfaction in the general female public (Cash & Henry, 1995; Chamay-Weber et al., 2005) and the low prevalence of diagnosed eating disorders (Qian et al., 2013), it is possible that these two populations may differ in theoretically important ways. As previous research has shown, body image psychological flexibility can both mediate (Mancuso, 2016; Timko et al., 2014) and moderate (Ferreira et al., 2011) the relationship between body dissatisfaction and other theoretically important constructs. Hence, it is important to determine whether the BI-AAQ is appropriate for use in clinical studies and, if so, to explore the relationship of body image flexibility to disordered eating in these populations.

The aim of the current study was to examine the BI-AAQ in a clinical sample in an attempt to further and more comprehensively validate the measure and expand its utility. We predicted that the single factor structure of the BI-AAQ would perform well in this population. With regard to construct validity, we predicted that the BI-AAQ would moderately to strongly correlate with measures of psychological flexibility, depression, anxiety, quality of life, and eating disorder risk. Additionally, we predicted that the "act with awareness," "nonjudgment," and "nonreact" subscales of the FFMQ mindfulness

measure would significantly correlate with the BI-AAQ. Conversely, we predicted that the “observe” and “describe” subscales of the FFMQ would not significantly correlate with the BIAAQ. Finally, we foresee that the BI-AAQ would predict eating disorder severity beyond the AAQ-II.

2. Method

2.1. Setting

All participants in the study were patients at a residential eating disorder facility located in Northern Utah. Avalon Hills Eating Disorders Program is a for-profit residential facility. The program provides services for female adolescents and adults with eating disorders who have been screened for medical stabilization before admission. The program is primarily based on modern forms of cognitive behavior therapy, with dialectical behavior therapy and acceptance and commitment therapy as the predominant treatment modalities. The facility also employs multiple supplemental experiential interventions and treatment, such as equine therapy, art, body image challenges, recreation, and a contingency management level program in which patients earn greater access to privileges as they progress through treatment. Therapy consists of daily group sessions, twice weekly individual sessions, and one family session per week. Duration of treatment is not defined but, rather, is determined by the treatment team based on treatment progress.

2.2. Participants

Of the initial 141 participants, nine were excluded from the current study due to apparent inattentive responses to the assessments (i.e., responding to all items with the same single number). The final analyses consisted of 132 participants. All participants were female and were diagnosed with an eating disorder as defined by the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV; American Psychiatric Association, 2000). Diagnoses included anorexia nervosa (51.5%, $n = 68$), bulimia nervosa (14.4%, $n = 19$), and eating disorder not otherwise specified (34.1%, $n = 45$). Participant ages ranged from 12 to 45 years old ($M = 19.1$, $SD = 5.8$). The majority of participants were White (90.9%) and were relatively evenly divided between adolescents and adults (54.5% and 45.5%, respectively). See Table 1 for additional participant demographic information and Table 2 for means and standard deviations on measure total scores for adolescent and adult participants as well as t -tests between age groups for each measure.

2.3. Procedure

Utah State University's institutional review board approved the collection and utilization of the data in the current study. At admission all participants completed an intake process that involved medical, dietary, and mental health evaluations. During their first week of treatment, each participant completed a computerized intake assessment battery that included demographic information and the following measures.

2.4. Measures

2.4.1. Body Image Acceptance and Action Questionnaire (BI-AAQ)

The BI-AAQ (Sandoz et al., 2013) is a 12-item self-report measure of body image flexibility. Items were adapted from three versions of the Acceptance and Action Questionnaire (Bond & Bunce, 2003; Bond et al., 2011; Hayes et al., 2004) with an emphasis on body-related content rather than general psychological experiences. For example, item 1: “Worrying about my weight makes it difficult for me to live a life that I value” and item 6: “If I start to feel fat, I try to think about

Table 1
Participant Demographics.

