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The Intuitive Eating Scale-2: Re-evaluating its Factor Structure using a Bifactor Exploratory Structural Equation Modelling Framework

Viren Swami[1-2], Christophe Maïano[3], Adrian Furnham[4], & Charlotte Robinson[5]

[1]School of Psychology and Sport Science, Anglia Ruskin University, Cambridge, United Kingdom

[2]Centre for Psychological Medicine, Perdana University, Kuala Lumpur, Malaysia

[3]Cyberpsychology Laboratory and Department of Psychoeducation and Psychology, Université du Québec en Outaouais, Saint-Jérôme, Canada

[4]Department of Leadership and Organizational Behaviour, Norwegian Business School, Oslo, Norway

[5]Department of Psychology, University of Bath, Bath, United Kingdom

Address correspondence to: Prof. Viren Swami, School of Psychology and Sport Science, Anglia Ruskin University, East Road, Cambridge, Cambridgeshire CB1 1PT, United Kingdom. Email: viren.swami@aru.ac.uk.

Abstract

Purpose: Previous studies examining the appropriateness of the 4-factor model of Intuitive Eating Scale-2 (IES-2) scores have returned equivocal results, which may reflect methodological limitations in the way IES-2 scores are modelled. Here, we applied a bifactor-exploratory structural equation modelling (B-ESEM) framework to better understand IES-2 multidimensionality.

Methods: A total of 603 participants from the United States completed the IES-2, alongside measures of body appreciation, body acceptance from others, and self-esteem. Our analyses compared the fit of various hypothesised models of IES-2 scores.

Results: Models of IES-2 scores based on confirmatory factor analysis (CFA) uniformly showed poor fit. ESEM models showed superior fit to CFA representations and a B-ESEM model showed improved fit over higher-order CFA and B-CFA representations of IES-2 scores. The optimal model was a B-ESEM model that accounted for, through correlated uniqueness (CU), the methodological artefact introduced by negatively-worded IES-2 items. This B-ESEM-CU model was fully invariant across gender and showed adequate construct validity.

Conclusion: The B-ESEM-CU framework appears well-suited to understand the multidimensionality of IES-2 scores. A model of IES-2 scores that yields a reliable latent indicator of global intuitive eating while allowing for simultaneous consideration of additional specific factors will likely provide more accurate accounting of the nature and outcomes of intuitive eating.

Keywords: Intuitive eating; Intuitive Eating Scale-2; Exploratory structural equation modelling; Bifactor analysis; Correlated uniqueness

Level of evidence: Level III, cohort study

Introduction

The construct of *intuitive eating* refers to a set of adaptive, healthy eating behaviours that are characterised by a reliance on internal hunger and satiety cues rather than situational and emotional cues [1]. Research has shown that individuals who eat intuitively are more likely to experience weight stability [2], eat healthily and adopt positive weight management behaviours [3-4], and demonstrate greater psychological well-being [5]. Unsurprisingly, the construct of intuitive eating has emerged as an important non-dieting approach to promote healthy eating and weight gain prevention [6].

Intuitive eating is most commonly measured using the 23-item Intuitive Eating Scale-2 [7]. In samples of college students from the United States, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) supported a 4-dimensional factor structure consisting of *Unconditional Permission to Eat* (i.e., an individual's willingness to eat when hungry and a refusal to label certain foods as forbidden; 6 items), *Eating for Physical Rather than Emotional Reasons* (i.e., eating when one is physically hungry rather than to cope with emotional distress; 8 items), *Reliance on Hunger and Satiety Cues* (i.e., an individual's trust in their internal hunger and satiety cues and reliance on these cues to guide eating behaviours; 6 items), and *Body-Food Choice Congruence* (i.e., a tendency to make food choices that honour one's health and body functioning; 3 items) [7].

Beyond the parent study, support for this 4-factor structure of IES-2 scores has been equivocal. While some CFA-based studies have supported the 4-dimensional model [8-9], other research in diverse national and linguistic contexts has indicated that this model has less-than-adequate fit and, based on exploratory factor analyses (EFA), has instead proposed IES-2 models consisting of between three to six factors [10-12]. Difficulties confirming the fit of the 4-factor model have been attributed to concerns that the construct of intuitive eating itself, rather than the IES-2, may be problematic. That is, the construct of intuitive eating may represent a largely Western eating style that does not reflect notions of adaptive, healthy eating patterns in other cultural settings [11-12].

