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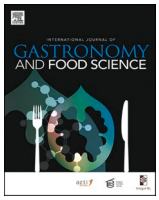

Analysis of heterogeneity in consumer attitudes based on the Intuitive Eating Scale-2

Zoltán Szakály [a], Andrea Bauerné Gáthy [b,*], Enikő Kontor [a], Péter Balogh [c,d], Péter Czine [c]

[a] Institute of Marketing and Commerce, Faculty of Economics and Business, University of Debrecen, Böszörményi str. 138, Debrecen, H-4032, Hungary
[b] Institute of Economics, Faculty of Economics and Business, University of Debrecen, Böszörményi str. 138, Debrecen, H-4032, Hungary
[c] Institute of Statistics and Methodology, Faculty of Economics and Business, University of Debrecen, Böszörményi str. 138, Debrecen, H-4032, Hungary
[d] HUN-REN-DE High-Tech Technologies for Sustainable Management Research Group, Böszörményi str. 138, Debrecen, H-4032, Hungary

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ABSTRACT

Intuitive eating, as a special form of conscious eating based on internal instincts, has been the subject of several studies so far, and there is ongoing scientific interest in the topic. At the same time, few studies have been conducted on a Hungarian sample. The aim of this study is to verify the structural validity of the Intuitive Eating Scale 2, based on a Hungarian sample of 990 participants, representative in terms of gender, age, and settlement. Another goal is to explore whether clusters that characterize the Hungarian population can be developed with IES2. To examine the objectives, confirmatory factor analysis (CFA) and latent profile analysis (LPA) were conducted. According to our results, with respect to Hungary, each of four subscales can be applied with adequate reliability. Well-separated clusters emerged, including the following eating habits: 'Inner Cue Ignorers', 'Emotional Eaters', 'Intuitive Eaters' and 'Disinterested Eaters'.

1. Introduction

During the study of eating behaviours, adaptive eating behaviour, i.e., the study of positive eating behaviour, was a minor topic in the literature until the beginning of the 2000s, with studies focusing exclusively on clinical eating disorders. However, researchers (including Tribole and Resch, 1995) argued that adaptive eating is more than the absence of cues to eating disorders, as individuals who eat adaptively use internal, physiological hunger and satiety cues to determine when and how much to eat. Individuals with eating disorders are influenced by various external or emotional signs in their eating behaviour, but the absence of eating disorder symptoms does not necessarily mean that the person eats adaptively (e.g., eats regularly without feeling hungry). People without an eating disorder may also be influenced by external or emotional cues.

Tylka and Kroon Van Diest (2013) define intuitive eating as an adaptive form of eating where there is a strong link with internal physiological signs of hunger and satiety. Intuitive eaters neither go on a diet, nor categorize food as 'good' or 'bad'; they choose food, the time of eating and the amount of food they eat in such a way that it supports the functioning of their body (Tylka and Kroon van Diest, 2013). Tribole and Resch (2012) define intuitive eating as an eating pattern based on an awareness of and a response to internal cues that can support long-term health objectives.

Tribole and Resch (2003) defined ten principles when creating the construct of intuitive eating. For better understanding of the construct, Tylka (2006) developed the IES scale, which is appropriate for measuring the degree of adaptive eating. The 21-item IES scale grouped Tribole and Resch's principles into three subscales. The first dimension is Unconditional Permission to Eat (UPE), which means that the individual allows himself/herself to eat foods he/she wants without guilt or judgment and in the absence of external dietary rules. In the second dimension - Eating for Physical, not Emotional Reasons (EPR), individuals eat because they are physically hungry, not to cope with emotional distress, loneliness, or boredom. Finally, Reliance on Hunger and Satiation Cues (RHSC) refers to individuals' reliance on internal hunger and satiety cues for their eating behaviours. Later, Tylka and Kroon Van Diest (2013) developed the 23-item IES2 model and added another subscale, Body-Food Choice Congruence, which refers to the choice of foods that are satisfying and nutritious and support health and body function.

Studies confirmed the validity of the constructs and proved that the

* Corresponding author.
E-mail addresses: szakaly.zoltan@econ.unideb.hu (Z. Szakály), bauerne.gathy.andrea@econ.unideb.hu (A. Bauerné Gáthy), kontor.eniko@econ.unideb.hu (E. Kontor), balogh.peter@econ.unideb.hu (P. Balogh), czine.peter@econ.unideb.hu (P. Czine).

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scores of IES and IES2 scales are negatively related to the symptoms of eating disorders (such as binge eating), body shame, the internalization of media appearance ideals, and self-objectivity (Tylka, 2006; Tylka and Wilcox, 2006; Denny et al., 2013; Tylka and Kroon Van Diest, 2013; Carbonneau et al., 2016; van Dyck et al., 2016; Caferoglu and Toklu, 2022), the body mass index (Augustus-Horvath and Tylka, 2011; Kroon van Diest and Tylka, 2010; Tylka and Kroon Van Diest, 2013; Camilleri et al., 2014; Khalsa et al., 2019; da Silva et al., 2019; Román et al., 2021), and emotional uncontrolled eating and depressive symptoms (Camilleri et al., 2015). At the same time, the scores are positively related to body evaluation (Augustus-Horvath and Tylka, 2011; Kroon van Diest and Tylka, 2010; Carbonneau et al., 2016), optimism, general satisfaction with life and self-esteem, and self-efficacy (Tylka, 2006; Tylka and Wilcox, 2006; Ruzanska and Warschburger, 2017). Intuitive eating is associated with lower rigid eating control and higher psychological adaptation (Tylka et al., 2015). Slimming diets and unhealthy weight control occur to a lesser extent among intuitive eaters (Christoph et al., 2021). These results are supported by a systematic literature review conducted by Bruce and Ricciardelli (2021), who found, among other things, that high levels of intuitive eating are associated with eating attitudes, body satisfaction, body-related thoughts in general and emotional functioning.

Further studies concluded that the construct might be suitable for understanding and exploring cultural differences and nuances (Saunders et al., 2018; Strodl et al., 2020).

Overall, the results supported an overall positive relation between intuitive eating and more positive patterns of eating behaviour, and highlighted the link between intuitive eating and mechanisms relevant to eating, the possible buffering effect of intuitive eating in the treatment of binge eating and eating-related problems in general (Duarte et al., 2016).

Most of the surveys conducted so far have studied the relevance of the IES and IES2 scales within one target group, and few surveys have been conducted on an entire country. The first surveys were carried out among women in higher education (Tylka, 2006; Tylka and Wilcox, 2006), and later focused more on students participating in higher education (Román et al., 2021; Saunders et al., 2018; van Dyck et al., 2016; Bas et al., 2017), or were limited to surveys of the younger generation (Strodl et al., 2020) or continued to focus on women (Duarte et al., 2016; Augustus-Horvath and Tylka, 2011). Special groups were also assessed, including pregnant women over 18 in Texas (Daundasekara et al., 2017), Hispanic American young adults (Saunders et al., 2018), and young people aged 18–30 in 8 countries (Australia, Belgium, Canada, China, Italy, Japan, Spain, USA), a survey involving 6272 people (Strodl et al., 2020).