	Adolescent (n =72)	Adult (n =60)	Combined (n =132)
Age	15.22 (1.32)	23.77 (5.66)	19.11 (5.80)
Eating Disorder			
Anorexia Nervosa	52.8%	50.0%	51.5%
Bulimia Nervosa	6.9%	23.3%	14.4%
Eating Disorder Not Otherwise Specified	40.3%	26.7%	34.1%
Ethnicity			
White	93.1%	88.3%	90.9%
Other	6.9%	11.7%	9.1%
Education			
Grade School	15.7%	0%	8.5%
High School / GED	84.3%	26.7%	57.7%
Some College	0%	31.7%	14.6%
Associates / Professional Degree	0%	6.7%	3.1%
College Degree	0%	28.3%	13.1%
Advanced Degree	0%	6.7%	3.1%
Employment			
Employed	9.0%	44.1%	32.5%
Unemployed	37.3%	27.1%	25.4%
Student	53.7%	28.8%	42.1%
Married	0%	8.3%	3.8%

Table 2
Means and t -Tests Comparing Adolescent and Adult Participant Scores on Each Measure.

	Adolescent (n =72)	Adult (n =60)	Combined (n =132)	t
BMI	18.75 (2.53)	19.89 (4.74)	19.27 (3.73)	-1.76
BI-AAQ	39.35 (16.37)	31.77 (14.54)	35.90 (15.96)	2.79**
AAQ-II	26.56 (9.66)	35.95 (8.56)	30.83 (10.28)	-5.86***
EDI-3 Eating Disorder Risk	47.63 (23.51)	60.22 (19.81)	53.35 (22.72)	-3.29**
EDI-3 Drive for Thinness	17.31 (8.67)	19.98 (7.13)	18.52 (8.09)	-1.91
EDI-3 Bulimia	4.18 (6.18)	10.72 (8.82)	7.15 (8.15)	-4.99**
EDI-3 Body Dissatisfaction	26.14 (12.91)	29.52 (10.14)	27.67 (11.81)	-2.76**
FFMQ Observe	23.40 (5.27)	24.46 (6.19)	23.88 (5.70)	-1.05
FFMQ Describe	22.63 (2.98)	23.56 (3.61)	23.05 (3.30)	-1.62
FFMQ Act with Awareness	22.29 (7.22)	26.12 (6.39)	24.02 (7.10)	-3.18**
FFMQ Nonjudgment	23.49 (9.12)	29.25 (6.19)	26.08 (8.42)	-4.14***
FFMQ Nonreact	16.99 (5.78)	16.19 (4.29)	16.63 (5.16)	.88
BDI-II	27.13 (14.40)	32.20 (12.07)	29.43 (13.58)	-2.15*
BAI	21.90 (13.44)	25.60 (11.26)	23.58 (12.59)	-1.69
EDQOL	42.22 (18.03)	55.72 (18.09)	48.36 (19.21)	-4.28***

df =130.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

something else.” Items are rated on a 7-point Likert-type scale (1= *never true* to 7= *always true*), with higher scores denoting greater levels of body image flexibility. The BI-AAQ displayed excellent internal reliability for adolescents and adults in the current study (α 's=.90 and .91, respectively).

2.4.2. Acceptance and Action Questionnaire-II (AAQ-II)

The AAQ-II (Bond et al., 2011) is a 7-item self-report measure of psychological inflexibility or experiential avoidance (e.g., “I worry about not being able to control my worries and feelings.”) Items are rated on a 7-point Likert-type scale (1= *never true* to 7= *always true*), with higher scores denoting greater levels of psychological inflexibility. The measure has demonstrated satisfactory internal consistency, reliability, and validity (Bond et al., 2011). Additionally, it has demonstrated good reliability and predictive validity in clinical eating disorder samples (Fulton et al., 2012; Juarascio et al., 2013). The AAQ-II displayed good internal reliability for adolescents and adults in the current study (α 's=.87 and .88, respectively).