While such arguments are plausible [13], an alternative account suggests that there have been limitations in the way IES-2 scores have been modelled [14]. First, although some studies have accounted for shared method variance by correlating errors between similarly phrased items [7-9], we are not aware of any study that has specifically accounted for the inclusion of seven negatively worded IES-2 items. These negatively worded items are likely to lead to method effects, which result in spurious covariances between items [15]. Second, the use of CFA to model lower-order IES-2 multidimensionality may be inappropriate because CFA requires that items only load on their respective hypothesised latent factors; that is, this method forces cross-loadings to be zero, which may result in model misspecification [16]. However, such an assumption is highly unrealistic *vis-à-vis* the IES-2, where IES-2 items do cross-load when allowed to [10-12].

A related concern is the way in which global multidimensionality of IES-2 scores has been modelled [14]. Studies that have assessed this issue have relied on a higher-order model of IES-2 scores, where the four lower-order factors are used to assess higher-order representation [7,12]. However, higher-order models are inherently flawed because they assume that associations between indicators and the higher-order factor are indirect (i.e., mediated by the lower-order factor) and that associations between the indicators and the unique part of the first-order factor are also mediated by the lower-order factor [17]. In contrast, bifactor models offer a more realistic accounting of global multidimensionality. In bifactor models, items are allowed to define a global G-factor (i.e., intuitive eating) and specific S-factors (e.g., body-food choice congruence); the G- and S-factors are orthogonal and, therefore, both can freely predict outcomes [17].

The issues discussed above can be addressed by correlating the uniqueness of the negatively worded IES-2 items and by using a bifactor-exploratory structural equation modelling framework (B-ESEM). ESEM is an analytic strategy that relaxes independent clusters model constraints by incorporating aspects of EFA (i.e., allowing for cross-loadings) and CFA (i.e., the use of advanced statistical methods) [16,18-19]. The B-ESEM method, in turn, provides a strategy for dealing with both cross-loadings and inflated G-factor loadings, as well as inflated cross-loadings that sometimes occurs in ESEM [19]. To date, only one previous study has used this framework to assess the factor structure of IES-2 scores: in an Italian sample, it was reported that a 4-factor B-ESEM model that correlated the uniqueness of the negatively worded items had improved fit compared with all other examined models, including ESEM models [14].

Emerging evidence, therefore, suggests that a B-ESEM framework that accounts for the correlated uniqueness (CU) of negatively worded items may offer a way of resolving some of the concerns over the dimensionality of IES-2 scores [14]. However, further evidence is needed, particularly in English-speaking samples. In the present study, therefore, we assessed the dimensionality of IES-2 scores in a sample of adults from the United States. Specifically, we assessed the fit of a 4-factor B-ESEM model with CU, which we compared against a B-ESEM model without CU, and ESEM and CFA models with and without CU. Our expectation was that the B-ESEM-CU model would show improved fit compared to all other models, and that this model would also be invariant across gender. Finally, we also preliminarily assessed construct validity through associations between IES-2 scores and body appreciation, body acceptance by others, self-esteem, and body mass index (BMI).

Method

Participants

Participants consisted of an online sample of 303 women and 300 men from the United States. The sample ranged in age from 18 to 75 years (*M* = 37.70, *SD* = 12.12) and in self-reported BMI from 12.80 to 49.67 kg/m^2 (*M* = 26.67, *SD* = 6.65). In terms of race, the majority (63.3%) were non-Hispanic White, 18.1% were Black/African American, 10.6% were Asian/Pacific Islander, 4.3% were Hispanic/Latina/Latino, 3.2% were multiracial, 0.2% were American Indian/Alaska Native, and 0.3% were of another race.

Measures

Demographics. Participants were asked to report their gender identity, age, and race. They were also asked to self-report their height and weight, which we used to compute BMI as kg/m^2. Forty-three participants were missing either height or weight data and 29 participants had improbable BMI values (< 12 or > 50 kg/m^2), so these were treated as missing data and replaced using the mean replacement technique.

