International Journal of Food Sciences and Nutrition

ISSN: 0963-7486 (Print) 1465-3478 (Online) Journal homepage: www.tandfonline.com/journals/iijf20

The associations of mindful and intuitive eating with BMI, depression, anxiety and stress across generations: a cross-sectional study

Hatice Merve Bayram & Murat Gürbüz

To cite this article: Hatice Merve Bayram & Murat Gürbüz (2025) The associations of mindful and intuitive eating with BMI, depression, anxiety and stress across generations: a cross-sectional study, International Journal of Food Sciences and Nutrition, 76:3, 326-336, DOI: 10.1080/09637486.2025.2462185

To link to this article: https://doi.org/10.1080/09637486.2025.2462185

Published online: 05 Feb 2025.

Submit your article to this journal

Article views: 511

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=iijf20

INTERNATIONAL JOURNAL OF FOOD SCIENCES AND NUTRITION
2025, VOL. 76, NO. 3, 326–336
https://doi.org/10.1080/09637486.2025.2462185

Taylor & Francis
Taylor & Francis Group

STUDIES IN HUMANS

Check for updates

The associations of mindful and intuitive eating with BMI, depression, anxiety and stress across generations: a cross-sectional study

Hatice Merve Bayram[a] and Murat Gürbüz[b]

[a]Department of Nutrition and Dietetics, Faculty of Health Sciences, Istanbul Gelisim University, Istanbul, Türkiye; [b]Department of Nutrition and Dietetics, Faculty of Health Sciences, Niğde Ömer Halisdemir University, Niğde, Türkiye

ABSTRACT

The study aimed to evaluate the differences between generations and relationship between mindful and intuitive eating with body mass index (BMI), depression, stress, and anxiety. This cross-sectional study was conducted on 547 adults. Online questionnaire including Intuitive Eating Scale–2nd edition (IES-2), Mindful Eating Questionnaire (MEQ), and Depression, Anxiety, Stress Scale was performed. Gen Z scored highest for "unconditional permission to eat", and lowest for "interference" ($p < 0.001$). Baby Boomers demonstrated the lowest "conscious nutrition" scores compared to others (p: 0.002). Weak negative correlations were observed between IES-2 scores and BMI (r: −0.165, $p < 0.001$), depression (r: −0.194, $p < 0.001$), anxiety (r: −0.191, $p < 0.001$), and stress (r: −0.100, p: 0.020). MEQ scores were negatively correlated with BMI, depression, anxiety, and stress (r: −0.159, r: −0.364, r: −0.372, r: −0.360, $p < 0.001$). "Eating for physical rather than emotional reasons" showed negative correlation with depression, anxiety, and stress scores (r: −0.259, r: −0.249, r: −0.168, $p < 0.001$).

ARTICLE HISTORY
Received 19 February 2024
Revised 21 January 2025
Accepted 27 January 2025

KEYWORDS
Mindful eating; intuitive eating; generation; BMI; depression

Introduction

There is a long and controversial history to the relationship between dieting and weight management. Numerous diet plans have failed to produce long-lasting results in terms of weight management. Unfortunately, the current obesogenic environment requires more effort than ever before to maintain healthy food intake and body weight. Some researchers have argued that dieting can, paradoxically, lead to weight gain and exacerbate the obesity crisis (Lowe 2015). Among the theoretical models, restriction theory and the spiral model of chronic dieting and eating disorders are proposed to explain this relationship. The restraint theory suggests that restriction reduces sensitivity to internal hunger cues and increases reliance on external cues, leading to overeating, whereas the spiral model suggests that repeated failures to lose weight lead to low self-esteem and depression. Dieting has been identified as a risk factor for various negative psychological and behavioural outcomes, including depression and disordered eating (Hazzard et al. 2021). Therefore, non-dieting approaches, including mindful/intuitive eating, to health improvement are of increasing interest (Hoare et al. 2022).

Mindful eating (ME) is the act of paying attention to, being aware of, and focussing on the experience of food during food consumption or in a food-related environment. The aim of ME is to help people enjoy the moment and the food, and to encourage full presence in the eating experience (Nelson 2017). Recent evidence indicates that mindfulness may have a significant impact on eating disorders (Sala et al. 2020). As such, ME may reduce overeating through the identification of emotional or external triggers for eating (Masuda and Hill 2013). Researchers have proposed that adhering to this eating style could result in weight reduction, even if the goal is not to lose weight (Nelson 2017). Intuitive eating (IE) is often used instead of ME, and both concepts are closely related. However, IE does not include the meditation component that ME does (Nelson 2017; Grider et al. 2021). Similar to ME, IE emphasises the importance of listening to internal hunger and satiety cues rather than dieting, and allows for unconditional permission to eat when hungry (Grider et al. 2021).

Defining generations is not a precise process. However, it is clear that there are discernible differences in the lifestyles, behaviours and preferences of individuals within each generation. Therefore, it is important to evaluate whether these non-diet approaches, which have become widespread and are

CONTACT Hatice Merve Bayram merve.bayrm@gmail.com Department of Nutrition and Dietetics, Faculty of Health Sciences, Istanbul Gelisim University, Istanbul, Turkey.
© 2025 Taylor & Francis Group, LLC

considered promising, are applied and accepted across generations. It is also reported that anthropometric measurements and mental health may have a relationship with ME and IE (Warren et al. 2017; Hazzard et al. 2021; Linardon et al. 2021). Additionally, observing differences between generations may be challenging because of the approach of cross-temporal comparison of individuals of the same age from each generation. However, it is quite easy to do a cross-sectional comparison of generations on any variable (Campbell et al. 2015). Therefore, this study aimed to evaluate the differences between generations and the relationship between mindful and intuitive eating with BMI, depression, stress, and anxiety.