Few surveys have been conducted on a national basis, and there are even fewer surveys involving a high number of participants. A large-scale survey of 1405 women and 1195 men was conducted in the USA by Tylka and Kroon Van Diest (2013). Differences regarding nationality specifics within the country were analysed (van Dyck et al., 2016) in Germany, and differences and identities were searched for in a survey conducted in 8 countries (Strodl et al., 2020). Based on the results of a survey conducted with a smaller sample in France (335 women, 297 men), the aim was to adapt and evaluate the IES2 to French conditions. The survey found that the French IES2 can be considered a useful tool for assessing intuitive eating cues in adults (Camilleri et al., 2015). In Romania, a study (491 women, 339 men) was conducted with the Romanian translation of the IES2 scale and, based on the results, the authors questioned how applicable the intuitive eating construct is to nations undergoing nutritional transition (Vintilă et al., 2020). In Quebec, Canada, the French-Canadian adult population was studied (334 women, 75 men), the validity of the instrument was proven, and significant correlations were revealed in relation to intuitive and psychological eating (Carbonneau et al., 2016). The Turkish adaptation of the IES2 was studied on a sample of adults in Turkey (271 people), and based on their results, it was found to be a reliable measurement tool for examining intuitive eating (Akırmak et al., 2020). In Brazil (N = 288 people), the Portuguese adaptation of the IES2 scale was assessed and found to be an appropriate tool (da Silva et al., 2019). A survey (N = 532 people) was conducted in Germany, during which the German version of the IES was assessed on adults aged between 18 and 91. Anastasiades et al. (2022) in two studies (N = 626, N = 793) and Giannakou et al. (2022) (N = 379) in another study, all conducted among Cypriot adults tested the Greek-language adaptation of the IES2 and found the construct to be an appropriate measurement instrument, albeit with a different factor structure. Anastasiades et al. (2022) highlight the necessity of considering cultural differences in the application of the model. Román et al. (2021) conducted a confirmatory factor analysis based on a survey of a sample of 732 Hungarian university students, based on the results of which the IES2 can be applied with adequate reliability in each category of students participating in higher education in our country. There has been no survey based on a nationally representative sample for Hungary. Therefore, the aim of this study is to verify the structural validity of the Intuitive Eating Scale 2 developed by Tylka and Kroon Van Diest (2013) based on such a sample, i.e., to establish that the original four subscales can be used with adequate reliability. Another goal is to explore whether clusters that characterize the Hungarian population can be developed by using the measurement tool of the IES2 scale.

2. Materials and methods

2.1. Study design and participant characteristics

The survey was conducted in November 2020 with 1000 participants. The sample size of 1000 is consistent with the typical number of items in Hungary. The data were collected via a standard questionnaire and face-to-face interviews conducted in the respondents' homes. In order to ensure representativeness, the sampling process took into account both regions and settlement types. This resulted in a structure that perfectly matched the quota set in advance by the Hungarian National Statistical Office (quota sampling). The sampling process was designed to ensure that each element of the population had an equal chance of being included in the sample. In practice, this principle was applied to the selection of individuals residing in each settlement. In all cases, the sampling method employed was random walking, which ensured complete randomness in the selection of appropriate respondents. That is to say, each individual was afforded an equal chance of being selected. The method entailed the assignment of a randomly selected starting address to each interviewer within the settlement. The interviewers commenced the interview at the third house on the same side of the street, in ascending order of house numbers, from the initial address. Upon completion of the interview at the third house, they proceeded to the next third house. The sampling design was also devised to ensure that the interviewer would not be uncertain about the location if they were conducting an interview in a single-family neighbourhood or in a neighbourhood comprising of multi-storey houses. The interviews lasted approximately 20 min. The refusal rate was 30%.

The interviewers selected the appropriate individual to be interviewed from the households visited using a method known as the birthday key. The method entails the interviewer inquiring as to the number of individuals aged 18 and above residing in the household. In the second step, the consumer whose date of birth (birthday) was the closest to the interview date (in simple terms, the one with the most recent birthday) was selected from the individuals of the appropriate age group. This method was employed to guarantee complete randomness in the second step. Following the application of weighting, the sample is deemed to be representative of the population with respect to gender, age, and place of residence (Table 1).

2.2. Statistical analysis

2.2.1. The questionnaire and translation process

A focused part in the questionnaire included the IES2 model with twenty-three statements developed by Tylka and Kroon Van Diest (2013) including four subscales: Unconditional Permission to Eat (UPE), Eating for Physical Rather Than Emotional Reasons (EPR), Reliance on Hunger and Satiety Cues (RHSC), Body–Food Choice Congruence (BFCC). In addition to the 23 statements, the interviewers also recorded the respondents' socio-demographic data. The respondents completed the questionnaire in Hungarian.

The recommendations of the International Testing Committee (Gregoire, 2018) were followed in the protocol for cultural adaptation. The translation of the scale into English was the responsibility of two independent experts, who carried out the translation process independently. After comparing the scale translated by the two experts, the authors of the article agreed on the text of the first Hungarian version of the questionnaire, which was then translated back into English by a professional bilingual translator. Together, the authors and the bilingual translator agreed that the translated questionnaire was identical to the original Tylka IES2 questionnaire (Tylka and Kroon van Diest, 2013). After that, the Hungarian version of the scales were revised on the basis of the differences found in the English version, and the final version of the scales was prepared.

Problems that had previously been identified when translating the IES2 scale into a foreign language, such as different dialects (e.g., Carbonneau et al., 2016), were not reported here as they are not relevant in Hungary.

At the time of conducting the survey, the authors were not aware of another IES2 survey in Hungarian (Román et al., 2021), so the two Hungarian translations could only be compared retrospectively, and no significant differences between the two versions could be detected. The final items from our translation of the IES2 into Hungarian are detailed in the Appendix.

2.2.2. Confirmatory factor analysis (CFA)

The aim of a CFA is to assess if all items load adequately on the expected factor. Regarding the statistical analyses used, firstly, the confirmatory factor analysis (CFA) with JASP 0.16.4.0 was conducted to check internal reliability via Cronbach's alpha (α) and Composite Reliability, while convergent validity and discriminant validity was checked via AVE to optimize the measurement model. The following statistical indices were calculated: $\chi 2$, $\chi 2$/df, root mean square error of approximation (RMSEA <0.08), the Comparative Fit Index (CFI), the Incremental Fit Index (IFI), the Goodness of Fit Index (GFI), and the Tucker-Lewis Index (TLI). Convergent validity was assessed through average variance extracted (AVE) and composite reliability (CR).

As the survey responses are self-reported, common method bias (CMB) has been assessed to determine the robustness of the data (Podsakoff et al., 2003). Harman's (1967) one-factor test was used to evaluate CMB. According to the results, a single unrotated component can only explain 27.68 % of the variance, which means it did not reach 50%. As a result, these analyses show no CMB problems in the collected data.