Intuitive eating. Participants completed the 23-item IES-2 [7]. All items were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Body appreciation. We used the 10-item Body Appreciation Scale-2 (BAS-2) [20], which assesses acceptance of one's body, respect and care for one's body, and protection of one's body from unrealistic beauty standards. All items were rated on a 5-point scale (1 = *never*, 5 = *always*) and an overall score was computed as the mean of all items, so that higher scores reflect greater body appreciation. BAS-2 scores have been shown to have a unidimensional factor structure and adequate internal consistency and construct validity in adults from the United States [20]. In the present study, internal consistency as assessed using McDonald's ω for BAS-2 scores was .95 (95% CI = .94, .96).

Body acceptance by others. Participants completed the Body Acceptance by Others Scale-2 (BAOS-2) [21]. This is a 13-item measure that assesses the degree to which individuals perceived body acceptance by others, with items rated on a 5-point scale (1 =

never, 5 = *always*). An overall score was computed as the mean of all 13 items, such that higher scores reflect greater body acceptance by others. BAOS-2 scores evidence a unidimensional factor structure with adequate internal consistency and construct validity in adults from the United States [21]. In the present study, McDonald's ω for BAOS-2 scores was .93 (95% CI = .91, .95).

Self-esteem. Participants completed the Rosenberg Self-Esteem Scale (RSES) [22]. This is a widely used, 10-item measure assessing global self-esteem on a 4-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Five items were reverse-coded and an overall score was computed as the mean of all items, so that higher scores reflect greater self-esteem. RSES scores have been shown to have a unidimensional structure and adequate internal consistency and construct validity with adults from the United States [23]. In the present study, McDonald's ω for RSES scores was .82 (95% CI = .77, .87).

Procedures

Ethics approval was obtained from the School Research Ethics Panel at the first author's institution (approval code: PSY-S19-026). All data were collected using Prolific, a crowdsourcing platform for research, on May 1, 2021. The project was advertised as a study on "eating habits and styles" and was limited to citizens and residents of the United States, those of adult age, and those fluent in English. All participants passed an attention check item that was placed halfway through the survey. Prolific ID codes and IP addresses were examined to ensure that no participant took the survey more than once. All participants provided digital informed consent and completed an anonymous survey consisting of the measures above, which were presented in a counter-balanced order to control for order effects. Participation was voluntary and participants received US$1.80.

Analytic Strategy

Data treatment. Less than 1.0% of the total dataset were missing completely at random, $\chi^2(175) = 188.08$, $p = .236$, and were replaced using the mean replacement technique.

Factor structure. All analyses were performed using Mplus 8.5's [24] robust weighted least squares estimator with mean and variance adjusted statistics (WLSMV). Prior to analyses, the seven negatively worded IES-2 items were reverse-coded so that all reported loadings were positive. The *a priori*, parent 4-factor structure of the IES-2 was estimated using CFA and ESEM. In the CFA model, IES-2 ratings were explained by four correlated latent factors without cross-loadings. In the ESEM model, all cross-loadings were estimated and a target rotation was used (i.e., all cross-loadings were "targeted" to be as close to zero as possible) [25]. Additionally, a single-factor CFA solution and a higher-order CFA model (CFA-HO) were also estimated, with the latter including the four *a priori* first-order factors and one second-order factor of intuitive eating.

Bifactor CFA (B-CFA) and bifactor ESEM (B-ESEM) models of the IES-2 comprised one more factor than their CFA and ESEM counterparts. In these models, all factors were specified as orthogonal [26] and all items had a main loading on both a global factor (G-factor of intuitive eating) and on their four specific factors (S-factors). Additionally, in order to control for the methodological artefact introduced by the seven negatively worded IES-2 items (Items #1, 2, 4, 5, 9, 10, and 11), all previously mentioned models were also estimated with correlated uniqueness (CU) between these items [15].