Methods

Study design and participants

This was a descriptive and cross-sectional study conducted between 21.11.2023 and 14.01.2024. Power analysis was performed in the sample selection; the prevalence was calculated as 20%, type 1 error rate $\alpha = 0.05$, type 2 error rate $\beta = 0.20$, and test power $1- \beta = 0.80$ using a previous study (Durukan and Gül 2019). Accordingly, the total number of participants was determined as a minimum of 450.

The study included adults aged 18 years or older who had access to the internet to complete an online questionnaire and could provide informed consent. Participants were excluded if they were pregnant or lactating, had a chronic or systemic illness, a psychiatric diagnosis, or were undergoing eating behaviour therapy. Additional exclusion criteria included the regular use of medications or supplements (e.g. antidepressants, antihypertensives), or any conditions affecting appetite. A total of 549 individuals participated; however, two were excluded as they were under 18 years of age. Thus, the final sample consisted of 547 participants, recruited through online announcements on social media platforms (e.g. Instagram, Facebook) and email invitations.

An online questionnaire including demographic characteristics (sex, age, marital status, education status, chronic disease, physical activity status, dietary habits, etc.), Intuitive Eating Scale – 2nd edition (IES-2), Mindful Eating Questionnaire (MEQ), and Depression, Anxiety, Stress Scale-Short Form (DASS-21) was performed. Additionally, some anthropometric measurements (body weight, height, waist, and hip circumferences) were taken with the participants' declaration.

Participants were classified according to generation: Those who were born between 1954 and 1964 were defined as baby boomers; those who were born between 1965 and 1976 were defined as Generation X; those who were born between 1977 and 1995 were defined as Generation Y; and those who were born between 1996 and 2015 were defined as Generation Z (Dorsey 2018).

Determination of demographic characteristics

The questionnaire included various questions to determine the demographic characteristics of the participants. Age was recorded as a continuous variable in years. Sex was categorized as "Male" or "Female." Education level was classified into three categories: "Elementary school or lower," "High school," and "University or higher," based on participants' self-reported highest level of education. Occupation was categorized as "Employee" for participants who were actively working and "Non-employee" for retirees, homemakers, unemployed individuals, or students. Physical activity was categorized as "Yes" for participants engaging in at least 150 min of moderate or 75 min of vigorous activity weekly and "No" for those not meeting these criteria. Smoking status was categorized as "Yes" for current smokers and "No" for non-smokers or former smokers. Chronic disease status was self-reported as "Yes" for individuals with physician-diagnosed chronic conditions (e.g. diabetes, hypertension) and "No" for those without. Social media use was categorized as "Yes" for participants who actively used platforms (Instagram, Facebook, X, etc.) at least once per week and "No" otherwise. Anthropometric measurements (e.g. height, weight, waist circumference, and hip circumference) were self-reported by participants. Body mass index (BMI) was calculated as weight (kg) divided by height squared (m^2).

Intuitive eating scale – 2nd edition (IES-2)

The IES-2 was developed by Tylka and Kroon Van Diest (2013) to measure individuals' tendency to follow their physical hunger and satiety cues when determining when, what, and how much to eat (Tylka and Kroon Van Diest 2013). The validity and reliability study of the Turkish version of IES-2 was determined by Bas et al. (2017). IES-2 has 23 items and 4 sub-scales: 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). Items are rated on a 5-point scale ranging from 1 = strongly disagree to 5 = strongly agree. Items 1, 2, 3, 6, 7, 8, and 9 are reverse scored. The higher the score of the scale, the higher the level of intuitive eating behaviour. The Cronbach alpha value for this study was found 0.872.

Mindful eating questionnaire (MEQ)

The MEQ was developed by Framson et al. (2009) to investigate how and why eating behaviour occurs rather than what is eaten. The validity and reliability study of the Turkish version of MEQ was determined by Köse et al. (2016). This Likert-5 type scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: always) contains 30 questions and 7 subscales: Eating without Thinking, Emotional Eating, Eating Control, Awareness, Eating Discipline, Conscious Nutrition, and Interference. Items 1, 7, 9, 11, 13, 15, 18, 24, 25, and 27 in the scale are scored straight, while the other questions are reverse scored. The higher the score of the scale, the higher the eating awareness. The Cronbach alpha value for this study was found 0.844.

Depression, anxiety, and stress scale short form (DASS-21)

Depression, anxiety, and stress symptoms were assessed using the Depression, Anxiety, and Stress Scale Short Form (DASS-21) developed by Lovibond and Lovibond (1995). The validity and reliability of the Turkish version of the DASS-21 have been evaluated by Sarıçam (2018). The questionnaire had seven items for each of the three scales designed to measure the negative emotional states of the DAS. Items 3, 5, 10, 13, 16, 17, and 21 were included in the depression scale; items 2, 4, 7, 9, 15, 19, and 20 were included in the anxiety scale; and items 1, 6, 8, 11, 12, 14, and 18 were included in the stress scale. A 4-point Likert Type Scale; 0 equals "Did not apply to me at all," 1 equals "Applied to me to some degree, or some of the time," 2 equals "Applied to me to a considerable degree, or a good part of the time," and 3 equals "Applied to me very much, or most of the time". For depression, the scores are between 0 and 4 defined normal, 5 and 6 mild depression, 7 and 10 moderate depression, 11 and 13 severe depression, and >13 very severe depression. For anxiety, the scores between 0 and 3 defined normal, 4 and 5 mild anxiety, 6 and 7 moderate anxiety, 8 and 9 severe anxiety, and >9 very severe anxiety. For stress, the scores are between 0 and 7 defined normal, 8 and 9 mild stress, 10 and 12 moderate stress, 13 and 16 severe stress, and >16 very severe stress (Sarıçam 2018). The Cronbach alpha value for this study was found 0.920.

