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Psychometric Properties of the Eating in the Absence of Hunger Questionnaire in Treatment-Seeking Adults with Overweight and Obesity

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Abstract

Understanding eating behaviors that contribute to overweight and obesity (OW/OB) is an important public health objective. One eating behavior known to contribute to overeating is eating in the absence of hunger (EAH). The Eating in the Absence of Hunger Questionnaire for Children was developed to assess external events and internal experiences that lead children to overeat. Despite the measure's adaptation for use with adults (i.e., EAH-A), its psychometric properties within this population have not been explored. This study assessed the psychometric properties of the EAH-A in sample of 311 treatment-seeking adults with OW/OB (mean BMI=34.5[5.1]; mean age=46.3[12.1]; 81.7% female; 20.6% Latinx, 59.2% white). The EAH-A contains 14 items and assesses three domains: negative affect eating (EAH-NAE), external eating, and fatigue/boredom eating, through two parallel sets of items assessing initiating EAH and continuing EAH. Exploratory Factor Analysis was performed with promax rotation and maximum likelihood

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factor extraction. Results supported a unitary factor of EAH, with scale responses driven by EAH-NAE items. Results may be explained in part by scale structure and domain imbalance favoring EAH-NAE items, or the true internal structure of EAH may consist of a singular latent construct. Follow-up analyses indicated redundancy of the scale's parallel sections. If researchers are primarily interested in EAH-NAE, only the three "start eating" or "keep eating" items may be needed. This study highlights the importance of validating the psychometric properties of a measure within intended populations to ensure interpretations are valid.

Keywords

Eating in the Absence of Hunger Questionnaire; Overeating; Psychometric properties; Adults; Obesity

1. Introduction

Given that the rate of adult overweight and obesity (OW/OB) in the United States has surpassed 70%, (Fryar et al., 2020; Hales et al., 2020), understanding patterns of eating behavior that may contribute to weight gain and obesity (OB) through excess intake is an important public health objective. Eating in the absence of hunger (EAH) is defined as eating beyond nutritional needs and is associated with weight gain and OB in both children and adults (Jani et al., 2020; van Strien et al., 2012). The Eating in the Absence of Hunger Questionnaire for Children (EAH-C) was developed to provide a simple questionnaire evaluating overeating behavior among children and adolescents by assessing external events and internal experiences that trigger eating or cause a child to continue eating when they are not hungry (Tanofsky-Kraff et al., 2008). The EAH-C in its original form assesses three subdomains of EAH: negative affect eating (EAH-NAE), external eating (EAH-EE), and fatigue/boredom eating (EAH-FBE).

The EAH-C development process and psychometric evaluation tested items on a somewhat diverse sample of children and adolescents (60% Caucasian, 30% Black, 3% Latinx) aged 6 to 19 of varied weight status (32% with OB; Tanofsky-Kraff et al., 2008). The initial psychometric evaluation supported the measure's temporal stability, internal consistency, and convergent validity. The EAH-C total score demonstrated a positive association with loss of control eating, and EAH-C subscale scores demonstrated statistically significant, moderate-to-strong, positive associations with emotional eating as measured by the Emotional Eating Scale-Adapted for Children and Adolescents (Tanofsky-Kraff et al., 2007). However, the initial development study failed to support the measure's discriminant validity from measures of anxiety and depression (Tanofsky-Kraff et al., 2008), and evidence from later studies that evaluated the measure's construct and criterion validity was mixed (Shomaker et al., 2013). While Tanofsky-Kraff et al. (2008) hypothesized a two-factor structure of EAH including emotional eating and eating due to environmental influences (i.e., external eating), their psychometric evaluation resulted in a three-factor structure, with a third domain: EAH-FBE. Although the EAH-NAE subscale significantly discriminated between children with and without OB (Tanofsky-Kraff et al., 2008), an assessment of concurrent criterion validity against the EAH task paradigm (Fisher & Birch, 2002), for

which the questionnaire may have been intended to replace, found no association between percent calories consumed during a free access period and the EAH-C total score nor EAH-EE subscale (Madowitz et al., 2014).