Model fit. Model fit was examined using examining the following fit indices: the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI (values $\leq .08$ indicate acceptable and $\leq .06$ indicate good fit), the standardised root mean square residual (SRMR; values $< .09$ indicate good fit), the Tucker-Lewis index (TLI; values $\geq .90$ indicate acceptable fit and $> .95$ indicate good fit), and the comparative fit index (CFI; values $\geq .90$

indicate acceptable fit and > .95 indicate good fit) [27-28]. Nevertheless, in the literature it is not uncommon that RMSEA and the CFI-TLI diverge, particularly for categorical data [29]. Additionally, goodness-of-fit assessment is insufficient to guide model selection when contrasting CFA, ESEM, B-CFA, and B-ESEM solutions [26]. Instead, careful examination of parameter estimates (i.e., loadings, cross-loadings, latent correlations, composite reliability) from the various models is recommended [26]. This examination begins with a comparison of the CFA and ESEM models, where the observation of reduced factor correlations in ESEM coupled with generally well-defined factors could be taken as evidence in favor of the ESEM solution over a similarly fitting CFA solution [26]. Next, the retained model should be contrasted to its bifactor counterpart. In this second comparison, the observation of a well-defined G-factor coupled with at least a subset of well-defined S-factors supports a bifactor solution over a similarly fitting first-order solution [26]. The composite reliability of scales from the best factor solution was estimated using McDonald's omega (ω), with values greater than .70 reflecting adequate internal reliability [30].

Gender invariance. Measurement invariance across gender of the optimal model (i.e., CFA, ESEM, B-CFA, and B-ESEM with or without CU) retained in the first step was examined. The following sequence was used [31]: (i) configural invariance; (ii) weak invariance (loadings); (iii) strong invariance (thresholds); (iv) strict invariance (uniquenesses); (v) invariance of CU (if the model with CU is retained); (vi) invariance of the latent variances/covariances; and (vii) invariance of latent mean factors. Model comparisons (i.e., the preceding model served as comparison) were based on changes (Δ) in CFIs, TLIs, and RMSEAs. A sequence was considered as invariant when ΔCFIs-ΔTLIs were ≤ -.01 and ΔRMSEAs ≤ -. 015 [32-33].

Construct validity. Construct validity was examined using a structural equation model (SEM) in which the IES-2 factor structure was estimated based on the optimal model retained in the first step. In this model, the latent factors of the IES-2 and the observed scores of body appreciation, body acceptance by others, self-esteem, and BMI were all correlated. Values ≤ .10 were considered weak, ~ .30 were considered moderate, and ~ .50 were considered strong correlations [34].

Results

Factor Structure

Goodness-of-fit indices of all measurement models are reported in Table 1. All CFA and B-CFA factor solutions with or without CU resulted in a poor (CFI and/or TLI < .90, RMSEA > .10) level of fit to the data. The ESEM solutions without CU resulted in a poor level of fit (TLI < .90, RMSEA > .10), whereas the ESEM-CU, B-ESEM and B-ESEM-CU solutions resulted in an acceptable level fit to the data for CFI (> .95) and TLI (> .90). However, RMSEA was only < .08 in the B-ESEM-CU solution. Additionally, the level of fit was substantially improved in the ESEM-CU (ΔCFI = +.032; ΔTLI = +.040; ΔRMSEA= -.022) or B-ESEM-CU models (ΔCFI = +.014; ΔTLI = +.016; ΔRMSEA= -.011) relative to their counterparts without CU. Likewise, the B-ESEM-CU (ΔCFI = +.010; ΔTLI = +.010; ΔRMSEA= -.007) solution resulted in an improved level of fit relative to its correlated factors counterpart (ESEM-CU). Thus, although results seem to favour the B-ESEM-CU solution, its parameters should be carefully examined and contrasted with the ESEM-CU [26]. The other CFA models were not contrasted given that they all presented unsatisfactory levels of fit to the data.