2.4.3. Eating Disorder Inventory 3rd Edition (EDI-3)

The EDI-3 (Garner, 2004) is a 91-item self-report assessment developed for individuals with eating disorders. Items are rated on a 7-point Likert-type scale (0= *never* to 6= *always*). The EDI-3 consists of multiple subscales and composite scales measuring a wide range of pathology and concerns related to eating disorders. The current study utilized only the Eating Disorders Risk Composite (EDRC) as it provides a global measure of eating and weight concerns. The EDRC is composed of the summed *T* scores for the Drive for Thinness, Bulimia, and Body Dissatisfaction scales of the EDI-3. The EDRC has been employed to successfully predict the emergence of eating disturbances, has been shown to be related to the development of eating disorders, and has been utilized extensively in clinical populations (Garner, 2004). The EDRC displayed excellent internal reliability for adolescents and adults in the current study (α 's=.95 and .92, respectively).

2.4.4. Five Facet Mindfulness Questionnaire (FFMQ)

The FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a 39-item self-report measure of mindfulness derived from a factor analysis of five psychometrically sound measures of mindfulness. It includes five subscales: (a) observe (e.g., “When I’m walking, I deliberately notice the sensations of my body moving”); (b) describe (e.g., “I’m good at finding words to describe my feelings”); (c) act with awareness (e.g., “When I do things, my mind wanders off and I’m easily distracted”); (d) nonjudgment (e.g., “I criticize myself for having irrational or inappropriate emotions”); (e) nonreact (e.g., “I perceive my feelings and emotions without having to react to them”). Items are rated on a 5-point Likert-type scale (1= *never or very rarely true* to 5= *very often or always true*), with higher scores denoting greater levels of mindfulness. The validity and reliability of the FFMQ has been supported by regression, mediation, and confirmatory factor analysis (Baer et al., 2006, 2008). Additionally, FFMQ scores have been shown to increase following mindfulness-based interventions. The subscales of the FFMQ have also demonstrated adequate to excellent reliability in non-clinical and clinical samples (α 's range from .75 to .91). Moreover, FFMQ scores have significantly correlated with eating disorder symptoms in clinical populations (Cowdrey & Park, 2012; Mead, Malinowski, & Lattimore, 2012). In the current study, the FFMQ and its subscales displayed adequate to excellent internal reliability for adolescents and adults (α 's: total score =.92 and .89; observe =.68 and .81; describe =.91 and .89; act with awareness =.96 and .87; nonjudgment =.98 and .87; nonreact =.87 and .77, respectively).

2.4.5. Beck Depression Inventory-II (BDI-II)

The BDI-II (Beck, Steer, & Brown, 1996) is a widely used, 21-item, self-report measure of depression. Each item consists of four state-

ments (scored from 0 to 3) indicating increasing levels of depression symptoms. The measure has well-established psychometric properties in general populations and clinical eating disorder populations (Beck et al., 1996; Taylor et al., 2016; Udo, McKee, & Grilo, 2015). The BDI-II displayed excellent internal reliability for adolescents and adults in the current study (α 's=.94 and .91, respectively).

2.4.6. Beck Anxiety Inventory (BAI)

The BAI (Beck, Epstein, Brown, & Steer, 1988) is a widely used, 21-item, self-report measure of anxiety. Items are rated on a 4-point Likert-type scale (0= *not at all* to 3= *severely*), with higher scores indicating greater levels of anxiety. The measure has well-established psychometric properties in general populations and clinical eating disorder populations (Beck et al., 1988; Haynos, Roberto, & Attia, 2015). The BAI displayed excellent internal reliability for adolescents and adults in the current study (α 's=.94 and .89, respectively).