Despite mixed evidence for the measure's validity, the EAH-C has been used with a variety of populations (Baldofski et al., 2016; Pérez-Morales et al., 2014; Walther & Hilbert, 2015). The measure has been modified for parents to report on their child (EAH-P; Shomaker et al., 2010, 2013) and for adults to report on themselves (EAH-A; Boutelle et al., 2011; Zocca et al., 2011). The EAH-A was created by changing the word "school" to "work" in the stem of the first series of items in the EAH-C (i.e., "Imagine that you are eating a meal or snack at home, work, or in a restaurant"). The EAH-A has been used with parents of children with OW/OB seeking treatment for their child and adults with OW/OB seeking treatment for themselves (Boutelle et al., 2011, 2019). However, despite its use in adult samples, the EAH-A has never been validated, nor have its psychometric properties been explored in adult samples of different weight status. As research suggests appetitive traits can be successfully targeted in treatment (Boutelle et al., 2020, 2022), a validated measure of EAH in adults could be useful for researchers and practitioners to provide insight into appetite-related targets for the treatment of adult OB.

The present study examined the psychometric properties of the EAH-A in a sample of treatment-seeking adults aged 18-65 with OW/OB, investigating whether a three-factor (i.e., the original three-factor structure), a two-factor, or a novel structure represents the best organization of assessment constructs. We hypothesized that factor analysis of the EAH-A would result in two internally consistent subscales: negative affect eating and external eating. We hypothesized the EAH-NAE subscale would demonstrate a strong positive association with emotional eating, the EAH-EE subscale would demonstrate a strong positive association with hedonic eating, and that both scales would demonstrate strong positive associations with binge eating. Additionally, we hypothesized that these scales would demonstrate weak positive associations with measures of depression and anxiety and no association with physical activity.

2. Methods

Baseline data from the Providing Adults Collaborative Interventions for Ideal Changes (PACIFIC) trial (Clinical Trial NCT02516839) was used for this study. Recruitment methods, measures, treatment arms, and outcomes are detailed in full in previous publications (Boutelle et al., 2019, 2022). Participant inclusion criteria included adults aged 18-65 years of age, body mass index (BMI) ≥ 25 and ≤ 45 kg/m^2, English language skills of at least the fifth-grade reading level, and willingness to participate in assessment and treatment visits. Exclusionary criteria included history of diagnosis of a serious current physical disease (e.g., diabetes), any medical condition that would make physical activity unsafe, current substance abuse, current pregnancy, lactation, and any medical or psychological problems that could make adherence to the study protocol difficult or dangerous. Participants completed baseline assessments at the University of California San Diego (UC San Diego) Center for Healthy Eating and Activity Research (CHEAR) prior

to beginning treatment. Written consent was obtained from all participants and the study protocol was approved by the Institutional Review Board at UC San Diego (151110).

2.1 Measures

Measures for this study were collected as part of baseline assessments of the PACIFIC trial, and questionnaires assessing similar and distinct constructs were chosen to assess convergent and discriminant validity of emerging EAH-A domains.

2.1.1 Demographics—Participants self-reported their age, gender, and race/ethnicity as part of the assessment. Demographic information was collected with language matching the US Census Bureau; however, in this manuscript we use the term Latinx to be inclusive of all Latin American subcultures and genders.

2.1.2 The Eating in the Absence of Hunger Questionnaire (EAH-A)—The EAH-A is a 14-item self-report questionnaire for adults that assesses the frequency of initiating and continuing to eat in the absence of hunger in response to internal and external experiences. Individuals respond with a five-level Likert-style response scale (1 = *Never* to 5 = *Always*). As originally developed, a total score and three subscale scores result, which include EAH-NAE, EAH-EE, and EAH-FBE (Tanofsky-Kraff et al., 2008). Subscale scores are generated by averaging the items loading onto each subscale, and a total score is created by averaging all 14 items, with higher scores indicating greater EAH (Tanofsky-Kraff et al., 2008). Of note, 7 items are repeated twice; one cluster of seven assesses initiating eating, while the subsequent assesses continuing eating.

2.1.3 The Food Craving Questionnaire—Trait (FCQT)—The FCQT is a 39-item self-report questionnaire that assesses various manifestations of cravings across time and situations (Cepeda-Benito et al., 2000). The FCQT assesses nine subdomains of cravings, with two subscales assessing the relationship between eating and negative affect: (1) Anticipation of Relief from Negative States and Feelings as a Result of Eating subscale (FCQT-NEGR) and (2) the Emotions That May be Experienced Before or During Food Cravings or Eating subscale (FCQT-EMOTION). Higher scores on the FCQT indicate higher reported cravings, and higher scores on these two subscales indicate greater emotional eating (Cepeda-Benito et al., 2000). Both subscales demonstrated strong internal consistency (FCQT-NEGR: α = 0.85, H = 0.69 [see Statistical Analysis]; FCQT-EMOTION: α = 0.94, H = 0.82). The FCQT-NEGR and ECQT-EMOTION subscales were used to assess convergent validity with emerging EAH-A domains.