2.2.3. Latent profile analysis (LPA)

With twenty-three statements based on the work of Tylka and Kroon Van Diest (2013), we performed a latent profile analysis (LPA) with the aim of delimiting the different clusters of the respondents. Accordingly, we applied the tidyLPA package of the R program. The LPA analysis was conducted in a structure following the work of Dana et al. (2021), therefore the first step was the standardization of the variables used for the analysis (23 evaluation statements) (z-scores were calculated, with Mean = 0 and Standard deviation = 1 as the mean value and dispersion index parameters). To find the optimal number of clusters, we tested several class number versions, and among the potential model types, four approaches (1: Constrained variance, fixed covariance (EEI); 2: Constrained variance, constrained covariance (EEE); 3: Freed variance, fixed covariance (VVI); and 4: Freed variance, freed covariance (VVV)) were included (Wardenaar, 2021). During the comparison of the models, we evaluated them on the basis of various information criteria (1: Akaike Information Criteria (AIC), 2: Bayesian Information Criteria (BIC), 3: Sample-size Adjusted BIC (SABIC)), and also the size of the classes (>5 %), and we considered the ease of interpretation of the results (Spurk et al., 2020; Dana et al., 2021; Coakley et al., 2022). Analysis of variance (ANOVA) with Bonferonni's post-hoc test and Pearson's chi-square test were used to examine the differences between the groups according to certain variables, with a significance level of $\alpha = 5\%$.

3. Results

3.1. Descriptive statistics

The descriptive statistics of the evaluation statements are included in Table 2. It is worth mentioning that the 23 statements were rated on a scale of 1–5, with categories meaning: 1: "strongly disagree", 2:

Table 1
Characteristics of the respondents.

Characteristic	Sample (n = 1000)	Hungarian population
Gender (%)		
Female	52.9	52.1
Male	47.1	47.9
Age group category (%)		
18–39	33.0	32.8
40–59	34.8	35.0
60–	32.2	32.2
Settlement type (%)		
Larger city	27.8	29.6
Other city or town	53.3	52.5
Capital	18.9	17.9
Region (%)		
Western Transdanubia	10.2	10.2
Central Transdanubia	10.9	10.9
Southern Transdanubia	9.1	9.0
Northern Great Plain	14.6	14.8
Central Hungary	31.0	31.2
Northern Hungary	11.4	11.5
Southern Great Plain	12.8	12.6
Highest educational attainment (%)		
8th grade elementary school at most	11.8	
Vocational or technical school	36.4	
Matura examination	35.8	
Higher education degree	16.0	
Subjective income (%)		
Can live well from it, and can also save money	9.9	
Enough to live on, but can barely save any money	37.9	
Can make ends meet, but cannot save money	44.0	
Sometimes find(s) it difficult to make ends meet	4.7	
Regularly find(s) it difficult to make ends meet	0.5	
Does not know/Has not answered	3.0	
Marital status (%)		
Married	43.3	
Lives with a registered partner	15.8	
Single	19.3	
Widow(er)	8.7	
Divorced	11.9	
Separated	1.0	

Table 2
Descriptive statistics of the statements.

	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	S.d.
Unconditional Permission to Eat (UPE)							
1. I try to avoid certain foods high in fat, carbohydrates, or calories.	23.03	10.10	27.58	19.49	19.80	3.03	1.42
3. If I am craving a certain food, I allow myself to have it.	6.06	8.28	25.46	27.17	33.03	3.73	1.18
4. I get mad at myself for eating something unhealthy.	40.71	18.59	20.60	14.14	5.96	2.26	1.28
9. I have forbidden foods that I don't allow myself to eat.	37.37	15.05	17.27	14.65	15.66	2.56	1.49
16. I allow myself to eat what food I desire at the moment.	4.65	7.68	27.37	27.78	32.52	3.76	1.13
17. I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat.	8.28	7.27	18.69	18.99	46.77	3.89	1.30
Eating for Physical Rather Than Emotional Reasons (EPR)							
2. I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.	48.89	17.27	18.08	10.40	5.36	2.06	1.25
5. I find myself eating when I am lonely, even when I'm not physically hungry.	52.63	16.16	16.06	10.61	4.54	1.98	1.23
10. I use food to help me soothe my negative emotions.	49.09	14.24	19.19	12.33	5.15	2.10	1.28
11. I find myself eating when I am stressed out, even when I'm not physically hungry.	49.19	17.68	16.16	11.52	5.45	2.06	1.27
12. I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.	6.16	7.68	17.27	25.35	43.54	3.92	1.21
13. When I am bored, I do NOT eat just for something to do.	10.40	8.99	17.78	18.69	44.14	3.77	1.37
14. When I am lonely, I do NOT turn to food for comfort.	10.30	7.98	15.25	21.52	44.95	3.83	1.35
15. I find other ways to cope with stress and anxiety than by eating.	2.73	5.56	18.58	23.23	49.90	4.12	1.07
Reliance on Hunger and Satiety Cues (RHSC)							
6. I trust my body to tell me when to eat.	4.75	6.06	18.08	31.51	39.60	3.95	1.12
7. I trust my body to tell me what to eat.	9.19	9.39	22.73	28.79	29.90	3.61	1.26
8. I trust my body to tell me how much to eat.	4.44	6.57	21.62	29.29	38.08	3.90	1.12
21. I rely on my hunger signals to tell me when to eat.	2.52	5.76	18.08	30.51	43.13	4.06	1.03
22. I rely on my fullness (satiety) signals to tell me when to stop eating.	2.93	6.77	16.97	31.31	42.02	4.03	1.06
23. I trust my body to tell me when to stop eating.	3.33	6.67	18.59	32.02	39.39	3.97	1.07
Body–Food Choice Congruence (BFCC)							
18. Most of the time, I desire to eat nutritious foods.	3.23	7.48	30.81	26.16	32.32	3.77	1.08
19. I mostly eat foods that make my body perform efficiently (well).	4.34	7.78	28.99	32.73	26.16	3.69	1.08
20. I mostly eat foods that give my body energy and stamina.	2.53	5.45	25.66	34.24	32.12	3.88	1.00

"disagree", 3: "neutral", 4: "agree", 5: "strongly agree". The percentages shown in Table 2 represent the percentage ratios of the categories listed for the statements examined.

It is necessary to mention that due to incomplete responses, our sample was reduced by ten people. Consequently, we worked with n = 990 samples during the further analyses.

Based on the results of Table 2, the highest agreement among the respondents is for Statement 15 'I find other ways to cope with stress and anxiety than eating.' (Mean = 4.12, S.d. = 1.07). The weakest agreement can be observed for Statement 5 'I find myself eating when I am lonely, even when I'm not physically hungry.' (Mean = 1.98, S.d. = 1.23).

3.2. Results of the confirmatory factor analysis (CFA), measurement model assessment

Construct validity was measured through a confirmatory factor analysis (CFA), and the measurement model suggested a good fit (χ^2 = 4297.531, df = 224, $\chi 2/df$ = 19.185, 0.000 < 0.001; root mean square error of approximation (RMSEA) = 0.078 < 0.08, Comparative Fit Index (CFI) = 0.947 > 0.90; Incremental Fit Index (IFI) = 0.947 > 0.90; Goodness of Fit Index (GFI) = 0.959 > 0.90; Tucker-Lewis Index (TLI) = 0.94 > 0.90 (Hu and Bentler, 1999). Convergent validity was assessed through average variance extracted (AVE) and composite reliability

(CR). Table 2.1 demonstrates that the values of AVE and CR exceed the cut-off value of 0.50 and 0.70, respectively (Fornell and Larcker, 1981), which indicated satisfactory convergent validity of measurements. In addition, Cronbach's alpha (α) values for each construct are also above the benchmark point of 0.70 (Table 3), which indicates acceptable construct reliability (Bagozzi and Yi, 2012). Next, the discriminant validity was attained as the pairwise inter-construct correlations were less than the square root of the AVE values (Table 4)

Table 4
Correlations table and discriminant validity.