The detailed parameter estimates from the ESEM-CU and B-ESEM-CU solutions are reported in Tables 2 and 3, respectively. The ESEM-CU model had modest-to-substantial main factor loadings (λ =.220-.889; M_{λ} = .687) coupled with reasonably small, yet non-negligible, cross-loadings ($|\lambda|$ = .001-.345; $M_{|\lambda|}$ = .114). Additionally, estimates of composite reliability were adequate (ω = .767-.915) and latent factor correlations were all statistically significant with a small-to-moderate magnitude (r = -.198 to .445; $M_{|r|}$ = .261). The B-ESEM-CU solution resulted in a well-defined and reliable G-factor (|λ| =.060-.789, $M_{|\lambda|}$ = .438; ω = .916). However, some items (very small and non-significant) remain substantial in their S-factors (Items #1, 3, 9, 10, 16, and 17). Additional results revealed three well-defined S-factors: Eating for Physical Rather than Emotional Reasons (λ = .532-.743, M_{λ} = .634; ω = .888), Unconditional Permission to Eat (λ = .271-.743, M_{λ} = .574; ω = .788), and Body-Food Choice Congruence (λ = .482-.641, M_{λ} = .574; ω = .784). However, the Reliance on Hunger and Satiety Cues S-factor was less well-defined (λ = .048-.664, M_{λ} = .331; ω = .659), which could be attributed to three items (Items #6, 7, and 8) that mainly serve to define the G-factor. In sum, the present results support the B-ESEM-CU representation of the present data: this model provided improved and acceptable level of fit to the data compared to all models, the global estimate of intuitive eating is well-defined, and enough specificity remained to estimate S-factors from the IES-2. Therefore, this model was retained for subsequent analyses.

Gender Invariance

Goodness-of-fit statistics of the B-ESEM-CU model tested separately in women and men are reported in Table 1 (Models 5-1 and 5-2). Results showed that all fit indices were acceptable (CFI/TLI > .90 or > .95; RMSEA ≤ .08), except for the RMSEA in women (.088). Additionally, goodness-of-fit statistics from the measurement invariance tests across gender are reported in Table 1 (Models 5-3 to 5-9). Results supported the complete measurement invariance (i.e., loadings, thresholds, uniqunesses, CU, variance/covariance, and latent means) of the B-ESEM-CU model.

Construct Validity

The SEM including the IES-2 latent factors and the other measures provided an acceptable level of fit to the data, χ^2(199) = 727.461, CFI = .967, TLI = .941, RMSEA = .066

(90% CI = .061, .072), SRMR = .023. As reported in Table 4, the IES-2 G-factor was significantly positively correlated with self-esteem, body appreciation, body acceptance by others, and negatively correlated with BMI. Results for the S-factors were mostly similar, although some associations were weaker in strength than comparable associations with the G-factor, and some associations did not reach significance. Of note, the non-significant association were between: (a) the Unconditional Permission to Eat S-factor and self-esteem, body appreciation, and BMI; (b) Reliance on Hunger and Satiety Cues and body acceptance by others; and (c) Body-Food Choice Congruence and BMI.

Discussion

The present study integrated and built on recent perspectives concerning the modelling of hypothesised IES-2 scores [14]. More specifically, our results supported: (i) the superiority of ESEM over CFA representations of participants responses to the IES-2; (ii) the superiority of bifactor over higher-order representations of IES-2 scores, and; (iii) the importance of controlling for the methodological artefact introduced by negatively worded IES-2 items. In broad outline, these results support recent calls [14] for scholars to better understand the nature and conceptualisation of IES-2 scores, and may help explain equivocal results *vis-à-vis* the dimensionality of IES-2 scores [8-12].

The first important finding from the present study was that ESEM models generally provided improved representations of IES-2 dimensionality compared to CFA models. Indeed, it was notable that CFA models in the present study showed less-than-adequate fit, which supports the need to incorporate cross-loadings in IES-2 scores modelling. Indeed, this may explain why some studies have failed to show adequate fit of 4-factor CFA models of IES-2 scores: forcing cross-loadings to be zero is very likely to be an unrealistic representation of IES-2 score dimensionality [14]. Moreover, the IES-2 factors in the present study were well-defined in the ESEM-CU solutions and estimates of factor correlations between IES-2 subscales were generally smaller than those reported in the parent study [7]. Overall, these results suggest ESEM models offer a more accurate representation of IES-2 multidimensional space than CFA models.