2.1.4 The Power of Food Scale (PFS)—The PFS is a 15-item self-report questionnaire that assesses hedonic eating, or the appetitive drive for palatable food (Lowe et al., 2009). The three subscales of the PFS capture levels of food proximity which include food available, food present, and food tasted. Higher scores on the PFS indicate greater thoughts, feelings, and motivations to seek palatable food (Lowe et al., 2009). The PFS total score demonstrated strong internal consistency (α = 0.93, omega-hierarchical [ω_H] = 0.80). The PFS was used to assess convergent validity with emerging EAH-A domains.

2.1.5 Binge Eating Scale (BES)—

The BES is a 16-item self-report questionnaire that assesses binge eating symptoms and severity (Gormally et al., 1982). The BES results in a single unidimensional scale, and higher scores indicate greater levels of binge eating behavior (Gormally et al., 1982). The BES total score demonstrated good internal consistency (α = 0.87, ω_H = 0.74). The BES was used to assess convergent validity with emerging EAH-A domains.

2.1.6 The Patient Health Questionnaire—9 (PHQ-9)—

The PHQ-9 is a nine-item self-report questionnaire that assesses depression symptoms and severity over the past two weeks (Kroenke et al., 2001). Higher scores on the PHQ-9 indicate higher levels of depression (Kroenke et al., 2001). The PHQ-9 total score demonstrated acceptable internal consistency (α = 0.76, ω_H = 0.64, H = 0.43). The PHQ-9 was used to assess discriminant validity from emerging EAH-A domains to ensure affect-driven eating was distinct from state depression.

2.1.7 The Generalized Anxiety Disorder Questionnaire—7 (GAD-7)—

The GAD-7 is a seven-item self-report questionnaire that assesses anxiety symptoms and severity over the past two weeks (Spitzer et al., 2006). Higher scores on the GAD-7 indicate higher levels of anxiety (Spitzer et al., 2006). The GAD-7 total score demonstrated good internal consistency (α = 0.83, ω_H = 0.64, H = 0.51). The GAD-7 was used to assess discriminant validity from emerging EAH-A domains to ensure affect-driven eating was distinct from state anxiety.

2.1.8 The Godin Leisure-Time Exercise Questionnaire (GLTEQ)—

The GLTEQ is a four-item self-report questionnaire that assesses physical activity during leisure time (Godin & Shephard, 1985). Higher scores on the GLTEQ indicate greater frequency of engaging in physical activity (Godin & Shephard, 1985). The GLTEQ was used to assess discriminant validity from emerging EAH-A domains as a measure of physical activity that is theoretically distinct from eating behavior in the literature.

2.1.9 Anthropometrics—

Height was measured to the nearest 0.1 cm in triplicate using a portable Schorr height board (Schorr Inc., Olney, MD). Weight was measured to the nearest 0.1 kilogram in duplicate using a calibrated digital Tanita scale (model WB 110-A). The values obtained at the baseline assessment visit were averaged to calculate BMI (weight in kilograms divided by height in meters squared).

2.2 Statistical Analysis

Adults who completed a baseline assessment and had complete EAH-A data were included in the present analyses. Descriptive and factor analyses were run with R version 4.1.0 (R Core Team, 2021). Exploratory factor analysis (EFA) was performed using the “psych” and “mokken” packages in R, utilizing promax rotations and maximum likelihood factor extraction (Revelle, 2021; Van Der Ark, 2012). Multiple EFA techniques including principal axis factoring, Velicer’s Minimum Average Partial, Horn’s parallel analysis, and an automated item selection procedure were considered to identify factors and evaluate characteristics of the set of 14 items. Additionally, metrics of internal consistency, omega-

hierarchical model indices, and convergent and discriminant validity were assessed to further validate EFA findings. An exploratory approach was chosen due to the nature of EAH remaining largely unexplored in both adult and treatment-seeking samples.