2.4.7. Eating Disorder Quality of Life (EDQOL)

The EDQOL (Engel et al., 2006) is a 25-item self-report measure of health-related quality of life with items developed to specifically target quality of life in eating disorder populations. Items are rated on a 5-point Likert-type scale (0= *never* to 4= *always*), with lower scores indicating greater quality of life. The EDQOL measures quality of life across four domains: (a) psychological (e.g., “How often has your eating/weight made you feel lonely? ”); (b) physical/cognitive (e.g., “How often has your eating/weight caused weakness? ”); (c) financial (e.g., “How often has your eating/weight resulted in significant financial debt? ”); (d) work/school (e.g., “How often has your eating/weight let to low grades? ”). The EDQOL has demonstrated excellent psychometric properties in clinical and non-clinical populations, including internal consistency, test-retest reliability, and predictive, convergent, and discriminant validity (Bamford et al., 2015; Engel et al., 2006). The EDQOL displayed excellent internal reliability for adolescents and adults in the current study (α 's=.92).

2.5. Analytic strategy

Software used for the analyses were Statistical Package for the Social Sciences (SPSS), version 21 and AMOS, version 21. A series of exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) were performed to examine the previously proposed single-factor structure of the BI-AAQ. Internal reliability was assessed through the use of the Cronbach's alpha coefficient. Construct validity was examined by computing Pearson's *r* correlation coefficients with the aforementioned measures, controlling for body mass index (BMI). Finally, to demonstrate incremental validity, the BI-AAQ's eating disorder predictive ability over the AAQ-II was examined using hierarchical multiple regressions also controlling for BMI.

Hooper, Coughlan, and Mullen (2008) guidelines were utilized to determine proper CFA model fit. Chi-square is traditionally used to determine proper model fit; however, its tendency to nearly always reject the model when large sample sizes are used limits its functionality (Bentler & Bonett, 1980). Therefore, the relative/normed chi-square statistic was used, as it minimizes the impact of sample size on model chi-square (Wheaton, Muthen, Alwin, & Summers, 1977). Generally, ratios below 2 are considered good fit and ratios below 3 are considered acceptable fit (Schermele-Engel, Moosbrugger, & Müller, 2003). Further evaluation of goodness of fit utilized the root-mean square error of approximation (RMSEA), standardized root-mean-square residual (SRMR), comparative fit index (CFI), and the Tucker-Lewis index (TLI). Hooper et al. (2008) use the following criteria to define good model fit: RMSEA \leq .07; SRMR \leq .08; CFI \geq .95; TLI \geq .95.