The second important finding is that, although our results did not support the adequacy of higher-order CFA and bifactor-CFA models, they did show the superiority bifactor-ESEM representations of the data. In broad outline, these results are consistent with previous reports that higher-order models of IES-2 dimensionality often show poor fit [12], possibly because higher-order models rely on a restrictive proportionality constraint (i.e., the ratio of the variance attributed to the higher-order factor versus uniquely attributed to first-order factors is constant for all items associated with a single first order factor) and because higher-order factors do not explain additional variance besides that already explained by first-order factors [26]. In contrast, bifactor models allow for the estimation of overarching constructs (i.e., a G-factor) without relying on the proportionality constraint, and may thus provide a more realistic accounting of IES-2 dimensionality.

Therefore, the present results highlight the importance of considering the existence of an overarching intuitive eating construct in IES-2 models. Importantly, the G-factor of intuitive eating had adequate internal consistency and strong indices of construct validity. Despite the extraction of this G-factor, factor loadings on the S-factors indicated that they generally kept their specificity, although the Reliance on Hunger and Satiety Cues S-factor was less well-defined. In short, the B-ESEM framework provides an optimal way to disaggregate global levels of intuitive eating from the specific facets of intuitive eating. Statistically, this is important as it suggests that, rather than hypothesising a higher-order CFA model (with likely inflated estimates of factor correlations), it is more appropriate to model IES-2 scores as consisting of a G-factor (i.e., an overarching continuum of intuitive eating) and four S-factors, each specified as being orthogonal.

The third important point is that it is important to control for the methodological artefact introduced by the seven negatively-worded items in the IES-2. Although including positively and negatively worded items may bring benefits (e.g., minimising acquiescence), the latter also often leads to method effects that result in spurious covariances among items [15]. Our results suggest that removing this "noise" variance by modelling negatively worded items as correlated uniqueness among the indicators led to improved indices of model fit. Although previous studies have accounted for shared method variance of similarly worded items [7-9], we suggest that it may be more important to account for negatively worded items instead. Thus, scholars intending to use the IES-2 in the future are advised to control for wording effects and use the B-ESEM model for analyses. As documented here, this B-ESEM-CU model also achieved full invariance across gender, which indicates that it is a suitable model for both women and men.

Strengths and Limits

This study benefitted from a relatively large sample size of adults and the use of advanced statistical methods. On the other hand, the main limitation of the present study is the reliance on a non-representative online sample of adults, which means that our results need to replicated before being generalised across other English-speaking populations. Similarly, it would useful in future work to replicate our work in specific subpopulations in the United States (e.g., race, sexual orientation, income), especially as previous work has problematised the 4-factor CFA representation of IES-2 scores in some groups [10]. Differences in sampling between the present and parent study (e.g., an online versus college samples, respectively) may also limit direct comparisons of our findings. Likewise, caution should be exercised when interpreting our findings in relation to BMI, given that about 12% of participants had missing or improbable BMI values. Finally, it would also be useful to apply the analytic methods of the present study to other measures of intuitive eating [35].

Doing so may help scholars better understand the extent to which improvements can be made to the way in which intuitive eating is currently conceptualised, and whether existing conceptualisations are useful across national and cultural boundaries [11-12].

What Is Already Known on This Subject?

Previous studies examining the fit of the 4-factor model of IES-2 scores have returned equivocal results, which may reflect methodological limitations in the way IES-2 scores are modelled.

What This Study Adds

We show that the factor structure of the IES-2 may benefit from a bifactor-exploratory structural equation modelling framework that accounts for correlated uniqueness among negatively worded items.

Declaration

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Conflicts of interest/Competing interest: None.