For the principal axis factoring, a factor was retained if it loaded at least three items with loadings ≥ 0.32, as literature suggests 0.32 may be an absolute minimum, while ≥ 0.40 is preferable (Meyers et al., 2013). Additionally, Velicer's Minimum Average Partial criteria with a threshold of 0.8 (Velicer, 1976), Horn's parallel analysis (Horn, 1965), and an automated item selection procedure with a scalability parameter > 0.3 (Palmgren et al., 2018) were also considered. The index of communality was used to determine the proportion of common variance found in an item under different factor structures.

Internal scale reliability was assessed using Cronbach's alpha (α) and McDonald's coefficient omega (ω; (McDonald, 1999). Omega-hierarchical (ω_H) was reported with $\omega_H \geq$ 0.65 indicative of strong dimensionality (Flora, 2020; Nájera Catalán, 2019; Watkins, 2017). If the total number of items per scale was less than nine, coefficient *H* from Mokken scale analysis (*H*) was reported as the second metric of internal consistency (Mokken, 1971), with $0.3 \leq H < 0.4$ indicative of a weak scale, $0.4 \leq H < 0.5$ indicative of a moderate scale, and $H \geq 0.5$ indicative of a strong scale (Stochl et al., 2012). ω_H was also used to assess the strength of an underlying common factor of EAH with iterative adjustment for residual subfactors. Factor solutions were compared by analyzing item loadings, communality, factor reliability, and clinical interpretability.

Convergent and discriminant validity were assessed to validate factor analytic findings. Convergent validity was assessed using Spearman correlations between EAH-NAE and emotional eating as identified by the FCQT-NEGR and FCQT-EMOTION subscales, in addition to EAH-EE and external eating as identified by the PFS total score. Correlations with EAH-A total scores were also examined. Discriminant validity was assessed using Spearman correlations between the EAH-A total score and depression symptoms as identified by the PHQ-9, anxiety symptoms as identified by the GAD-7, and self-reported physical activity as identified by the GLTEQ. No *a priori* thresholds were set for convergent or discriminant validity, but rather the strength and direction of observed associations were compared to those of hypothesized associations. Observations were included in convergent and discriminant validity analyses if at least 50% of items were completed and mean imputation was used for missing data. This analytic plan was pre-specified and data driven analyses are discussed in Section 3.5.

3. Results

3.1 Demographics

In total, 311 participants had complete EAH-A data and were included in the analysis. Participants had a mean age of 46.3 years and 81.7% (n = 254) of the sample identified their sex as female. In terms of the racial and ethnic breakdown of the sample, 20.6% (n = 64) identified as Latinx, 59.2% (n = 184) identified as non-Latinx white, 7.7% (n = 24) identified as Asian/Pacific Islander, and 6.4% (n = 20) identified as Black. See Table 1 for detailed demographic information.

3.2 Exploratory Factor Analysis

Results of factor extraction indices did not converge with a unanimous factor solution. While principal axis factoring suggested a single domain best fit the data, parallel analysis suggested three domains and Velicer's Minimum Average Partial suggested two domains.

The three-factor solution did not align items within domains identified in the original psychometric evaluation (Tanofsky-Kraff et al. 2008). One factor loaded only two parallel items, and this solution was thus abandoned (Raubenheimer, 2004). In the two-factor solution, six items had notable cross-loadings onto both factors, two items had loadings < 0.32, and two items had loadings > 1.0 onto the second factor, suggesting the model may overfit the data in this sample (Table 2). Additionally, contrary to findings in the original publication, the parallel "keep eating" and "start eating" versions of the EAH-EE items ("food looks, tastes or smells so good" and "others are still eating") loaded onto separate factors (Tanofsky-Kraff et al., 2008).

The one-factor solution resulted in twelve items with communality above 0.20 and each of the fourteen items loading at least 0.39 or higher onto the single factor (Table 2). Additionally, the unitary factor demonstrated moderate-to-strong internal consistency, supporting the presence of a single underlying primary factor (α = 0.89, ω_H = 0.67). Additional subfactor adjustments resulted in five subfactors as the optimal structure of residual variability (ω_H = 0.74). In each iterative analysis, EAH-NAE items consistently clustered together with stronger loadings, while examined exploratory models failed to explain variance in other items (i.e., EAH-EE and EAH-FBE). When the model required a second factor, the two factors correlated strongly (r = 0.72).