Latent Variables	UPE	EPR	RHSC	BFCC
UPE	**0.717**			
EPR	−0.284	**0.773**		
RHSC	−0.285	0.368	**0.822**	
BFCC	−0.202	0.302	0.441	**0.764**

Note: The values in bold indicate the square root of AVE of the construct.

3.3. Results of the latent profile analysis (LPA)

3.3.1. Fit statistics

To select the optimal number of clusters, we performed the analysis of the fit indicators described in section 3.2 as the first step in the latent profile analysis. Based on Table 5, it can be seen that the value of the log-likelihood (in absolute value), AIC, BIC and SABIC indicators decreased, while the entropy value (which shows what percentage of the sample was correctly classified into one of the groups) showed an increase up to the five-class solution, which indicates a better fit of the model. However, since two clusters did not show interpretable differences in the case of the five-class classification, we decided to select and analyse the *four-class version.*

3.3.2. Analysis of the results of the four-class model

Table 6 contains the mean, standard deviation, and z-score values of the four clusters delimited through the LPA analysis for the examined statements.

The first cluster differs from the other clusters particularly in the third (RHSC) and fourth (BFCC) subscales. It indicates that this cluster does not rely on internal signals, does not believe that the body indicates when and how much food it needs and does not consider the effect of food on the body.

The second cluster can be characterized as having forbidden foods for individuals who feel guilty when eating them. In addition, the symptoms of emotional and stress eating are also clear in this cluster.

The third cluster is the closest to eating behaviour defined by intuitive eating. It does not limit the range of foods, but it relies on the body's signals about the foods it eats. It does not use eating as a kind of substitute to relieve emotional and stress problems, it feels the capability to cope with these problems without eating. When choosing foods, it considers their positive effects on the body.

In the case of the fourth cluster, there is no character jump for any subscale. Cluster members follow intuitive eating patterns on a mental level, but do not consciously pay attention to their body's signals.

For the questions of the first subscale 'Unconditional Permission to Eat', although we identified significant differences between the clusters, the post-hoc analysis showed no difference in the case of some statements, for example, between clusters one and three, as well as clusters two and four. The second and fourth clusters typically gave higher average values regarding conscious eating, i.e. they try to avoid certain foods high in fat, carbohydrates, or calories, and they have forbidden foods that they do not allow themselves to eat. While clusters two and four prefer to listen to their internal signals when making their eating decisions, in the case of these questions, similarly to each other, they gave significantly high average values for the following statements: 'If I am craving a certain food, I allow myself to have it' (C2 – 3.76; C4 – 3.59) and a significantly lower average value was assigned to the statement 'I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat' (C2 – 3.75; C4 – 3.65). Within the UPE subscale, only the statement 'I get mad at myself for eating something unhealthy' does not follow the above pattern (C1 – 2.39; C4 – 2.26), where clusters one and four gave similar average values.

Regarding the second subscale, 'Eating for Physical Rather Than Emotional Reasons', it can be concluded that, taken as a whole, the four clusters show a significant difference in the evaluation of each statement. Mostly participants in the second cluster feel that they eat for emotional reasons - while in contrast, the third cluster shows the lowest average value for these statements (C2 –3.51 vs. C3 – 1.23) - or out of boredom (C2 – 3.41 vs. C3 – 1.15), even if they are not physically hungry (C2 – 3.60 vs. C3 – 1.21). Comparing the clusters, the third cluster shows the biggest difference in this factor; its members gave higher values in the statements where they declared that they do not turn to eating to cope with negative emotions, boredom, or with solitude (the average was between 4.67 and 4.70). In these statements: 'I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort', 'When I am bored, I do NOT eat just for something to do', 'When I am lonely, I do NOT turn to food for comfort', the first, second and fourth clusters were evaluated in a similar way, giving evaluations close to the average, between 3.17 and 3.41.

In the case of the third subscale, 'Reliance on Hunger and Satiety Cues', where it was assessed how much they rely on their body or hunger cues, there was a significant difference between the clusters' evaluations for each statement. Accordingly, the second and fourth clusters showed similar values. Both clusters gave values around 3.8 (C2 and C4) regarding the extent to which an individual relies on body or satiety signals to decide when, what and how much to eat. For this subscale, the single cluster showed the lowest average values (C1 – 2.05-2.62), while the third cluster had the highest (C3 – 4.33-4.85). The most significant differences can be seen in the statements in which they stated how much they rely on the feeling of fullness: 'I rely on my fullness (satiety) signals to tell me when to stop eating', and on the signs of satiety: 'I trust my body to tell me when to stop eating', in judging when they stop eating (these mean values are 2.12 and 2.05 for cluster C1, respectively, while for cluster C3 they are 4.85 and 4.81).

Table 3
Measurement items with factor loading, composite reliability, and average variance extracted.

Constructs	Items	Factor loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's alpha (α)
UPE	UPE1	0.609	0.514	0.862	0.784
	UPE2	0.809			
	UPE3	0.794			
	UPE4	0.619			
	UPE5	0.736			
	UPE6	0.708			
EPR	EPR1	0.809	0.597	0.922	0.847
	EPR2	0.834			
	EPR3	0.788			
	EPR4	0.855			
	EPR5	0.698			
	EPR6	0.689			
	EPR7	0.716			
	EPR8	0.776			
RHSC	RHSC1	0.746	0.676	0.926	0.872
	RHSC2	0.706			
	RHSC3	0.805			
	RHSC4	0.853			
	RHSC5	0.908			
	RHSC6	0.896			
BFCC	BFCC1	0.712	0.584	0.807	0.743
	BFCC2	0.707			
	BFCC3	0.863			

Table 5
Latent profile analysis fit statistics.

	Log-likelihood	AIC	BIC	SABIC	Entropy	Minimum class size (%)
two-cluster solution	−30273.38	60686.76	61029.59	60807.27	0.92	46.36
three-cluster solution	−29442.65	59073.29	59533.68	59235.13	0.93	15.45
four-cluster solution	*−28996.21*	*58228.41*	*58806.34*	*58431.57*	*0.91*	*11.01*
five-cluster solution	−28679.24	57642.49	58337.96	57886.96	0.92	12.63

Note: Using a Constrained variance, fixed covariance (EEI) approach.

Table 6
Mean, standard deviation and z-scores for the statements in the model.