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Table 1

Goodness-of-Fit Statistics for the Intuitive Eating Scale-2

Models	Nº	Description	Wχ²	df	CFI	TLI	RMSEA	RMSEA 90% CI LB	RMSEA 90% CI UB	SRMR	CM	ΔWχ²	df	p	ΔCFI	ΔTLI	ΔRMSEA
CFA	1-1	1-factor	6312.373*	230	.657	.590	.209	.205	.214	.154	-	-	-	-	-	-	-
	1-2	1-factor-CU	4997.000*	209	.706	.645	.195	.190	.200	.134	-	-	-	-	-	-	-
	1-3	4-factor	2141.399*	224	.882	.867	.119	.115	.124	.085	-	-	-	-	-	-	-
	1-4	4-factor-CU	1479.123*	203	.922	.902	.102	.097	.107	.070	-	-	-	-	-	-	-
	1-5	HO	2421.501*	226	.865	.849	.127	.122	.132	.099							
	1-6	HO-CU	1912.372*	205	.895	.871	.118	.113	.122	.087	-	-	-	-	-	-	-
B-CFA	2-1	4-factor	1868.235*	207	.898	.876	.115	.111	.120	.077	-	-	-	-	-	-	-
	2-2	4-factor-CU	1503.396*	186	.919	.890	.108	.103	.113	.068	-	-	-	-	-	-	-
ESEM	3-1	4-factor	1309.020*	167	.930	.894	.106	.101	.112	.037	-	-	-	-	-	-	-
	3-2	4-factor-CU	768.316*	146	.962	.934	.084	.078	.090	.026	-	-	-	-	-	-	-
B-ESEM	4-1	4-factor	834.483*	148	.958	.928	.088	.082	.094	.026	-	-	-	-	-	-	-
	4-2	4-factor-CU	586.326*	127	.972	.944	.077	.071	.084	.022	-	-	-	-	-	-	-
B-ESEM-CU: MI across gender	5-1	Men	309.819*	127	.972	.944	.069	.060	.079	.025	-	-	-	-	-	-	-
	5-2	Women	423.325*	127	.971	.942	.088	.079	.097	.027	-	-	-	-	-	-	-
	5-3	Configural invariance	734.199*	254	.971	.942	.079	.073	.086	.026	-	-	-	-	-	-	-
	5-4	Weak invariance	822.571*	344	.971	.958	.068	.062	.074	.035	5-3	236.975	90	<.001	.000	+.016	-.011
	5-5	Strong invariance	908.169*	408	.970	.963	.064	.058	.069	.036	5-4	145.946	64	<.001	-.001	+.005	-.004
	5-6	Strict invariance	993.423*	431	.966	.960	.066	.060	.071	.038	5-5	75.624	23	<.001	-.004	-.003	+.002
	5-7	CU invariance	998.866*	452	.967	.963	.063	.058	.069	.039	5-6	40.926	21	<.001	+.001	+.003	-.003
	5-8	Variance-Covariance invariance	797.963*	467	.980	.978	.048	.043	.054	.060	5-7	52.547	15	<.001	+.013	+.015	-.015
	5-9	Latent mean invariance	866.637*	472	.976	.975	.053	.047	.058	.061	5-8	35.072	5	<.001	-.004	-.003	+.005

Notes. Wχ² = robust weighed least square (WLSMV) chi-square; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval of the RMSEA; LB = lower bound; UB = upper bound; SRMR = standardised root mean square residual; CM = comparison model; CU = correlated uniqueness; HO = higher-order; CFA = confirmatory factor analyses; ESEM = exploratory structural equation modeling; B-CFA = bifactor CFA; B-ESEM = bifactor ESEM; MI = measurement invariance; Δ = change from the previous model; ΔWχ² = WLSMV chi square difference test (calculated with the Mplus DIFFTEST function). The fact that WLSMV χ² values are not exact, but "estimated" as the closest integer necessary to obtain a correct *p*-value explains the fact that the χ² and the resulting CFI values can be non-monotonic with model complexity. * $p \leq .01$

Table 2

Standardized Parameters Estimates from the Exploratory Structural Equation Model with Correlated Uniqueness of the Intuitive Eating Scale-2

Items	EPR (λ)	UPE (λ)	RHSC (λ)	BFC (λ)	δ
1	*-.017*	**.525**	*.030*	-.345	.529
3	-.094	**.758**	-.113	.234	.466
4	.220	**.220**	.159	-.125	.842
9	*.016*	**.462**	*-.004*	-.297	.648
16	-.077	**.772**	.103	.194	.365
17	.159	**.585**	.191	-.199	.495
2	**.624**	*-.035*	*.034*	.086	.548
5	**.707**	-.127	*.032*	-.078	.478
10	**.746**	*.032*	-.109	*-.005*	.509
11	**.731**	*-.018*	*-.037*	*.035*	.473
12	**.735**	.219	-.162	.242	.433
13	**.714**	-.097	.155	*-.025*	.367
14	**.889**	-.081	.091	-.174	.181
15	**.817**	.107	-.064	.172	.294
6	*.026*	*.038*	**.689**	.175	.377
7	-.185	*.001*	**.758**	.146	.426
8	*-.035*	*.027*	**.824**	*.048*	.305
21	.089	.133	**.539**	*.046*	.592
22	.092	*.036*	**.700**	*-.027*	.448
23	*.023*	*.033*	**.884**	*-.047*	.215
18	.120	-.106	.152	**.590**	.465
19	.111	-.118	.176	**.788**	.127
20	.136	-.081	.162	**.737**	.227
ω	.915	.767	.891	.845	
EPR	-				
UPE	-.081	-			
RHSC	.445	.216	-		
BFC	.256	-.198	.372	-	