3.3 Automated Item Selection Procedure

Next, an automated item selection procedure was employed to identify the strength of a single factor to organize the fourteen items. All items loaded onto the same factor and the overall H for the total score was 0.43, providing further evidence for the scalability of a moderate single dimension organizing responses to these items (Table 3; Mokken, 1971). Results from EFA approaches suggest the measure is best represented by a singular factor solution. Accordingly, all subsequent convergent and discriminant validity analyses were explored based on the single factor solution. However, given our initial hypotheses, we also explored convergent validity with the EAH-NAE and EAH-EE subscales to further evaluate the strength of the single factor solution in our sample.

3.4 Convergent and Discriminant Validity

Convergent and discriminant validity were assessed for the EAH-A total score as a unitary factor of EAH (Table 4). Overall completion rates for convergent and discriminant validity measures were high (92.3 - 100%). See Table 5 for the extent of missing data for convergent and discriminant validity measures. Correlations of convergent validity measures with the EAH-A total score were also compared to correlations with the EAH-NAE and EAH-EE subscales organized by Tanofsky-Kraff et al. (2008)'s original three-factor solution. These correlations were compared in order to assess the strength of the unitary factor structure as compared to original published factor structure, and to evaluate whether domains of EAH-

EE and EAH-NAE may be distinct in this sample as initially hypothesized. Moderate-to-strong positive correlations were observed between the FCQT-NEGR and FCQT-EMOTION subscales with the EAH-A total scores, and similar associations were also observed between the FCQT subscales and the EAH-NAE items. Moderate positive correlations were also observed between the PFS total scores and EAH-A total scores and between the PFS total scores and EAH-EE items. Moderate-to-strong positive correlations were observed between the BES total scores and EAH-A total scores, EAH-NAE items, and moderately with EAH-EE items.

Moderate positive correlations were also observed between PHQ-9 total scores and EAH-A total scores and between GAD-7 total scores and EAH-A total scores. No correlation was observed between GLTEQ total scores and EAH-A total scores.

3.5 Follow-Up Analyses

A priori specified analyses were followed-up with additional investigation of potential scale redundancy due to its parallel structure and the utility of EAH-NAE items. We performed EFA (i.e., principal axis factoring) separately for the two parallel sections of the scale (i.e., "keep eating" and "start eating" sections) with seven items each. We found both parallel sections to still be best organized by a single factor of EAH with factor loadings of similar magnitude. When a second subfactor was explored through principal axis factoring of "keep eating" or "start eating" items, we observed a loading pattern similar to models of combined items and strong correlations between factors within both sets of items ($r = 0.67$; $r = 0.61$). Similar internal consistencies were observed between the two parallel sections ($\omega_H = 0.73$; $\omega_H = 0.72$), and parallel sections correlated strongly ($r = 0.84$).

Finally, we analyzed correlations between parallel "keep eating" and "start eating" EAH-NAE items. We found the three "keep eating" EAH-NAE items had a strong correlation with the three "start eating" EAH-NAE items ($r = 0.89$). Consistent correlations between each set of EAH-NAE items and FCQT subscales used for convergent validity were also observed (Table 4).

4. Discussion

This study performed a psychometric evaluation of the EAH-A among adults with OW/OB. We assessed the construct, convergent, and discriminant validity of the EAH-A in a sample of treatment-seeking adults with OW/OB. Our investigation of construct validity of the EAH-A with EFA did not parallel the original 3-factor structure proposed in the EAH-C from which the present measure was adapted (Tanofsky-Kraff et al., 2008). Instead, we found all items loaded onto a unitary factor of EAH, and scale responses were driven most strongly by EAH-NAE items. EAH-EE and EAH-FBE items in the scale were not able to capture significant unique variance in EAH distinct from EAH-NAE.

Our assessment of convergent validity provided further evidence that EAH-A total scores were driven most strongly by EAH-NAE items, and our observation of moderate-to-strong positive correlations with constructs theoretically related to EAH in the literature (i.e., emotional eating, hedonic eating, and binge eating) provided support for the measure's

convergent validity. Our results suggested EAH-EE items in the scale were not able to capture significant unique variance in responses to support the presence of a domain of EAH-EE distinct from EAH-NAE. Our assessment of discriminant validity between the PHQ-9 and GAD-7 with the EAH-A total score resulted in moderate positive correlations, consistent in direction but stronger in magnitude than was originally hypothesized. However, the original psychometric evaluation in children also failed to demonstrate discriminant validity from measures of depression and anxiety (Tanofsky-Kraff et al., 2008), and this may be explained by our finding that scale responses were driven by negative affect eating. Lastly, as hypothesized, no correlation was observed between the EAH-A and the GLTEQ, providing support for the discriminant validity of the EAH-A from self-reported physical activity.

