Original article

Intuitive eating and its relationship to physical activity, body mass index and eating behavior among university students. A case study

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Abstract. University years are a time of decline in diet quality, which may play a central role in weight gain. People's eating behavior depends on a series of emotions such as joy, depression, anxiety, and sadness, so the choice of food and the frequency and quantity of meals do not depend exclusively on physiological needs. A series of studies have shown that intuitive eating may be helpful in the treatment of eating disorders and obesity. This cross-sectional study aims to establish if the concern for an intuitive diet is related to physical activity and if these two can lead to a lower body mass index and obesity prevention. The study was conducted in Romania on 1585 students (846 women and 739 men) aged 19 to 26 years. The questionnaire included four parts related to sociodemographic characteristics and anthropometric measurements (IES-2), IPAQ (PA), and HEI 2020 score. According to the scores, participants' diets were categorized as "poor" (≤50), "needs improvement" (from 51 to 80), and "good" (> 80). Pearson correlation coefficients were calculated between HEI scores, BMI, PA, IES-2 total score, and IES-2 subscales for participants. Statistical analyses showed a significant correlation between HEI and the score of participants with BMI ($r = -0.322$; $p < 0.01$), PA ($r = -0.734$; $p < 0.01$), and IES-2 score ($r = 0.654$; $p < 0.01$). IES-2 scores were significantly inversely correlated with BMI ($r = -0.341$; $p < 0.01$). Also, the results of the correlation analyses showed a direct correlation with all subscales of IES-2 and HEI scores ($p<0.05$). The findings of this study reveal that intuitive eating is positively related to diet quality, weight status, and PA. Intuitive eating can offer a more holistic and long-term weight control approach than traditional body weight management strategies.

Key words: Intuitive eating, body mass index, HEI 2020 score, physical activity

Introductions

Obesity has been declared a pandemic by the WHO, and it causes several diseases, including hypertension, high cholesterol, dyslipidemia, type 2 diabetes, cardiovascular disease, and many cancers (1). Changes in the predominantly sedentary lifestyle of young people and the increase in fast-food products have deepened this problem, becoming increasingly severe every year (16). University years are a time of declining diet quality, which may play a central role in weight gain because students eat frequently at fast-food restaurants and consume many soft drinks (2,3).

People set different goals when dieting or undertaking physical activity, such as reducing weight, improving health, increasing social acceptance, or managing stress. There is a proven link between physical activity and enhancing and regulating food, both of which help people lead a healthier lifestyle (4,5). People's eating behavior depends on a series of emotions such as joy, depression, anxiety, and sadness, so the choice of food and the frequency and quantity of meals do not depend exclusively on physiological needs (6). Regarding diets and regular physical activities, people's goals greatly influence the results obtained. For example, following a severe diet to reduce weight and not ensure better health can predispose the person to unbalanced eating behavior (7). Traditional diets that aim to reduce body weight based on reducing the amount of food or some components of the diet have proven ineffective in the long term (8). Studies have shown that intuitive eating may help treat eating disorders and obesity (9,10).

Intuitive eating (IE), as an adaptive eating style, was founded in 1995 by Evelyn Tribole and Elyse Resch, based on ten principles: (i) reject the diet, (ii) recognize one's hunger, (iii) make peace with food, (iv) challenge the food police, (v) respect one's fullness, (vi) discover the satisfaction factor, (vii) cope with one's feelings without using food, (viii) respect one's body, (ix) exercise and feel the difference, and (x) honor one's health with gentle nutrition, emphasizes eating in response to physiological hunger and satiety cues (11,12). The basic principle of IE is to gain body wisdom, i.e., the body will instinctively know the amount and variety of food to maintain both nutritional health and an appropriate weight (13). IE shifts the focus from body weight to well-being and promotes unconditional permission to eat in response to internal physiological hunger signals and the food that is desired now, without classifying food into acceptable and nonacceptable categories. Intuitive eating promotes a healthy attitude towards food and body image. Intuitive eaters would have more nutritious dietary intake and positive eating patterns than nonintuitive eaters (14).

In addition to a balanced diet, a common way to maintain optimal weight is related to physical activity. Physically active subjects have healthier behaviors, including better eating habits (15). Many studies suggest that physical activity is a gateway behavior to improved eating regulation in that it helps people self-regulate their eating more healthily. Specialists believe that the associations between physical activity and eating-related behaviors depend more on the goals behind an individual's desire (17-18). Studies show that regular physical activity will improve the level of several hormones such as adrenaline, and the level of endorphins in the body (19, 20). The secretion of endorphins reduces anorexia nervosa and bulimia, as well as the desire to consume food just to combat stress, implicitly leading to better nutritional behavior (21).