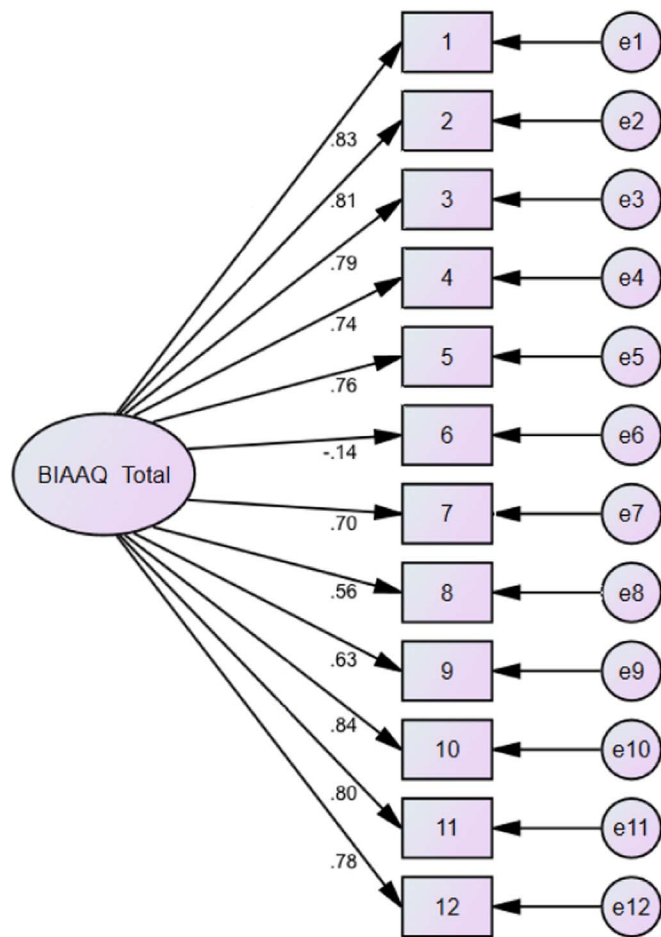


Fig. 1. Confirmatory Factor Analysis of the 12-Item Body Image-Acceptance and Action Questionnaire.

3. Results

3.1. Differences between adolescent and adult participants

T-tests were performed between adolescent and adult participants for each of the measures to examine potential differences between the groups (see Table 2). Significant differences between the groups were found for BI-AAQ, AAQ-II, EDRC total and bulimia and body dissatisfaction subscales, FFMQ act with awareness and nonjudgment subscales, BDI-II, and EDQOL scores. Examination of the model fit between age groups will help determine whether these differences affect the current studies research question.

3.2. Factor Analysis

A CFA was first performed to confirm the single factor structure of the BI-AAQ in this population (see Fig. 1). The results indicated a poor fit for most fit indices ($\chi^2/df = 4.69$, RMSEA = .168, SRMR = .098, CFI = .815, TLI = .774) with only the relative/normed chi-square statistic meeting model fit criteria. Item 6 had a very small nonsignificant negative standardized regression weight of $-.141$. All other regression weights were statistically significant ($p < .001$) and ranged from .558 (item 8) to .839 (item 10).

Because of the overall poor fit of the model and the low factor loading of item 6, an EFA replicating the original Sandoz et al. (2013) validation study's methods was performed in order to examine the factor structure of the BI-AAQ in the eating disorder population compared to the initial validation study's population. The methods employed by Sandoz et al. (2013) included principal factor analysis,

direct oblimin rotation (with a delta of 0), and extracting a single factor. Using these methods, the EFA produced item loadings at or above .57 for all items except item 6, which had a loading of $-.12$. Using all 12 items of the BI-AAQ accounted for 52.31% of the variance. A second EFA utilizing the same methods was then performed with 11 items of the BI-AAQ, after removing item 6. This again resulted in item loadings at or above .57 for all items. Additionally, the 11-item model accounted for 56.94% of the total variance, an increase of 4.63% over the 12-item model.

Next, with item 6 removed an additional CFA was performed in order to assess the fit of the 11-item model. The results of this new model were slightly improved over the 12-item model ($\chi^2/df = 4.67$, RMSEA = .167, SRMR = .083, CFI = .844, TLI = .805). Both the relative/normed chi-square and the SRMR fit-indicators were near or within the recommended values. All other fit indices improved, but did not meet criteria for good fit.

A model-comparison between the 12-item and 11-item models' fit was then performed utilizing methods recommended by Schermelleh-Engel et al. (2003). The differences between chi-square values (253.26 and 205.56, respectively) and degrees of freedom (54 and 44, respectively) were calculated. This resulted in a difference of 47.70 between chi-square values and a difference of 10 between degrees of freedom indicating a significant difference between the two models ($p < .001$). Thus, while still not displaying proper model-fit, the 11-item model appears to fit the data significantly better than the 12-item model in this sample.

Two final CFAs were performed using the 12-item model, in order to test for potential model-fit differences between adult and adolescent participants. Because the BI-AAQ had not previously been validated in adolescent samples, there was some concern that the adolescents in the current sample may have been significantly different from the adults, skewing the results. These concerns proved to be unfounded as adult and adolescent samples had poor fits (adults = $\chi^2/df = 3.09$, RMSEA = .188, SRMR = .110, CFI = .766, TLI = .714) and (adolescents = $\chi^2/df = 3.79$, RMSEA = .198, SRMR = .118, CFI = .771, TLI = .720).