There are several potential explanations for why our factor analysis findings did not result in the initially hypothesized two-factor solution nor the three-factor solution found in the original publication of the measure in children. Item imbalance across hypothesized domains favoring EAH-NAE items in the scale may have resulted in limited contribution from EAH-EE and EAH-FBE items. Furthermore, redundancy within the two parallel “keep eating” and “start eating” sections in the scale may have increased the likelihood of a single factor solution. Exploratory post-hoc analyses of parallel sections suggest that one set of seven items can predict the second set at 84% accuracy. While separate processes may in fact be responsible for initiating and continuing eating when satiated (Epstein & Carr, 2021; French et al., 2012), it is also possible that respondents are unable to differentiate between the two phenomena when reflecting on it after the fact. A revised measure that addresses these limitations may eliminate this redundancy by consolidating the two parallel sections. If researchers are interested in EAH-EE, they may need to add additional items to address the domain imbalance (e.g., eating because food is present, eating due to environmental cues, etc.) to assess if EAH-EE is truly a distinct subdomain of EAH.

Sample differences may explain why our findings differed from the initial validation study, as the original validation sample consisted of non-treatment seeking children and adolescents, including those of healthy weight. Furthermore, the initial validation sample was more balanced in terms of gender (53.5% female), while our adult sample was primarily female (81.7%). Sex differences have been documented in the EAH literature in children (Keller et al., 2019), and thus it is very possible these differences may also be found in adulthood and may have contributed to the different structure of EAH in our sample of adults.

It is also possible that a unitary factor represents the true internal structure of EAH, and all items may be tapping into the same latent construct of overeating. Recent proposals have suggested while eating trait questionnaires use different terminology, all measure an overlapping unitary factor of overeating, which has been referred to as uncontrolled eating, or disinhibited eating, among other names (Tanofsky-Kraff et al., 2020; Vainik et al., 2015, 2019). In line with this theory, a number of studies have found evidence that emotional (i.e., negative affect eating) and external eating represent distinctions in severity, existing on a single overeating continuum (Shomaker et al., 2011; Vainik et al., 2015; Vannucci et al.,

2013). It is possible a revised measure of EAH with additional domain representation could provide evidence for this internal structure.

Another possible explanation of our findings is that eating due to external cues and eating due to negative affect may be distinct constructs but have synergistic relationships that drive overeating. Literature from loss-of-control eating and binge eating supports the role of negative affect as a temporal antecedent to overeating, and thus may drive an individual to seek out food in their environment (Burton & Abbott, 2017; Tanofsky-Kraff et al., 2020). Perhaps EAH-EE and EAH-NAE co-occur so frequently that it is difficult for respondents to parse between the two, driving similar responses to both sets of items. This relationship should be further explored in future research, as it may have useful clinical implications. For example, rather than addressing eating due to emotions and eating due to environmental cues as distinct processes, patients can be given strategies that address both processes simultaneously.

Our follow-up analyses suggest the first set of three EAH-NAE items (i.e., "…you are feeling sad or depressed?", "…you are feeling angry or frustrated?", "…you are feeling anxious or nervous?") in the measure can predict the second set at 89% accuracy. Researchers may choose their preferred stem if they have greater interest in assessing continuing vs. initiating eating, or may consider a modified stem prompt that combines the two processes. Further psychometric testing of these standalone items is required to support their criterion and predictive validity and clinical utility. Additionally, future studies may consider exploring a measurement invariance design (Putnick & Bornstein, 2016), first comparing findings from the measure's development sample (non-treatment-seeking children) to those in a sample of treatment-seeking children with OW/OB. Ultimately, a comparison of findings between treatment-seeking children and those from the current study with treatment-seeking adults may provide information about the temporal stability of EAH across the lifespan of individuals with OW/OB.