Statement	Full sample (n = 990)	Cluster 1 (n = 109)		Cluster 2 (n = 271)		Cluster 3 (n = 332)		Cluster 4 (n = 278)		F- value
	Mean (S.d.)	Mean (S.d.)	Z-score	Mean (S.d.)	Z-score	Mean (S.d.)	Z-score	Mean (S.d.)	Z-score	
Unconditional Permission to Eat										
1. I try to avoid certain foods high in fat, carbohydrates, or calories.	3.03 (1.42)	2.74 (1.25)	−0.20[a]	3.39 (1.22)	0.25[b]	2.65 (1.56)	−0.27[a]	3.25 (1.35)	0.15[b]	18.40[a]
3. If I am craving a certain food, I allow myself to have it.	3.73 (1.18)	2.74 (1.30)	−0.84	3.76 (0.94)	0.03[a]	4.14 (1.18)	0.35	3.59 (1.08)	−0.12[a]	45.82[a]
4. I get mad at myself for eating something unhealthy.	2.26 (1.28)	2.39 (1.21)	0.10[a]	3.14 (1.18)	0.69	1.50 (0.94)	−0.59	2.26 (1.21)	0.00[a]	108.13[a]
9. I have forbidden foods that I don't allow myself to eat.	2.56 (1.49)	2.38 (1.33)	−0.12[a,b]	3.15 (1.23)	0.40	2.14 (1.60)	−0.29[a]	2.57 (1.47)	0.00[b]	25.43[a]
16. I allow myself to eat what food I desire at the moment.	3.76 (1.13)	2.86 (1.17)	−0.80	3.82 (0.94)	0.06[a]	4.14 (1.12)	0.34	3.59 (1.06)	−0.15[a]	42.72[a]
17. I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat.	3.89 (1.30)	2.93 (1.35)	−0.74	3.75 (1.07)	−0.11[a]	4.52 (1.07)	0.48	3.65 (1.38)	−0.18[a]	58.88*
Eating for Physical Rather Than Emotional Reasons										
2. I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.	2.06 (1.25)	2.19 (1.18)	0.11	3.51 (0.93)	1.15	1.23 (0.61)	−0.66	1.59 (0.82)	−0.38	407.70[a]
5. I find myself eating when I am lonely, even when I'm not physically hungry.	1.98 (1.23)	2.20 (1.16)	0.18	3.41 (1.02)	1.16	1.15 (0.47)	−0.67	1.50 (0.74)	−0.39	428.61[a]
10. I use food to help me soothe my negative emotions.	2.10 (1.28)	2.18 (1.09)	0.06	3.49 (0.97)	1.09	1.32 (0.81)	−0.61	1.65 (0.91)	−0.35	310.42[a]
11. I find myself eating when I am stressed out, even when I'm not physically hungry.	2.06 (1.27)	2.19 (1.05)	0.10	3.60 (0.87)	1.21	1.21 (0.71)	−0.67	1.53 (0.69)	−0.42	508.36[a]
12. I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.	3.92 (1.21)	3.17 (1.24)	−0.63[a]	3.41 (1.00)	−0.43[a]	4.67 (0.89)	0.62	3.83 (1.25)	−0.07	94.38[a]
13. When I am bored, I do NOT eat just for something to do.	3.77 (1.37)	3.22 (1.31)	−0.40[a]	3.39 (1.02)	−0.28[a]	4.68 (0.93)	0.67	3.27 (1.56)	−0.37[a]	96.49[a]
14. When I am lonely, I do NOT turn to food for comfort.	3.83 (1.35)	3.29 (1.35)	−0.40[a]	3.39 (1.07)	−0.32[a]	4.70 (0.90)	0.65	3.41 (1.52)	−0.31[a]	89.36[a]
15. I find other ways to cope with stress and anxiety than by eating.	4.12 (1.07)	3.30 (1.18)	−0.77[a]	3.50 (0.97)	−0.58[a]	4.88 (0.39)	0.71	4.14 (1.05)	0.02	159.39[a]
Reliance on Hunger and Satiety Cues										
6. I trust my body to tell me when to eat.	3.95 (1.12)	2.62 (1.12)	−1.19	3.78 (0.96)	−0.15[a]	4.55 (0.87)	0.53	3.93 (1.01)	−0.02[a]	113.93[a]
7. I trust my body to tell me what to eat.	3.61 (1.26)	2.39 (1.04)	−0.97	3.48 (1.06)	−0.10[a]	4.33 (1.05)	0.57	3.35 (1.22)	−0.20[a]	97.83[a]
8. I trust my body to tell me how much to eat.	3.90 (1.12)	2.43 (1.00)	−1.31	3.80 (0.92)	−0.09[a]	4.60 (0.72)	0.63	3.73 (1.07)	−0.15[a]	162.59[a]
21. I rely on my hunger signals to tell me when to eat.	4.06 (1.03)	2.32 (0.88)	−1.68	3.75 (0.86)	−0.30	4.85 (0.39)	0.76	4.11 (0.76)	0.05	374.82*
22. I rely on my fullness (satiety) signals to tell me when to stop eating.	4.03 (1.06)	2.12 (0.87)	−1.80	3.84 (0.81)	−0.18[a]	4.85 (0.38)	0.78	3.97 (0.79)	−0.05[a]	434.68[a]
23. I trust my body to tell me when to stop eating.	3.97 (1.07)	2.05 (0.77)	−1.80	3.81 (0.79)	−0.15[a]	4.81 (0.48)	0.78	3.90 (0.81)	−0.07[a]	432.50[a]
Body–Food Choice Congruence										
18. Most of the time, I desire to eat nutritious foods.	3.77 (1.08)	2.77 (1.06)	−0.92	3.66 (0.99)	−0.10[a]	4.31 (0.97)	0.50	3.62 (0.94)	−0.14[a]	75.25[a]
19. I mostly eat foods that make my body perform efficiently (well).	3.69 (1.08)	2.86 (1.11)	−0.77	3.52 (0.98)	−0.15[a]	4.17 (1.07)	0.45	3.60 (0.88)	−0.08[a]	53.47[a]
20. I mostly eat foods that give my body energy and stamina.	3.88 (1.00)	2.98 (0.99)	−0.89	3.68 (0.92)	−0.20[a]	4.40 (0.89)	0.52	3.80 (0.88)	−0.08[a]	78.04[a]

[a] = $p < 0.05$. Z-scores sharing the same superscript are not significantly different from each other.

In the fourth subscale, 'Body–Food Choice Congruence', which includes questions about the congruence between eating and its effects on the body and health, there is no significant difference in the opinions of the members of the second and fourth clusters. Similar mean values are assigned to the questions related to the subscale: 'Most of the time, I desire to eat nutritious foods', 'I mostly eat foods that make my body perform efficiently (well)' and 'I mostly eat foods that give my body energy and stamina' (the average values in both clusters ranged from 3.6 to 3.8). On the BFCC subscale, the first and third clusters are clearly separated from each other and from C2 and C4, while each cluster

assigns significantly lower average values to the individual questions, while the third cluster gives significantly higher average values, which means that for them it is important and they pay attention to what effect the food they consume will have on their body and organism.

3.3.3. Characteristics of clusters

Based on Table 7, it can be seen that there is a significant difference between the clusters at the level of 5% on four of the examined variables (gender, age category, settlement type, region). There are significantly more women in the second cluster, and significantly more men in the third. Regarding the age, it can be seen that significantly more respondents between 40 and 59 belong to the third cluster, while significantly more respondents over 60 belong to the fourth subgroup. With regard to the settlement, we can see that significantly more respondents living in cities were included in the first cluster. Finally, in the case of the region, we can conclude that significantly more respondents living in the Northern Hungary region were in the first and fourth clusters, while significantly more people from the Southern Great Plain were in the second, and from the Northern Great Plain in the third, clusters.

4. Discussion and conclusion

The first aim of this study was to verify the validity of the Intuitive Eating Scale 2. We demonstrated that our hypothesis that the IES2 eating model can be applied in Central Europe was confirmed by a nationally representative sample of the Hungarian population. All statistical fit indicators confirmed that this type of model is suitable for the study of eating attitudes in Hungary. Following this, we developed clusters of identical groups of respondents using the items of the IES2 model. Based on the four clusters formed and considering the distributions within the cluster, we can come to the following conclusions.