Statistical analysis

Data were analysed using SPSS 24.0. Categorical data were expressed as the frequency (percentage), and differences were analysed using Fisher's exact test (when including any expected p-value ≤ 0.05) or the chi-square test. The normality of data distribution was assessed using the Kolmogorov–Smirnov test. The ANOVA test was used to compare the mean values of BMI, depression, anxiety, stress, IES-2, and MEQ scores. Post-hoc comparisons were conducted using Tukey's test to identify specific group differences. Pearson correlation was used for BMI, depression, anxiety, stress, IES-2 and MEQ scores. For all statistical tests, a p value of <0.05 was considered statistically significant.

Results

A total of 547 participants were completed the study. Table 1 shows the demographic characteristics of participants. There was a significant difference between generations in terms of age ($p < 0.001$), education ($p < 0.001$), occupation ($p < 0.001$), smoking (p: 0.003), regular physical activity (p: 0.002), social media use ($p < 0.001$), and having a chronic disease ($p < 0.001$). Notably, body weight differed significantly among various generations, particularly between Gen Z and the older generations ($p < 0.001$). Differences in BMI and WC were more pronounced between Gen Z and the older generations, especially Gen X and Gen Y ($p < 0.001$). Furthermore, HC also showed significant variation across generations, with baby boomers and Gen Z exhibiting the greatest differences ($p < 0.001$).

Table 2 shows the difference of IES-2, MEQ, and DASS-21 scales between generations. "Unconditional permission to eat" which is the IES-2 sub-scale showed a statistical differences between Gen X and Gen Z (p: 0.002). There was a statistically differences between baby boomers and Gen Y and Z; between Gen Z and Gen X and Gen Y for "awareness" sub-scale ($p < 0.001$). "Conscious nutrition" was found statistically different between baby boomers and Gen X, Gen Y, and Gen Z; between Gen X and Gen Z (p: 0.002). "Interference" showed a statistically differences between Gen Z and baby boomers, Gen X, Gen Y ($p < 0.001$). Additionally baby boomers and Gen Z showed a statistical differences for depression score (p: 0.016).

Table 1. Demographic characteristics of participants (*n*: 547).

Parameters	Baby boomers (*n*: 79)	Gen X (*n*: 109)	Gen Y (*n*: 163)	Gen Z (*n*: 196)	Total (*n*: 547)	*p*-value
Age (mean ± SD)	67.69 ± 5.86	52.02 ± 3.15	37.59 ± 5.95	22.56 ± 2.64	39.54 ± 16.51	<0.001
Sex						0.093
Male	28 (35.4)	32 (29.4)	34 (20.9)	56 (28.6)	150 (27.4)	
Female	51 (64.6)	77 (70.6)	129 (79.1)	140 (71.4)	397 (72.6)	
Education						<0.001
Elementary school or lower	53 (67.1)	24 (22.0)	16 (9.8)	–	93 (17.0)	
High school	12 (15.2)	21 (19.3)	47 (28.8)	95 (48.5)	175 (32.0)	
University or higher	14 (17.7)	64 (58.7)	100 (61.4)	101 (51.5)	279 (51.0)	
Occupation						<0.001
Non-Employee	79 (100.0)	77 (70.6)	111 (68.1)	99 (50.5)	366 (66.9)	
Employee	–	32 (29.4)	52 (31.9)	97 (49.5)	181 (33.1)	
Smoking						0.003
Yes	12 (7.2)	27 (24.8)	59 (36.2)	67 (34.2)	165 (30.2)	
No	67 (84.8)	82 (75.2)	104 (63.8)	129 (65.8)	382 (69.8)	
Regular physical activity						0.002
Yes	10 (12.7)	30 (27.5)	34 (20.9)	65 (33.2)	139 (25.4)	
No	69 (87.3)	79 (72.5)	129 (79.1)	131 (66.8)	408 (74.6)	
History of chronic disease						<0.001
Yes	52 (65.8)	51 (46.8)	58 (35.6)	36 (18.4)	197 (36.0)	
No	27 (34.2)	58 (53.2)	105 (64.4)	160 (81.6)	350 (64.0)	
Social media use						<0.001
Yes	31 (39.2)	95 (87.2)	146 (89.6)	166 (84.7)	438 (80.1)	
No	48 (60.8)	14 (12.8)	17 (10.4)	30 (15.3)	109 (19.9)	
Height (cm) (mean ± SD)	162.47 ± 20.39	166.36 ± 9.30	167.43 ± 8.62	170.33 ± 9.36	167.66 ± 9.10	<0.001
Body weight (kg) (mean ± SD)	77.82 ± 14.63	80.83 ± 56.22	71.76 ± 15.89	66.50 ± 14.97	71.31 ± 15.46	<0.001
WC (cm) (mean ± SD)	94.46 ± 15.44	88.53 ± 16.29	82.35 ± 19.32	75.00 ± 15.64	82.70 ± 18.23	<0.001
HC (cm) (mean ± SD)	110.00 ± 14.50	102.78 ± 16.97	98.50 ± 19.04	92.73 ± 15.91	98.94 ± 17.86	<0.001
BMI (kg/m^2) (mean ± SD)	28.79 ± 5.26	27.28 ± 4.46	25.53 ± 4.98	22.76 ± 3.91	25.35 ± 5.05	<0.001

ANOVA test was used for height, body weight, BMI, WC, HC. Chi-square test was used for categorical data. BMI, body mass index; WC, waist circumference; HC, hip circumference.