Study strengths include use of current best practices in psychometric analysis, including the use of polychoric correlations within the EFA context, exploring a hierarchical factor structure, the use of omega-hierarchical as a measure of internal consistency for short scales and subscales, and the use of an automated item selection procedure. Additional strengths include a large and somewhat racially/ethnically diverse sample. Despite these strengths, the study is not without limitations. All respondents were treatment-seeking and with OW/OB, and our sample was predominantly female. Thus, eating behaviors from this sample are not representative of eating behaviors of non-treatment seeking adults or of adults with healthy weight, nor should they be generalized to males or nonbinary individuals. Although this study includes a relatively diverse sample, additional diversity in race/ethnicity, socioeconomic status, gender identity, language, etc. would benefit the generalizability of the study's findings to other populations and settings.

5. Summary and Conclusions

In sum, the present findings suggest that in treatment-seeking adults with OW/OB, the EAH-A may be best analyzed with a unitary factor structure, evaluating EAH-NAE. This factor

was identified using advanced psychometric analyses, ensuring the application of a reliable and valid domain to the present sample. This study suggests that to measure EAH-NAE, only three items from this scale may be needed. This study highlights the importance of validating the psychometric properties of a measure within intended populations to ensure interpretations are valid. Future work should continue to explore facets of EAH within the current best practices of measure development, explore whether EAH-NAE and EAH-EE are truly distinct constructs or if they may exist on a continuum, and evaluate the clinical utility and predictive validity of a condensed scale with the three identified EAH-NAE items.

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Abbreviations:

OW/OB	overweight and obesity
EAH	eating in the absence of hunger
EAH-C	Eating in the Absence of Hunger Questionnaire for Children
EAH-A	Eating in the Absence of Hunger Questionnaire for Adults
EAH-NAE	Eating in the Absence of Hunger Negative Affect Eating subscale
EAH-EE	Eating in the Absence of Hunger External Eating subscale
EAH-FBE	Eating in the Absence of Hunger Fatigue/Boredom Eating subscale
EFA	exploratory factor analysis
BMI	body mass index
FCQT	Food Craving Questionnaire—Trait
FCQT-NEGR	Anticipation of Relief from Negative States and Feelings as a Result of Eating subscale
FCQT-EMOTION	Emotions That May be Experienced Before or During Food Cravings or Eating subscale
PFS	Power of Food Scale

BES	Binge Eating Scale
PHQ-9	Patient Health Questionnaire—9
GAD-7	Generalized Anxiety Disorder Questionnaire—7
GLTEQ	Godin Leisure-Time Exercise Questionnaire

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Table 1.

Sample Characteristics

Demographics, *N* (%) unless stated otherwise	
Age (years), Mean (SD)	46.3 (12.1)
Sex (female)	254 (81.7%)
Race/Ethnicity	
Latinx	64 (20.6%)
Non-Latinx, White	184 (59.2%)
Black	20 (6.4%)
Asian/Pacific Islander	24 (7.7%)
American Indian	3 (1.0%)
Multiracial *	15 (4.8%)
Unreported	9 (2.9%)
BMI (kg/m^2), Mean (SD)	34.5 (5.1)
Household Income	
<$50 000/year	62 (19.9%)
$50 000-$99 999/year	95 (30.5%)
>$100 000/year	125 (40.2%)
Prefer not to answer/Unreported	29 (9.3%)

Abbreviations: BMI = body mass index

* Note: race/ethnicity percentages add up to > 100% due to selection of multiple categories by some respondents.

Table 2.

1 and 2-Factor Structure Loadings

		1-Factor Structure	2-Factor Structure	
Item		**Factor 1**	**Factor 1**	**Factor 2**
Keep eating because…	1. Food looks, tastes or smells so good	0.57	0.24	0.35
	2. Others are still eating	0.42	0.17	0.26
	3. Feeling sad or depressed	0.77	−0.02	0.79
	4. Feeling bored	0.58	0.39	0.24
	5. Feeling angry or frustrated	0.86	0.06	0.84
	6. Feeling tired	0.64	1.12	−0.24
	7. Feeling anxious or nervous	0.78	−0.05	0.83
Start eating because…	8. Food looks, tastes or smells so good	0.50	0.35	0.19
	9. With other people who are eating	0.39	0.26	0.14
	10. Feeling sad or depressed	0.77	−0.08	0.84
	11. Feeling bored	0.60	0.38	0.26
	12. Feeling angry or frustrated	0.86	−0.06	0.94
	13. Feeling tired	0.62	1.11	−0.25
	14. Feeling anxious or nervous	0.79	−0.09	0.88

Table 3.