The purpose of this cross-sectional study is to show if the concern for an intuitive diet is related to the inclusion of physical activity in the health support program and if these two together can lead to a lower body mass index and the prevention of obesity.

Materials and Methods

The study was conducted in Romania on a total of 1585 students (846 women and 739 men) aged 19 to 26 years who volunteered to participate in the study.

The questionnaire included 4 parts. The first part included sociodemographic characteristics and anthropometric measurements (age, body weight, height). The second part included a 23-item Intuitive Eating Scale-2 (IES-2) to assess individuals' intuitive eating states. The third part included the short version of the IPAQ questionnaire to assess individuals ' physical Activity (PA). The fourth part includes questions that aim to determine food habits using the HEI 2020 score.

Anthropometric measurements

They were carried out: body weight and height. For each participant, the body mass index was calculated by dividing the body weight (kg) by the square of the height (m2). Subjects were classified according to BMI using the WHO classification for adults (22).

Intuitive Eating Scale (IES-2)

The Intuitive Eating Scale (IES-2) assessed participants' intuitive eating behavior levels. The IES-2 includes 23 items with four subscales. The scale is rated using the 5-point Likert scale. The reverse scoring items included 1, 2, 3, 6, 7, 8 and 9. In the IES-2, higher scores indicate a higher level of intuitive eating behavior (23).

PA (Physical Activity)

The students' PA was assessed based on the short version of the IPAQ questionnaire, translated into Romanian (14). Weekly activity was expressed in a metabolic equivalent task (MET) minutes/week. One MET equals energy expenditure during rest and is approximately equal to 3.5 ml O2kg−1 min−1 in adults. Students were classified into three main categories: Low physical activity (non-athletic Students) (2,999 MET minutes/week) (24).

Food habits

Food habits were assessed using the HEI 2020 score, a tool developed by the US Department of Agriculture. The HEI 2020 score is a 13-component 100-point scale that assesses the adequacy and moderation components of the diet. Higher scores are associated with better dietary compliance (23). The HEI 2020 score was calculated using a self-reported DHQIII questionnaire (25, 26).

Statistical analysis

Data analyses were performed using SPSS 23 (SPSS Inc., USA). The level of significance $\alpha = 0.05$ was used to check the hypothesis. The difference in results was considered statistically significant when a p-value obtained was less than or equal to 0.05. The distribution of the data was determined by the Kolmogorov-Smirnov test. As our variables were normally distributed, the Pearson correlation test was used. The Mann-Whitney U test was used to compare the differences between the two independent groups of male and female students. The Bonferonni correction was used to reduce the cases of false positives.

Results and Discussions

Table 1 shows some of the participants' characteristics. The average age of the participants was 22.4±1.8 years for girls and 23.1±1.6 for boys. The average BMI for girls was 22.87±5.12, and for boys, it was 26.14±4. 89.

Table 2 shows the division by class according to the BMI of the subjects. 6.38% of girls and 4.19% of boys were in the underweight category, 48.69% of the girls and 37.08 of the boys were in the normal weight

Table 1. Descriptive statistics of subjects according to anthropometric measurements.

	Gender	n	x±s	Z	p
Body weight (kg)	Female	846	59.83±14.22	-11.023	0.000*
	Male	739	78.54±16.46		
Height (cm)	Female	846	162.58±7.53	-15.216	0.000*
	Male	739	178.32±8.28		
BMI (kg/m^2)	Female	846	22.87±5.12	-5.329	0.000*
	Male	739	26.14±4.89		
Age	Female	846	22.4±1.8	-5.126	0.000*
	Male	739	23.1±1.6		0.000*

Z Man-Whitney U test, P<0.05. The values Z obtained in the Mann-Whitney U test are -11.023 for Body Weight, -15.216 for height, -5.329 for BMI, and -5.126 for age and have negative values, which is particularly common in these conditions.

category; in the overweight class, there were 26.95% of girls and 24.76% of boys, and in the obese category there were 17.98% girls and 24.76% boys.