Inner Cue Ignorers – The first cluster (109 people, 11.01%) shows differences particularly in the third (Reliance on Hunger and Satiety Cues) and fourth (Body-Food Choice Congruence) subscales for the clusters. The deviation is in a negative direction, since the members of the cluster reject their body's signals or ignore them, that is, it does not affect the frequency and quantity of their meals. They judge the following statement clearly negatively: 'I trust my body to tell me when to eat' (the average is 2.62 compared to C2 – the Cluster 3, *Intuitive eaters'* average was 4.55). There are similar differences in means compared to the other three clusters when they report that they trust their body to tell them what to eat, how much to eat, when to stop eating or they rely on their hunger signals to tell them when to eat. Based on the Table 7, among the members of the cluster, men are overrepresented (56% vs. 44%). Although there are no outliers in terms of age group, the younger and middle-aged groups appear more often (18–39 35.8%; 40–59 36.7%). In terms of region, cluster members typically live in cities (76.1%) in Central Hungary (22.9%), the Northern Great Plain (19.3%) and Northern Hungary (18.3%). In terms of education, they have vocational training, vocational school education (36.7%) and a high school diploma (34.9%), and the proportion of those with higher education is low (11.9%) within the cluster. In terms of their income situation, the largest proportion are those who struggle to make ends meet. They make a living but cannot save: 47.7%; Just enough to make ends meet (33.0%). In terms of their marital status, the majority of them are married (42.2%) or in a cohabitation (20.2%) A significant number of cluster members belong to the normal (39.4%) or slightly overweight (34.9%) category; the proportion of thin people (1.8%) is strongly underrepresented, while the proportion of obese people (23.9%) is significantly overrepresented in the cluster.

Emotional eaters – In contrast to the first cluster, those in the second cluster (271 persons, 27.4%) show higher values in the first (UPE) and second (EPR) subscales. Based on the results of the UPE subscale, compared to the other clusters, the forbidden foods mainly exist for individuals in this cluster, and they are the ones who try to avoid high fat, carbohydrate - and calorific foods, which they feel guilty about

Table 7
Differences across clusters.

Explanatory variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	χ^2 statistic
	Frequency (%)				
Gender within sample					15.61[a] df = 3 Cramer's V = 0.13
Female	9.6	31.9**	29.1	29.3	
Male	12.6	22.7	37.8[b]	26.9	
Gender within clusters					
Female	44.0	59.1[b]	44.2	52.9	
Male	56.0	40.9	55.8[b]	47.1	
Age group category within sample					15.97[a] df = 6 Cramer's V = 0.09
18–39	10.6	28.3	30.2	30.8	
40–59	11.3	29.1	38.4[b]	21.2	
60–	11.5	23.8	31.0	33.7[b]	
Age group category within clusters					
18–39	35.8	38.7	33.8	40.9	
40–59	36.7	38.3	41.5[b]	27.2	
60–	27.5	23.0	24.7	31.9[b]	
Settlement type within sample					26.44[a] df = 6 Cramer's V = 0.12
Larger city	6.5	30.5	35.3	27.6	
Other city or town	15.5**	26.5	30.4	27.6	
Capital	4.7	25.1	39.8	30.4	
Settlement type within clusters					
Larger city	16.5	31.2	29.6	27.5	
Other city or town	76.1**	52.8	49.7	53.6	
Capital	7.3	16.0	20.7	18.8	
Region within sample					106.13[a] df = 18 Cramer's V = 0.19
Western Transdanubia	13.1	11.1	39.4	36.4	
Central Transdanubia	5.7	20.8	38.7	34.9	
Southern Transdanubia	10.6	35.1	40.4	13.8	
Northern Great Plain	14.3	32.0	43.5[b]	10.2	
Central Hungary	8.7	29.3	30.0	32.1	
Northern Hungary	16.9[b]	11.0	30.5	41.5[b]	
Southern Great Plain	10.7	45.0[b]	18.3	26.0	
Region within clusters					
Western Transdanubia	11.9	4.1	11.9	13.0	
Central Transdanubia	5.5	8.2	12.5	13.4	
Southern Transdanubia	9.2	12.3	11.6	4.7	
Northern Great Plain	19.3	17.5	19.5[b]	5.4	
Central Hungary	22.9	31.2	26.2	33.3	
Northern Hungary	18.3[b]	4.8	11.0	17.8[b]	
Southern Great Plain	12.8	21.9[b]	7.3	12.3	
Highest educational attainment within sample					8.50 df = 9
8th grade elementary school at most	17.0	23.6	29.2	30.2	
Vocational or technical school	11.2	28.7	34.8	25.3	
Matura examination	10.3	27.7	33.7	28.3	
Higher education degree	8.6	26.3	32.2	32.9	
Highest educational attainment within clusters					
8th grade elementary school at most	16.5	9.3	9.5	11.6	
Vocational or technical school	36.7	37.9	37.8	32.6	
Matura examination	34.9	37.9	37.8	37.7	
Higher education degree	11.9	14.9	14.9	18.1	
Subjective income within sample					18.47 df = 15
Can live well from it, and can also save money	9.1	30.3	32.3	28.3	
Enough to live on, but can barely save any money	13.3	26.0	31.4	29.3	
Can make ends meet, but cannot save money	8.6	27.6	37.9	26.0	

(*continued on next page*)

Table 7 (*continued*)

Explanatory variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	χ^2 statistic
	Frequency (%)				
Sometimes find(s) it difficult to make ends meet	18.6	30.2	16.3	34.9	
Regularly find(s) it difficult to make ends meet	0.0	50.0	25.0	25.0	
Does not know/Has not answered	16.7	25.0	25.0	33.3	
Subjective income within clusters					
Can live well from it, and can also save money	8.3	11.2	9.8	10.1	
Enough to live on, but can barely save any money	47.7	37.9	37.5	41.7	
Can make ends meet, but cannot save money	33.0	43.1	48.5	39.5	
Sometimes find(s) it difficult to make ends meet	7.3	4.8	2.1	5.4	
Regularly find(s) it difficult to make ends meet	0.0	0.7	0.3	0.4	
Does not know/Has not answered	3.7	2.2	1.8	2.9	
Marital status within sample					23.84 df =
Married	11.1	26.0	39.3	23.6	15
Lives with a registered partner	13.1	25.0	29.8	32.1	
Single	9.8	32.1	28.8	29.3	
Widow(er)	11.9	20.9	28.4	38.8	
Divorced	9.3	32.7	29.9	28.0	
Separated	20.0	10.0	20.0	50.0	
Marital status within clusters					
Married	42.2	40.1	49.7	35.5	
Lives with a registered partner	20.2	15.6	15.2	19.6	
Single	19.3	25.7	18.9	22.8	
Widow(er)	7.3	5.2	5.8	9.4	
Divorced	9.2	13.0	9.8	10.9	
Separated	1.8	0.4	0.6	1.8	
BMI category within sample					8.79 df = 9
Underweight	1.8	3.3	1.5	3.6	
Healthy weight	10.5	30.7	31.9	27.0	
Overweight	11.0	24.2	35.4	29.4	
Obese	13.1	25.3	34.8	26.8	
BMI category within clusters					
Underweight	1.8	3.3	1.5	3.6	
Normal weight	39.4	46.8	39.9	40.2	
Overweight	34.9	31.2	37.5	37.0	
Obese	23.9	18.6	21.0	19.2	