3.3. Convergent and Discriminant Validity

Correlations between AAQ-II and 11- and 12-item BI-AAQ total scores and each of the measures, controlling for BMI, are displayed in Table 3. Correlation coefficients for the predicted convergent measures were moderate to strong ($rs = .29$ to $.72$) and statistically significant ($p < .01$), while coefficients for the predicted discriminant measures were small ($rs = .04$ and $.21$; $ps = .64$ and $.02$), providing evidence for convergent and discriminant validity. Moreover, compared to the

Table 3
Pearson correlations between AAQ-II and BIAAQ total scores and convergent and discriminant measures controlling for body mass index.

	AAQ-II	BI-AAQ 12-Item	BI-AAQ 11-Item
AAQ-II	–	.53***	.56***
EDI-3 Eating Disorder Risk	.62***	.67***	.71***
EDI-3 Drive for Thinness	.56***	.72***	.75***
EDI-3 Bulimia	.39***	.29**	.30**
EDI-3 Body Dissatisfaction	.53***	.58***	.63***
FFMQ Observe	.25**	.21*	.19*
FFMQ Describe	.07	-.04	-.05
FFMQ Act with Awareness	.72***	.49***	.49***
FFMQ Nonjudge	.72***	.42***	.45***
FFMQ Nonreact	-.51***	-.37***	-.40***
BDI-II	.69***	.55***	.59***
BAI	.61***	.36***	.38***
EDQOL	.65***	.64***	.66***

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

Table 4
Hierarchical multiple regressions predicting EDRC Scores from BMI, AAQ-II, and 12- and 11-item BI-AAQ scores.

Variable	B	β	R ²	ΔR^2	ΔF
Step 1					
BMI	1.19**	.20**	.43	.43	49.89***
AAQ-II	1.34***	.60***			
Step 2					
BMI	.94**	.16**	.57	.15	44.58***
AAQ-II	.82***	.37***			
12-item BI-AAQ	.64**	.45***			
Step 1					
BMI	1.19**	.20**	.44	.44	49.89***
AAQ-II	1.34***	.60***			
Step 2					
BMI	.93**	.15**	.61	.18	58.19***
AAQ-II	.73***	.33***			
11-item BI-AAQ	.72***	.51***			

** p < .01.
*** p < .001.

AAQ-II, the BI-AAQ was less highly correlated with general measures of psychological health and more highly correlated with the drive for thinness and body dissatisfaction EDI-3 subscales, which are related to eating disorder-specific internal experiences, providing further evidence for construct validity.

3.4. Incremental validity

A hierarchical regression analysis was employed to examine whether the BI-AAQ (a disorder specific version) would improve prediction of eating disorder risk beyond the AAQ-II (a general version). Results are displayed in Table 4. The analysis was conducted predicting the EDRC scores from BMI and the AAQ-II in step 1, followed by the 12-item BI-AAQ in step 2. The model resulted in significant R coefficients after both steps (p < .001). Following the first step, the adjusted R² indicated that approximately 43% of the variations in EDRC scores were attributable to BMI and scores on the AAQ-II. As predicted, the addition of the BI-AAQ in the next step resulted in a significant R² increase (p < .001), indicating that the BI-AAQ contributed an additional 15% of variation beyond the AAQ-II.

This same process was replicated with the 11-item BI-AAQ in place of the 12-item version. The addition of the 11-item BI-AAQ in step 2 resulted in a significant R² increase (p < .001) of 18% over the AAQ-II, an increase of 3% compared to the 12-item BI-AAQ. This demonstrates that the 11-item version of the BI-AAQ predicted EDRC scores better than both the AAQ-II and the 12-item BI-AAQ.