Table 2. Differences of IES-2, MEQ, and DASS-21 scales between generations (*n*: 547).

	Baby boomers (*n*: 79)	Gen X (*n*: 109)	Gen Y (*n*: 163)	Gen Z (*n*: 196)	Total (*n*: 547)	*p*-value
IES-2 sub-scales						
Unconditional permission to eat	3.29 ± 0.71	3.08 ± 0.67	3.22 ± 0.65	3.38 ± 0.64	3.26 ± 0.67	0.002
Eating for physical rather than emotional reasons	3.38 ± 0.53	3.35 ± 0.73	3.34 ± 0.77	3.25 ± 0.73	3.32 ± 0.72	0.404
Reliance on hunger and satiety cues	3.57 ± 0.91	3.36 ± 1.16	3.37 ± 1.17	3.56 ± 0.98	3.47 ± 1.07	0.468
Body–food choice congruence	3.44 ± 0.89	3.39 ± 1.14	3.39 ± 1.12	3.59 ± 0.92	3.47 ± 1.03	0.635
Total IES-2 scores	3.40 ± 0.46	3.29 ± 0.61	3.31 ± 0.61	3.39 ± 0.53	3.35 ± 0.56	0.452
MEQ sub-scales						
Eating without thinking	3.43 ± 0.82	3.37 ± 0.86	3.44 ± 0.82	3.32 ± 0.81	3.38 ± 0.82	0.569
Emotional eating	3.76 ± 0.83	3.68 ± 0.99	3.66 ± 1.13	3.44 ± 1.04	3.60 ± 1.04	0.052
Eating control	3.77 ± 0.81	3.49 ± 0.90	3.66 ± 0.88	3.56 ± 0.79	3.61 ± 0.85	0.091
Awareness	2.99 ± 0.45	3.15 ± 0.43	3.25 ± 0.42	3.12 ± 0.39	3.15 ± 0.42	<0.001
Eating discipline	3.04 ± 0.82	3.00 ± 0.78	2.83 ± 0.79	2.99 ± 0.76	2.95 ± 0.78	0.100
Conscious nutrition	2.78 ± 0.53	3.03 ± 0.55	3.05 ± 0.54	2.97 ± 0.50	2.98 ± 0.53	0.002
Interference	3.87 ± 0.81	3.72 ± 0.78	3.69 ± 0.81	3.41 ± 0.85	3.62 ± 0.83	<0.001
Total MEQ scores	3.33 ± 0.39	3.32 ± 0.46	3.34 ± 0.45	3.24 ± 0.41	3.30 ± 0.43	0.137
Depression scores	11.71 ± 3.57	12.87 ± 4.25	12.52 ± 4.42	13.74 ± 5.09	12.91 ± 4.58	0.016
Anxiety scores	12.67 ± 3.70	11.88 ± 3.90	12.09 ± 3.80	13.06 ± 4.52	12.48 ± 4.10	0.074
Stress scores	13.61 ± 3.01	14.06 ± 4.33	13.90 ± 4.22	14.32 ± 4.48	14.04 ± 4.19	0.834

ANOVA test was used. IES-2, eating scale – 2nd edition; MEQ, mindful eating questionnaire.

A weak negative correlation was observed among baby boomers between BMI and "interference", as well as between depression and several IES-2 or MEQ components, including total IES-2 scores, "eating for physical rather than emotional reasons", "body–food choice congruence", and "eating control". Furthermore, a weak negative correlation was identified between anxiety and both total IES-2 scores or "unconditional