[a] $= p < 0.05$.
[b] Denotes an adjusted residual greater than 2.

eating. Based on the second subscale (EPR), the symptoms of emotional and stress eating emerge even more clearly in this cluster. Compared to the other clusters, it is much more typical that they eat when they are lonely (3.41 vs. C3, *Intuitive eaters* – 1.15 or C4, *Disinterested eaters* – 1.50), or stressed (3.60 vs. C3 – 1.21). In addition, they typically use eating to overcome negative emotions: 'I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad) even when I'm not physically hungry' (3.51 vs. C3 – 1.23 and C4 – 1.59). This result is consistent with the results of the RHSC and BCC subscales, which show a slight negative deviation compared to the other clusters, i.e., they trust their body's signals less and, as a result of emotional eating, are less able to pay attention to whether the food they eat is beneficial for their body. There are significantly more women here; they represent 59.1% of the cluster. In terms of age, those over 40 (61.3% of the cluster) and typically city dwellers (52.8% of the cluster) can be classified here. In terms of education, they tend to have a high school diploma or secondary school qualification (75.8% of the cluster together). 31.2% of the members of the cluster live in the central Hungarian region, and 21.9% live in the Southern Great Plain. Most of them can make ends meet, but cannot save, or only a little (81% of the cluster). Individuals within the cluster tend to have a normal-weight (46.8%) or are overweight (31.2% within the cluster) (Table 7).

Intuitive eaters – The third cluster (332 people, 33.5%) is the closest to the eating behaviour defined as intuitive eating. Members of this cluster have positive perceptions of each of the subscales related to their body signals. For the UPE subscale statements, they typically have higher mean scores for statements that support relying on their body's cues, i.e., when they have a craving for something, they consume it, and do not follow dietary instructions ('I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat': 4.52 vs. C1 – 2.93; C2 – 3.75 and C4 – 3.65). However, they tended to score close to or below the average of the other clusters on statements that tested their agreement with ignoring their body's cues, i.e. they were positive about their internal cues to eat. Of the statements listed on the EPR subscale, they clearly identified more strongly than the other clusters with the following: not using eating as a means of coping with negative emotions; not eating out of boredom or loneliness; and using other ways to cope with stress instead of eating. The third subscale (RHSC) examines the reliance on signals of hunger and satiety. Regarding every statement of the RHSC, it is clear that the members of the cluster trust and rely on their body's signals. In the fourth subscale (BFCC), it is also confirmed that the cluster members consider it important to properly nourish their bodies and follow their signals accordingly. The cluster members are significantly men (55.8%) between the ages of 40 and 59 (38.4%), who live in cities (49.7%) or villages (35.3%) in Central Hungary (26.2%) or the Northern Great Plain (19.5%). In terms of education, they have vocational training, vocational school education (37.8%) and a high school diploma (37.8%), while the proportion of those with higher education (14.9%, 32.2% of the entire sample) within the cluster is higher. Regarding their income, they do not have problems making a living, but they cannot save (48.5%). However, the proportion of those within the cluster who have regular daily living problems is particularly low (0.3%). In terms of their marital status, the cluster consists of married people (49.7%), and the proportion of people belonging to the unmarried category is low (9.8%). Examining the bodyweight of the cluster members, it can be established that a considerable proportion of them belong to the normal (39.9%) or slightly overweight (37.5%) category; the proportion of underweight people (1.5%) is strongly underrepresented, while the proportion of obese people (21.0%) is slightly overrepresented in the cluster (Table 7).

Disinterested eaters – In the case of the fourth cluster (278 people, 28.0%), no characteristic feature can be highlighted. In the context of UPE, RHSC, and BFCC subscales, it approaches the values of the second cluster (Emotional Eaters); in the case of UPE, they do not show a strong restrictive attitude towards unhealthy foods: 'I have forbidden foods that I don't allow myself to eat' (2.57), nor do they feel anger when eating them: 'I get mad at myself for eating something unhealthy' (2.26). Regarding the subscale of the RHSC, it can also be concluded that the members of the cluster show similar values to the second cluster in their eating behaviours when they have to decide how much they rely on their body's signals when making decisions about when (3.93 vs. C2 – 3.78), what (3.35 vs. C2 – 3.48) and how much (3.73 vs. C2 – 3.80) they should eat. Based on the BFCC subscale, it can be highlighted that, compared to Emotional Eaters (C3), they require significantly less that the selected foods have a beneficial effect on their body: 'Most of the time, I desire to eat nutritious foods' (3.62 vs. C3 – 4.31); at the same time, the group ignoring internal signals (C1) pays more attention to the nutritional value of food (3.62 vs. C1 – 2.77). In the case of the EPR subscale, the evaluations indicate that it is not typical for Disinterested Eaters to choose eating as a way of counteracting negative emotional effects (1.65), or resolving anxiety, depression, sadness (1.59), or loneliness

(1.50). In the fourth cluster, there are slightly more women (52.9%), between the ages of 18 and 39. Most of them live in cities (53.6%), and in terms of their education, those with a high school diploma are typical (37.7%). Regarding their settlements, most of them - 33.3% - come from the central Hungarian region. In terms of income, this includes those who are able to make ends meet, but cannot save, or save a little (81.2% of the cluster). Individuals within the cluster tend to have a normal-weight (40.2%) or are overweight (37.0%) (Table 7).

Overall, it can be concluded that, based on the CFA analysis, the IES2 model consisting of twenty-three statements developed by Tylka and Kroon Van Diest (2013) can be applied with sufficient reliability to the Hungarian sample. Each of the four subscales of the original construct, namely UPE, EPR, RHSC and BFCC, were similarly confirmed by the results obtained by Tylka and Kroon Van Diest (2013); Tylka et al. (2015); van Dyck et al. (2016); Duarte et al. (2016); Carbonneau et al. (2016); Ruzanska and Warschburger (2017); da Silva et al. (2019); Akırmak et al. (2020); Román et al. (2021), but our results did not confirm the results obtained by Vintilă et al. (2020). The Hungarian sample also confirmed the results of Camilleri et al.'s (2015) study on the French population, according to which, in terms of gender, intuitive eating is more characteristic of men than of women. Our findings align with those of Carbonneau et al. (2016), Strodl et al. (2020), and Jinghua et al. (2022), indicating that gender may influence the scores obtained in IES2. Consequently, gender can be considered a potential factor affecting intuitive eating behaviours.