Finally, similar regressions were performed with each of the EDRC subscales (i.e., drive for thinness, bulimia, and body dissatisfaction) entered as dependent variables. These are displayed in Table 5. The addition of the 12-item BI-AAQ in step 2 resulted in a significant R² increase (p < .001) for the drive for thinness and body dissatisfaction subscales beyond BMI and the AAQ-II alone (24% and 12%, respectively). However, the BI-AAQ did not significantly contribute to the prediction of bulimia subscale scores (p=.29).

3.5. Internal reliability

Cronbach's alpha coefficients were calculated to examine the internal reliability of both the 11- and 12-item models of the BI-AAQ. Results indicated excellent reliability for both models, with a

Table 5
Hierarchical multiple regressions predicting EDRC subscale scores from BMI, AAQ-II, and BI-AAQ scores.

Variable	B	β	R ²	ΔR^2	ΔF
<i>EDI-3 Drive for Thinness</i>					
Step 1					
BMI	.02	.01	.31	.31	28.88***
AAQ-II	.44***	.56***			
Step 2					
BMI	.09	.04	.55	.24	67.25***
AAQ-II	.20***	.26***			
12-item BI-AAQ	.29***	.58***			
<i>EDI- 3 Bulimia</i>					
Step 1					
BMI	.82***	.37***	.31	.31	29.32***
AAQ-II	.29***	.37***			
Step 2					
BMI	.80***	.37***	.32	.01	1.14
AAQ-II	.25***	.32***			
12-item BI-AAQ	.05	.09			
<i>EDI- 3 Body Dissatisfaction</i>					
Step 1					
BMI	.35	.11	.31	.31	28.84***
AAQ-II	.61***	.53***			
Step 2					
BMI	.23	.07	.43	.12	26.89***
AAQ-II	.37***	.32***			
12-item BI-AAQ	.30***	.41***			

**p < .01.
*** p < .001.

slight increase in the 11-item model (12-item =.91, 11-item =.93).

4. Discussion

The purpose of the present study was to examine the psychometric properties of the BI-AAQ in a clinical eating disorder sample. The psychometrics of the measure had previously been analyzed mainly in nonclinical samples consisting of community members and college undergraduates. While the BI-AAQ displayed good reliability and validity in previous samples, the utility of the measure in clinical populations, where body image flexibility is likely to be of considerable interest, has heretofore been less well known.

The BI-AAQ demonstrated strong psychometric properties with regard to construct validity, incremental validity, and internal reliability. The BI-AAQ displayed good construct validity with predicted relationships demonstrated between convergent and divergent measures. The relationships between the 11-item BI-AAQ and both the AAQ-II and eating disorder risk was large (r =-.55 and .71, respectively), indicating that the BI-AAQ is strongly associated with related measures of psychological inflexibility and eating disorder severity. Moreover, the BI-AAQ, particularly the 11-item version, significantly contributed in the prediction of eating disorder risk after accounting for AAQ-II scores, establishing incremental validity. Thus, while the BI-AAQ and AAQ-II are related, the BI-AAQ appears to be more sensitive in the prediction of eating disorder severity than the AAQ-II in the current clinical sample. These findings provide evidence for the

clinical utility of the BI-AAQ in clinical samples. We endorse the use of the 11-item BI-AAQ as a clinical tool to better evaluate psychological flexibility and eating disorder risk in clinical eating disorder populations.

While these psychometric properties were strong, the findings of the current study also provide evidence that the hypothesized measurement model of body image flexibility by the BI-AAQ may not be entirely consistent within clinical populations. Confirmatory factor analysis of the original 12-item version of the BI-AAQ resulted in overall poor fit. Item 6 appeared to be particularly problematic. After removing this item, the revised, 11-item model performed significantly better than the 12-item model; however, it still resulted in overall poor fit with the data.