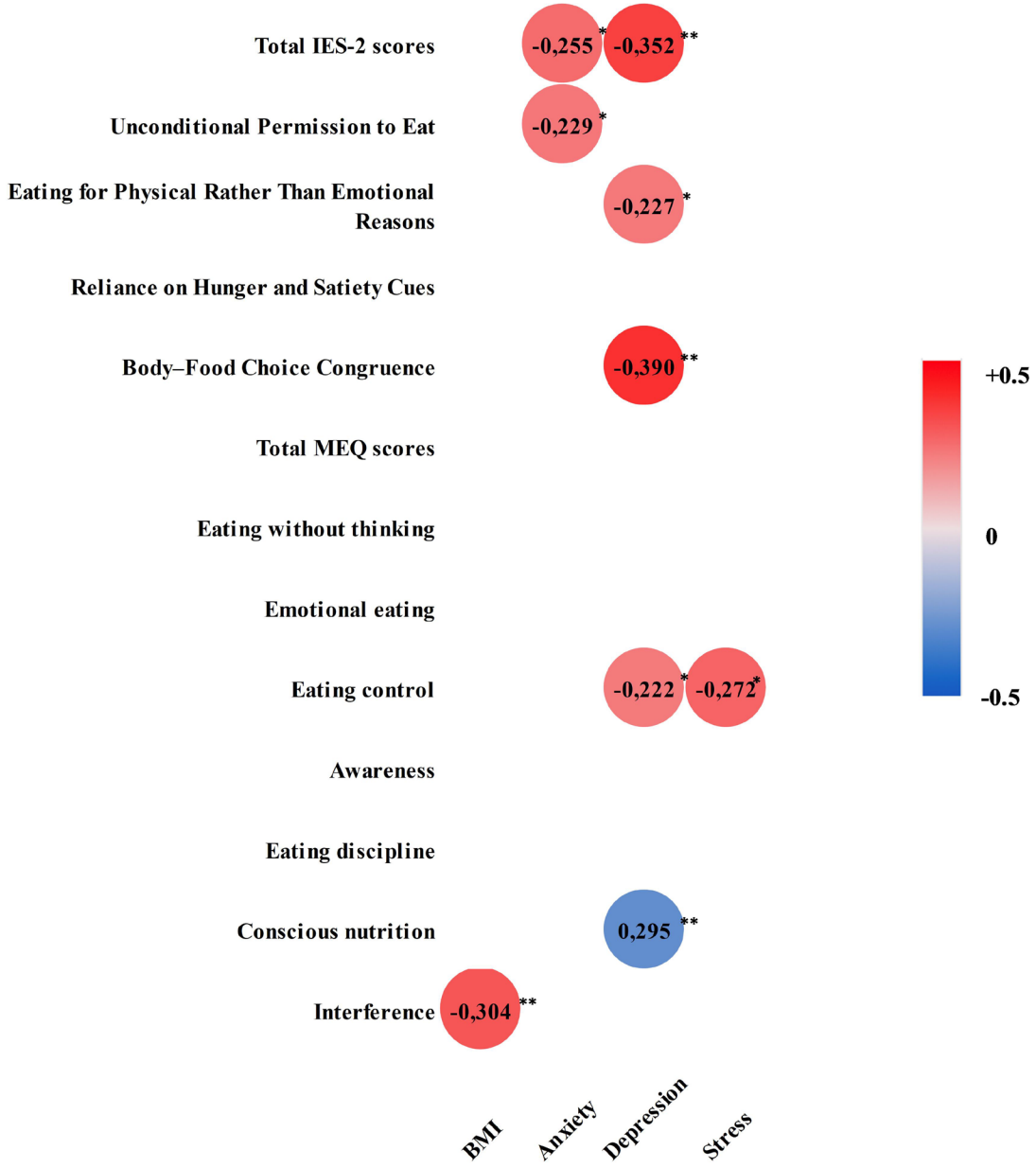

Figure 1. Correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in baby boomers (Pearson correlation was used. *$p < 0.05$, **$p < 0.001$. The red bars indicate positive correlations, blue bars indicate negative correlation).

permission to eat", while stress showed a weak negative correlation with "eating control". Interestingly, a weak positive correlation was observed between depression and "conscious nutrition" for baby boomers (Figure 1).

Figure 2 presents the correlations of BMI and various psychological variables, such as depression, anxiety, and stress, with intuitive and mindful eating in Gen X. BMI exhibited weak negative correlations with total IES-2 score and its sub-scales, except for "unconditional permission to eat", as well as with several MEQ components, including total MEQ scores, "eating discipline", and "ınterference". Anxiety showed a weak negative correlation with the total IES-2 score and its subscales, except for "unconditional permission to eat", while depression showed a weak negative correlation with the total MEQ score and its subscales, except for "eating control" and "interference". Stress was correlated with the total MEQ score and the most subscales; however, no correlation was observed with any of the IES-2 components.

BMI was negatively correlated with IES-2 components, including total IES-2 scores, "Eating for physical rather than emotional reasons", and "reliance on hunger and satiety cue" in Gen Y. Additionally, a negative correlation was observed between BMI and total MEQ scores, as well as various sub-scales, including "eating without thinking", "eating control", "eating discipline", "conscious nutrition", and