Coefficient *H* (*H*) Values from Automated Item Selection Procedure

Item		*H* (SE)
Keep eating because…	1. Food looks, tastes or smells so good	0.45 (0.034)
	2. Others are still eating	0.33 (0.038)
	3. Feeling sad or depressed	0.45 (0.034)
	4. Feeling bored	0.45 (0.032)
	5. Feeling angry or frustrated	0.48 (0.034)
	6. Feeling tired	0.43 (0.033)
	7. Feeling anxious or nervous	0.45 (0.031)
Start eating because…	8. Food looks, tastes or smells so good	0.43 (0.035)
	9. With other people who are eating	0.35 (0.040)
	10. Feeling sad or depressed	0.45 (0.033)
	11. Feeling bored	0.45 (0.032)
	12. Feeling angry or frustrated	0.48 (0.033)
	13. Feeling tired	0.41 (0.033)
	14. Feeling anxious or nervous	0.45 (0.034)
Overall *H* for Total Score		0.43 (0.026)

Table 4.

Convergent and Discriminant Validity

	Convergent Validity Scale/Subscale	**Correlation (*r*)**	***P*-value**
EAH-A	FCQT-NEGR	0.51	< 0.001
	FCQT-EMOTION	0.68	< 0.001
EAH-NAE	FCQT-NEGR	0.56	< 0.001
	FCQT-EMOTION	0.66	< 0.001
“Keep eating” EAH-NAE items	FCQT-NEGR	0.55	< 0.001
	FCQT-EMOTION	0.63	< 0.001
“Start eating” EAH-NAE items	FCQT-NEGR	0.53	< 0.001
	FCQT-EMOTION	0.63	< 0.001
EAH-A	PFS Total Score	0.59	< 0.001
EAH-EE	PFS Total Score	0.50	< 0.001
EAH-A	BES Total Score	0.62	< 0.001
EAH-NAE	BES Total Score	0.55	< 0.001
EAH-EE	BES Total Score	0.48	< 0.001
	Discriminant Validity Scale	**Correlation (*r*)**	***P*-value**
EAH-A	PHQ-9 Total Score	0.47	< 0.001
	GAD-7 Total Score	0.33	< 0.001
	GLTEQ	−0.031	0.583

Abbreviations: EAH-A = Eating in the Absence of Hunger Questionnaire for Adults (total score); EAH-NAE = EAH-A Negative Affect Eating subscale; EAH-EE = EAH-A External Eating subscale; FCQT = Food Craving Questionnaire—Trait; FCQT-NEGR = FCQT anticipation of relief from negative states and feelings as a result of eating subscale; FCQT-EMOTION = FCQT the emotions that may be experienced before or during food cravings or eating subscale; BES = Binge Eating Scale; PHQ-9 = Patient Health Questionnaire—9; GAD-7 = Generalized Anxiety Disorder Questionnaire—7; GLTEQ = Godin Lesiure Time Exercise Questionnaire.

Table 5.

Missing Data for Convergent/Discriminant Validity Measures

Measure or Scale	*N* (%) of sample with complete measure/scale	*N* (%) of sample completed > 50% of items	*N* (%) of sample excluded for missing entire measure/scale
FCQT-NEGR	282 (90.7%)	287 (92.2%)	24 (7.7%)
FCQT-EMOTION	284 (91.3%)	287 (92.2%)	24 (7.7%)
PFS	301 (96.8%)	311 (100.0%)	0 (0.0%)
BES	274 (88.1%)	286 (92.0%)	25 (8.0%)
PHQ-9	307 (98.7%)	311 (100.0%)	0 (0.0%)
GAD-7	284 (91.3%)	286 (92.0%)	25 (8.0%)
GLTEQ	301 (96.8%)	310 (99.7%)	1 (0.0%)

Abbreviations: FCQT = Food Craving Questionnaire—Trait; FCQT-NEGR = FCQT anticipation of relief from negative states and feelings as a result of eating subscale; FCQT-EMOTION = FCQT the emotions that may be experienced before or during food cravings or eating subscale; BES = Binge Eating Scale; PHQ-9 = Patient Health Questionnaire—9; GAD-7 = Generalized Anxiety Disorder Questionnaire—7; GLTEQ = Godin Lesiure Time Exercise Questionnaire.