As we can be seen in table 3, according to the HEI 2020 scores, participants' diets were categorized as "poor" (≤50), "needs improvement" (from 51 to 80), and "good" (> 80). For each of these HEI categories, the score was 28.78±11.26, 59.32±5.82, and 81.43±4.23, respectively. The same results are reported by the other authors (27, 28).

The Bonferroni correction examining differences in the diet quality category indicated that participants with a "poor" quality diet had higher BMI, lower IES-2 score, and lower HEI 2020 score than participants in the "needs improvement" category and "good" diet quality.

As can be seen in table 4, Pearson product-moment correlation coefficients were calculated between HEI scores, BMI, PA, IES-2 total score, and IES-2 subscales for participants. In agreement with literature cited (9,29,30), statistical analyses showed a significant correlation of HEI the score of participants with BMI (r= -0.322; p < 0.01), PA (r= -0.734; p < 0.01), IES-2 score (r= 0.654; p < 0.01), IES-2 scores were significantly inversely correlated with BMI (r= -0.341; p < 0.01). Also, the results of the correlation analyses were significantly correlated with all subscales of IES-2 scores and HEI scores (p<0.05).

Table 2. Distribution of subjects according to BMI classes.

BMI Classes	Female (n=846)		Male (n=739)		Total (n=1585)	
	n	%	n	%	n	%
Underweight	54	6.38	31	4.19	85	5.36
Normal weight	412	48.69	274	37.08	686	43.28
Overweight	228	26.95	251	33.97	479	30.22
Obese	152	17.98	183	24.76	335	21.13

Underweight (BMI<18.5), normal weight (BMI 18.5-24.9), overweight (BMI 25.0-29.9), obese (BMI≥30).

Conclusions

In conclusion, the findings of this study reveal that intuitive eating is positively related to diet quality, weight status, and PA in Romanian students. Poor diet quality is accompanied by a decline in physical activity for many college students. The results obtained in this study confirm that many times, physical activities solve these emotional causes of excessive food consumption, balancing the eating behavior of the subjects and thus reaching average BMI values, thus reducing obesity among the students who are the subjects of this study. Although our study is a cross-sectional analysis, the findings are in accordance with the idea that intuitive eating can offer a more holistic and long-term weight control approach compared to other traditional body weight management strategies. Understanding these complexities might lead to more effective intervention strategies for addressing overweight and obesity risk in university populations.

Table 3. Mean and standard deviations of study variables by HEI categorization (female n=846).

	Healthy Eating Index Score			*p*-value
	Poor (n =573)	Needs improvement (n=192)	Good (81)	0.000
HEI Score	28.78±11.26	59.32±5.82	81.43±4.23	0.000
BMI (kg/m^2)	24.12±5.16	22.34±4.45	21.14±3.97	0.000
IES-2 total score	3.12±0.32	3.38±0.29	3.79±0.21	0.000
UPE subscale score	3.34±0.51	3.41±0.43	3.82±0.37	0.000
EPR subscale score	3.02±0.35	3.11±0.0.46	3.48±0.48	0.000
RHSC subscale score	3.06±0.75	3.39±0.68	4.21±0.56	0.000
B-FCC subscale score	3.42±0.89	3.55±0.72	4.31±0.61	0.000

Abbreviations: HEI: Healthy Eating Index; BMI: Body mass index; IES-2: Intuitive Eating Scale 2; UPE: Unconditional permission to eat; EPR: Eating for physical rather than emotional reason; RHSC: Reliance on hunger and satiety cues; B-FCC: Body – food choice congruence.

Table 4. Pearson correlation between intuitive eating, healthy eating index, BMI, and physical activity level.

	BMI	PA	IES-2	UPE	EPR	RHSC	B-FCC
HEI	-0.322**	0.734**	0.654**	0.321**	0.256**	0.387**	0.270**
BMI		-0.584**	-0.341**	-0.078	-0.025	-0.276**	-0.141**
PA			0.722**	0.283**	0.312**	0.297**	0.342**
IES-2 Total Score				0.542**	0.491**	0.438**	0.245**
UPE subscale score					0.174**	-0.026	0.147**
EPR subscale score						0.146**	0.038
RHSC subscale score							0.332**

**Correlation is significant at the 0.01 level.
Abbreviations: HEI: Healthy Eating Index; BMI: Body mass index; PA: physical activity; IES-2: Intuitive Eating Scale 2; UPE: Unconditional permission to eat; EPR: Eating for physical rather than emotional reason; RHSC: Reliance on hunger and satiety cues; B-FCC: Body – food choice congruence.

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