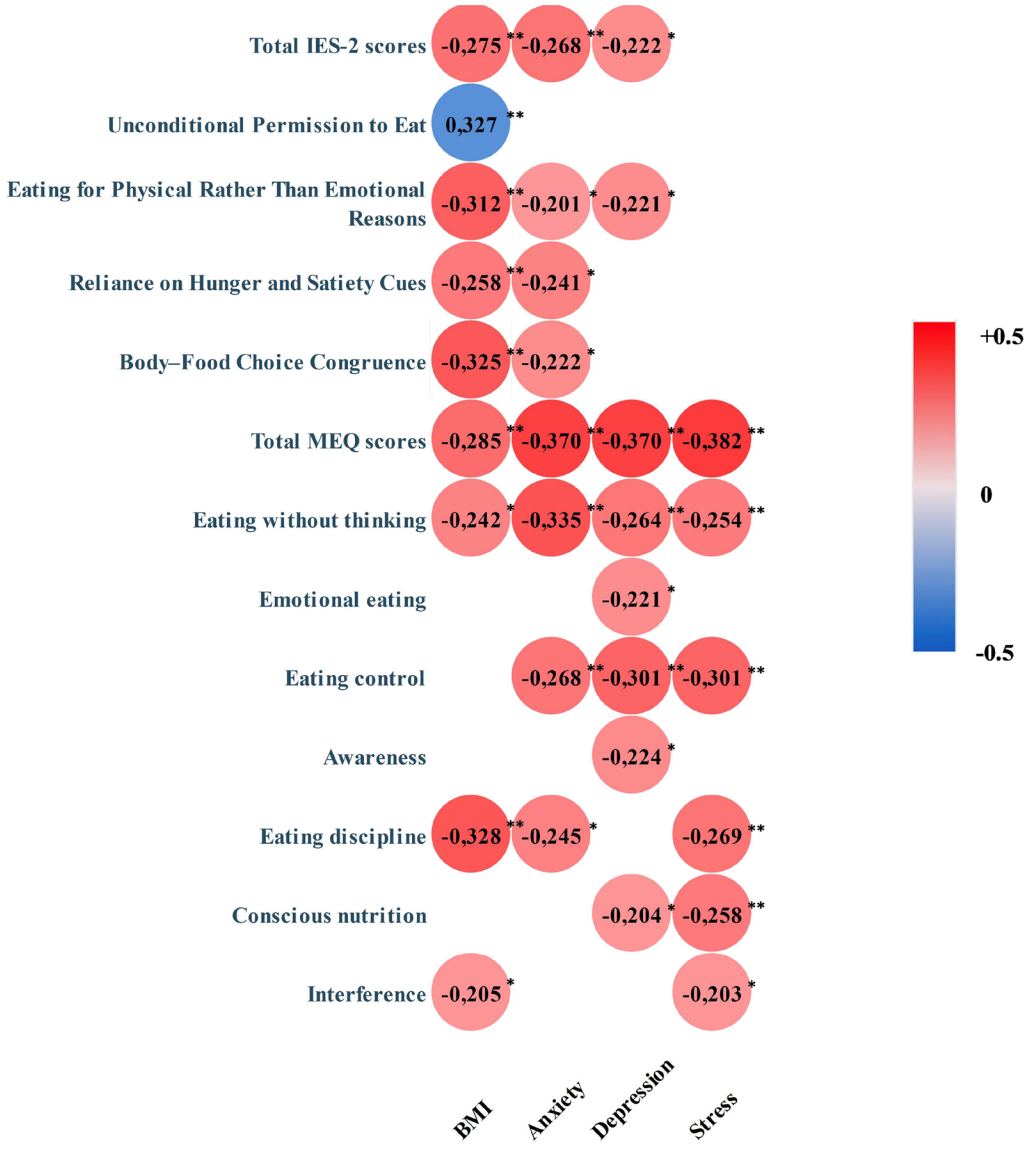

Figure 2. Correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in generation X (Pearson correlation was used. *$p < 0.05$, **$p < 0.001$. The red bars indicate positive correlations, blue bars indicate negative correlation).

"interference". Anxiety and depression both showed a weak negative correlation with several IES-2 components. Interestingly, anxiety demonstrated no significant correlation with IES-2 components, except for the total IES-2 score. However, all psychological variables exhibited a weak negative correlation with almost all MEQ components (Figure 3).

In the Gen Z, no correlation was observed between BMI and IES-2 or MEQ components, with the exception of "unconditional permission to eat" and "conscious nutrition", respectively. All psychological variables demonstrated a negative correlation solely with "eating for physical rather than emotional reasons" among the IES-2 components. Conversely, a weak-to-moderate negative correlation was observed with most MEQ components, including "eating without thinking", "emotional eating", "eating control" and "interference" (Figure 4).

Table 3 shows the correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in all participants. There was a weak negative correlation between BMI and most IES-2 and MEQ components, except for "unconditional permission to eat", "emotional eating", "awareness" and "interference". Both depression and anxiety scores showed negative correlations with a range of measures, including total IES-2 and MEQ scores as well as several subscales. Stress score demonstrated no significant negative correlation with IES-2 components, except for "eating for physical rather than emotional reasons". However, a weak negative correlation was observed for all MEQ components, except for "eating discipline".