In this case, the poor model fit is likely explained by the discrepancy between the observed values in the clinical sample and the expected values of the nonclinical population in which the measure was developed. Multiple studies have found significant differences in cognitive content and processes between clinical and nonclinical samples (e.g., Rawal, Park, & Williams, 2010; Shafran & Robinson, 2004; Steinglass, Eisen, Attia, Mayer, & Walsh, 2007). There may also be differences in how those with more general problematic eating behaviors and those with clinically significant levels of disordered eating relate to questions regarding body image flexibility. The poor model fit found in the clinical sample could be due to differences in relationships with negative thoughts and emotions surrounding eating behaviors. For example, item 1, “Worrying about my weight makes it difficult for me to live a life that I value,” would be interpreted differently depending on the manner in which one relates to words such as “worry,” “weight,” and “value.” While someone with nonclinical, problematic eating may experience their thoughts of worry about weight as distressing, someone with clinically significant levels of disordered eating may experience similar thoughts as constructive and perhaps even motivating. Thus, they may feel that worry about their weight enhances their ability to engage in disordered eating behaviors, resulting in desired weight loss. This could also help explain why item 6 (“If I start to feel fat, I try to think of something else”) performed so poorly in this sample. The item lends itself to multiple interpretive possibilities by patients in the clinical sample that could have led to inconsistent responding. For example, some might embrace their feelings of being overweight as a way to motivate themselves, while others might interpret “think of something else” as mentally reviewing further weight loss strategies, still others might distract themselves from feelings of being overweight as they find them to be distressing. These possible relational differences to cognitions should be considered as additional methods of body image flexibility assessment are developed in the future.

Because body image flexibility is an important construct related to eating disorders, there remains a need for a robust measure of body image flexibility tailored to clinical populations. Such a measure will likely need to be developed specifically within a clinical population in order to accurately capture this construct within the context of these populations. Future research should address the development of such a measure.

The current study has some limitations. First, the sample was rather homogeneous, especially with regard to sex and ethnicity. Additionally, the residential program consists of intensive, comprehensive treatment and is therefore relatively costly. This likely skewed the sample toward higher levels of socioeconomic status. These factors reduce the overall generalizability of the findings, perhaps even within the clinical population that was targeted in the current study. Moreover, the limited sample size did not allow for examination of potential differences between participants diagnosed with anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified. Similarly, approximately one third of the sample was diagnosed with eating disorder not otherwise specified and subthreshold diagnoses were not gathered. This too limited our ability to more specifically

examine potential differences based on specific eating disorder behaviors. Finally, the significant differences between adolescent and adult participants is worth considering. Despite the differences in measure totals, the CFA indicated no significant difference in model fit between the groups. We feel that this is a promising finding for the BI-AAQ as eating disorder-related measures are often used for both adolescent and adults due to eating disorders usually emerging around late adolescence (Currin, Schmidt, Treasure, & Jick, 2005). Likewise, the AAQ-II was used for both adolescent and adult participants. Future studies might benefit from utilizing a youth-specific measure of psychological flexibility such as the Avoidance and Fusion Questionnaire for Youth (Greco, Lambert, & Baer, 2008). Further studies with larger, more diverse samples are needed to extend and potentially corroborate the current findings. Additionally, only one type of reliability (internal consistency) was examined in the current study. While the BI-AAQ has demonstrated good test-retest reliability in general population samples (Ferreira et al., 2011; Sandoz et al., 2013), the measure's reliability over time in a clinical sample remains unknown.

The findings of the current study, while indicating model fit problems with the BI-AAQ in clinical eating disorder populations, also suggest that the measure is psychometrically sound in other areas. The removal of item 6 is recommended when the BI-AAQ is used in clinical populations, as this improves the psychometric properties of the measure. While not ideal, the resulting 11-item BI-AAQ is still a useful measure of psychological flexibility in a clinical population, better predicting eating disorder severity than the AAQ-II, despite its problems. That being said, there remains a need for further development of body image flexibility measures developed within and tailored to clinical populations.

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