A comparison of our results with those of other studies that also required translation of the IES-2 scale reveals the following. In the majority of countries, the IES2 was identified as a valuable instrument for investigating intuitive eating behaviour. The results of the majority of studies corroborated the four-factor scale (UPE, EPR, RHSC, BFCC), as was the case in the present Hungarian study. Consequently, the factor structure of the IES-2 proposed by van Dyck et al. (2016) for the Luxembourg-Swiss-German-Austrian sample and by Ruzanska and Warschburger (2017) for the German population was validated for the German translation of the questionnaire. In the French-Canadian adult population of the province of Québec, a study by Carbonneau et al. (2016) demonstrated that the original four-factor structure of the IES-2 was an appropriate and reliable instrument for assessing intuitive eating. Additionally, the four-factor IES2 model was corroborated by Román et al. (2021) using a Hungarian translation of the scale. Bas et al. (2017) and Akirmak et al. (2020) demonstrated that the IES-2, when translated into Turkish, is an appropriate instrument for measuring eating habits. However, while the results of Bas et al. (2017) supported the four-factor scale, Akirmak et al. (2020) proposed that the total score of the Turkish IES-2 should be calculated without the UPE items, given that the test-retest reliability and internal reliability of this subscale were moderate. The results obtained from the scale translated into Portuguese by Duarte et al. (2016) and Brazilian-Portuguese by da Silva et al. (2019) supported the four-factor structure of the IES-2. However, Camilleri et al. (2015) and Saunders et al. (2018) have yielded differing results. Camilleri et al. (2015) found three dimensions in their French sample (EPR, RHSC, UPE) and Saunders et al. (2018) also identified only three in their Hispanic American sample (EPR, RHSC, BFCC). Vintilă et al. (2020) examined the psychometric data from the Romanian translation of the IES2 and concluded that the construct is less applicable to nations undergoing nutritional transition. The IES2 scale, translated into Greek, was employed by Giannakou et al. (2022) to evaluate the dietary habits of the adult population in Cyprus. The findings corroborated the three-factor model. In a further study, Anastasiades et al. (2022) re-translated the scale, applying it to a sample of Cypriot adults. Their findings supported the conclusion that the Greek Intuitive Eating Scale-2 is best represented as a 6-factor model, suggesting that models of IES-2 scores may differ across national or cultural contexts.

It can be highlighted as a strength of the present study that it is based on a complete, representative national sample in terms of three aspects, and can thus be considered the first such study in the Hungarian context. Furthermore, no example of a clustering procedure based on the LPA statistical method regarding IES and IES2 can be found in the literature. At the same time, this is also a limitation of the study since there is no possibility of comparison in the case of the established clusters. A further limitation of the study is that, in addition to demographic factors, it did not include other physical (such as BMI index), psychological (such as anorexia), or eating-related (such as following certain diets) variables. Nevertheless, we are convinced that our findings can be applied to both healthier eating programmes and by practitioners in the fields of health, nutrition and psychology.

Ethical statement

The study obtained ethical approval on 15 October 2020 (approval number: GTK-KB 002/2020) from the Research Ethics Committee of the University of Debrecen, Faculty of Economics and Business. Participants gave informed consent before taking part in the research.

Implications efor gastronomy

Please find uploaded our manuscript entitled "***Analysis of heterogeneity in consumer attitudes based on the Intuitive Eating Scale-2***", for consideration for publication in International Journal of Gastronomy and Food Science. The manuscript is new, and has not been published before.

We hope that the results of our research will contribute to the scientific analysis of culinary concepts and trends from the consumer side. The aim of our study is to validate the Intuitive Eating Scale 2 on the basis of the first representative sample of 990 people in Hungary. A further aim is to explore whether IES2 can be used to form clusters that characterize the Hungarian population.

The results were also compared with those of other countries to identify similarities and differences in eating habits.

We hope that our research will make a useful contribution to food science and gastronomy as a whole. We look forward to hearing from you soon.

CRediT authorship contribution statement

Zoltán Szakály: Writing – review & editing, Writing – original draft, Conceptualization. **Andrea Bauerné Gáthy:** Writing – review & editing, Writing – original draft, Formal analysis. **Enikő Kontor:** Writing – review & editing, Writing – original draft, Formal analysis. **Péter Balogh:** Methodology, Formal analysis, Data curation. **Péter Czine:** Methodology, Formal analysis, Data curation.

Declaration of competing interest

The authors state that there's no financial/personal interest or belief that could affect their objectivity.

Appendix

IES2 items in English and Hungarian.

1. I try to avoid certain foods high in fat, carbohydrates, or calories./Próbálok elkerülni bizonyos ételeket, melyeknek magas a zsír-, a szénhidrát-, vagy a kalóriatartalma.
2. I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry./Enni szoktam, amikor erős érzelmi hatás ér (pl. szorongás, depresszió, szomorúság), még akkor is, ha fizikailag nem vagyok éhes.
3. If I am craving a certain food, I allow myself to have it./Ha megkívánok valamilyen ételt, megengedem magamnak, hogy megegyem.

4. I get mad at myself for eating something unhealthy./Dühös vagyok magamra, ha valamilyen egészségtelent eszem.
5. I find myself eating when I am lonely, even when I'm not physically hungry./Enni szoktam, amikor magányos vagyok, még akkor is, ha fizikailag nem vagyok éhes.
6. I trust my body to tell me when to eat./Hiszek abban, hogy a testem jelzi, hogy mikor kell ennem.
7. I trust my body to tell me what to eat./Hiszek abban, hogy a testem jelzi, hogy mit kell ennem.
8. I trust my body to tell me how much to eat./Hiszek abban, hogy a testem jelzi, hogy mennyit kell ennem.
9. I have forbidden foods that I don't allow myself to eat./Vannak olyan „tiltott" ételek számomra, melyeket nem engedélyezek magamnak.
10. I use food to help me soothe my negative emotions./Az ételt felhasználom arra, hogy segítsen enyhíteni a negatív érzéseimet.
11. I find myself eating when I am stressed out, even when I'm not physically hungry./Enni szoktam, amikor stresszes vagyok, még akkor is, ha fizikailag nem vagyok éhes.
12. I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort./Képes vagyok megbirkózni a negatív érzelmeimmel (pl. szorongás, szomorúság) anélkül, hogy ennék.
13. When I am bored, I do NOT eat just for something to do./Amikor unatkozom, nem eszem csak azért, hogy csináljak valamit.
14. When I am lonely, I do NOT turn to food for comfort./Amikor magányos vagyok, nem eszem csak azért, hogy csökkentsem a magány érzését.
15. I find other ways to cope with stress and anxiety than by eating./Képes vagyok az evés helyett más megoldást találni arra, hogy megbirkózzak a stresszel és a szorongással.
16. I allow myself to eat what food I desire at the moment./Megengedem magamnak, hogy megegyek egy olyan ételt, amelyet a pillanat hevében megkívánok.
17. I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat./Nem követek olyan étkezési szabályokat vagy étrendet, amely meghatározza, hogy mit, mikor és mennyit egyek.
18. Most of the time, I desire to eat nutritious foods./A legtöbb esetben tápláló ételekre vágyom.
19. I mostly eat foods that make my body perform efficiently (well)./Többnyire olyan ételeket eszem, amelyek jótékony hatással vannak a testem működésére.
20. I mostly eat foods that give my body energy and stamina./Többnyire olyan ételeket eszem, amelyek energiával látják el a testemet és növelik az állóképességemet.
21. I rely on my hunger signals to tell me when to eat./Bízom abban, hogy az éhség jelei megmondják nekem, hogy mikor kell ennem.
22. I rely on my fullness (satiety) signals to tell me when to stop eating./Bízom abban, hogy a jóllakottság (telítettség) jelei megmondják nekem, hogy mikor kell abbahagynom az étkezést.
23. I trust my body to tell me when to stop eating./Hiszek abban, hogy a testem megmondja nekem, hogy mikor kell abbahagynom az étkezést.

Data availability

Data will be made available on request.

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