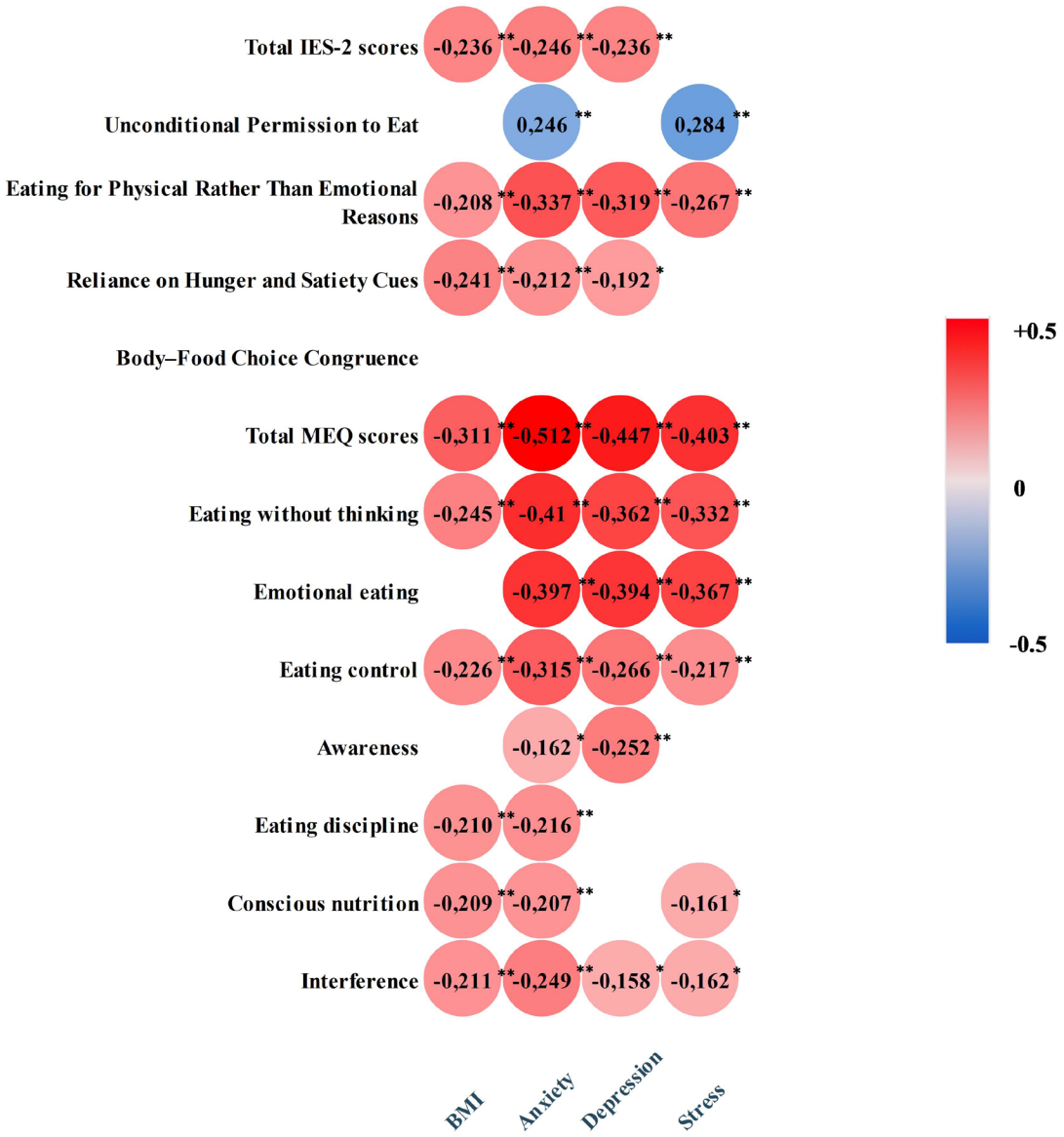

Figure 3. Correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in generation Y (Pearson correlation was used. *$p < 0.05$, **$p < 0.001$. The red bars indicate positive correlations, blue bars indicate negative correlation).

Discussion

Non-dieting approaches, including mindful/intuitive eating, to improve health are of increasing interest (Hoare et al. 2022). According to the literature, IE is associated with a number of measures of better psychological health. For example, intuitive eaters have been found to show better psychological and behavioural health and lower levels of depression, anxiety, and stress symptoms (Warren et al. 2017; Hazzard et al. 2021; Linardon et al. 2021). In this study, for all participants, the highest "total IES-2 scores" were found for baby boomers, while the lowest scores were found for Gen X. However, the total IES-2 scores were close to the upper limit, and there was no statistically differences between generations. It was observed that all generations in Türkiye believed in healthy eating (Zeren et al. 2023). Additionally, this means that the social media users in the study were intuitive eaters. This is because the study was conducted using an online survey method in an Internet environment, and most participants reported using social media.

It has been proposed that "unconditional permission to eat" whatever food is desired based on these cues, regardless of nutrient or caloric content, may decrease excessive preoccupation with food (Avalos and Tylka 2006). We found that Gen Z had the highest scores for "Unconditional permission to eat, whereas Gen X had the lowest scores, with statistically significant differences. Social norms can influence nutrition. Physical image and social media mainly