Notes. EPR = Eating for Physical Rather than Emotional Reasons; λ = factor loadings; UPE = Unconditional Permission to Eat; RHSC = Reliance on Hunger and Satiety Cues; BFC = Body-Food Choice Congruence; δ = Uniqueness; ω = McDonald's omega. Non-significant loadings and correlations are underlined and italicized.

Table 3
Standardized Parameters Estimates from the Bifactor Exploratory Structural Equation Model with Correlated Uniqueness of the Intuitive Eating Scale-2

Items	EPR (λ) S-factor	UPE (λ) S-factor	RHSC (λ) S-factor	BFC (λ) S-factor	G-factor	δ
1	-.066	**.584**	*.016*	-.352	**-.107**	.518
3	-.111	**.709**	.191	.213	***-.060***	.399
4	.124	**.271**	-.095	-.192	**.281**	.787
9	*-.018*	**.502**	*.061*	-.283	**-.124**	.648
16	-.148	**.743**	.078	.089	**.209**	.368
17	.059	**.634**	*.043*	-.254	**.227**	.476
2	**.532**	-.072	*.038*	.076	**.395**	.548
5	**.604**	-.127	*-.019*	-.063	**.366**	.481
10	**.646**	*-.016*	*.025*	*.016*	**.274**	.506
11	**.631**	-.063	*.037*	.044	**.352**	.471
12	**.616**	.118	*.033*	.211	**.353**	.436
13	**.591**	-.088	*-.015*	*-.038*	**.527**	.364
14	**.743**	-.055	-.080	-.170	**.503**	.158
15	**.705**	*.026*	.099	.163	**.429**	.282
6	*-.025*	.097	**.196**	.068	**.758**	.372
7	-.250	.090	***.048***	*-.014*	**.770**	.335
8	-.081	.123	**.243**	-.061	**.789**	.293
21	.068	.175	**.354**	*.029*	**.513**	.576
22	.122	.084	**.664**	*.016*	**.529**	.257
23	*.005*	.133	**.480**	-.066	**.736**	.207
18	.084	-.185	*.002*	**.482**	**.512**	.464
19	.066	-.224	*-.020*	**.641**	**.640**	.124
20	.089	-.184	*-.003*	**.600**	**.609**	.228
ω	.888	.788	.659	.784	.916	

Notes. EPR = Eating for Physical Rather than Emotional Reasons; λ = factor loadings; UPE = Unconditional Permission to Eat; RHSC = Reliance on Hunger and Satiety Cues; BFC = Body-Food Choice Congruence; S-factor = specific factor; G-factor = global factor; δ = Uniqueness; ω = McDonald's omega. Non-significant loadings and correlations are underlined and italicized.

Table 4
Construct Validity Analyses of the Intuitive Eating Scale-2

	Intuitive Eating Scale-2				
	EPR S-factor	UPE S-factor	RHSC S-factor	BFC S-factor	G-Factor
Self-esteem	.191***	.027	-.162***	.270***	.394***
Body appreciation	.140***	.017	-.102*	.321***	.651***
Body acceptance by others	.216***	.100**	.030	.201***	.446***
Body mass index	-.110**	-.053	.108*	-.084	-.212***

Notes. EPR = Eating for Physical Rather than Emotional Reasons; UPE = Unconditional Permission to Eat; RHSC = Reliance on Hunger and Satiety Cues; BFC = Body-Food Choice Congruence; S-factor = specific factor; G-factor = global factor. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.