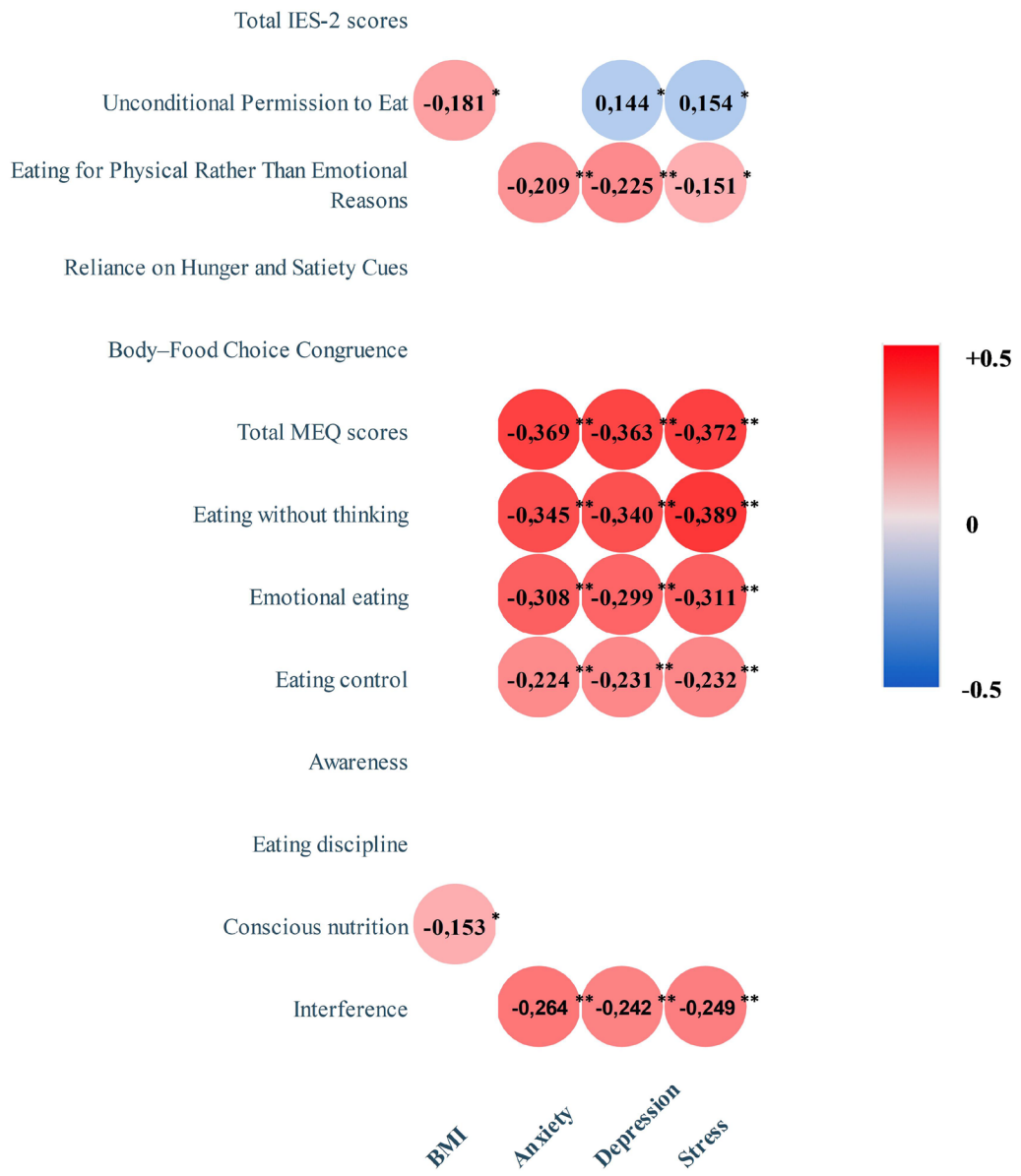

Figure 4. Correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in generation Z (Pearson correlation was used. *$p < 0.05$, **$p < 0.001$. The red bars indicate positive correlations, blue bars indicate negative correlation).

influence the healthy eating habits of Gen Z in Turkey (Zeren et al. 2023). A study found that social media could nudge young people to consume more and derive more calories from foods in place of high-energy dense foods (Hawkins et al. 2021). Similarly, another study reported that young people conform to the amount of tasty food eaten by their peers through social media interactions (Bevelander et al. 2013).

For all participants from each generation, the mean value of the total MEQ scores was close to the upper limit in the specified range. Durukan and Gül (2019) found the same results for all generations. It was thought that the social media users in the study were mindful eaters.

Interference refers to the ability to cope with sensory factors such as smell, sight, and sound, and distractors such as invitation, food variety, and advertising (Framson et al. 2009). Framson et al. (2009) found that higher age was associated with lower "interference" score. Conversely, we found that baby boomers had the highest scores for "interference", whereas the lowest scores were found for Gen Z. There were statistically significant differences between Gen Z and baby boomers and Gen X and Gen Y. Similar results were found for baby boomers according to Durukan and Gül (2019); however, there were no statistically significant differences between generations (Durukan and Gül 2019). It is not surprising that baby boomers in Türkiye have the highest "interference", "eating control" and "eating discipline" scores because they are hardworking, idealistic, self-reliant

Table 3. Correlation of BMI, depression, anxiety and stress scores with IES-2 and MEQ scores in all participants.

	BMI	Depression scores	Anxiety scores	Stress scores
IES-2 sub-scales				
Unconditional permission to eat	*R*: −0.020 *P*: 0.638	*R*: 0.091 *P*: 0.032	*R*: 0.106 *P*: 0.013	*R*: 0.142 *P*: 0.001
Eating for physical rather than emotional reasons	*R*: −0.121 *P*: 0.005	*R*: −0.259 $p < 0.001$	*R*: −0.249 $p < 0.001$	*R*: −0.168 $p < 0.001$
Reliance on hunger and satiety cues	*R*: −0.144 *P*: 0.001	*R*: −0.140 *P*: 0.001	*R*: −0.138 *P*: 0.001	*R*: −0.079 *P*: 0.066
Body–food choice congruence	*R*: −0.121 *P*: 0.005	*R*: −0.98 *P*: 0.022	*R*: −0.135 *P*: 0.003	*R*: −0.037 *P*: 0.395
Total IES-2 scores	*R*: −0.165 $p < 0.001$	*R*: −0.194 $p < 0.001$	*R*: −0.191 $p < 0.001$	*R*: −0.100 *P*: 0.020
MEQ sub-scales				
Eating without thinking	*R*: −0.124 *P*: 0.004	*R*: −0.297 $p < 0.001$	*R*: 0.337 $p < 0.001$	*R*: −0.326 $p < 0.001$
Emotional eating	*R*: −0.20 *P*: 0.640	*R*: −0.302 $p < 0.001$	*R*: −0.277 $p < 0.001$	*R*: −0.288 $p < 0.001$
Eating control	*R*: −0.111 *P*: 0.009	*R*: −0.259 $p < 0.001$	*R*: −0.252 $p < 0.001$	*R*: −0.248 $p < 0.001$
Awareness	*R*: −0.049 *P*: 0.256	*R*: −0.162 $p < 0.001$	*R*: −0.123 *P*: 0.004	*R*: −0.124 *P*: 0.004
Eating discipline	*R*: −0.134 *P*: 0.002	*R*: −0.087 *P*: 0.042	*R*: −0.111 *P*: 0.010	*R*: −0.052 *P*: 0.231
Conscious nutrition	*R*: −0.179 $p < 0.001$	*R*: −0.057 *P*: 0.188	*R*: −0.081 *P*: 0.057	*R*: −0.106 *P*: 0.014
Interference	*R*: −0.048 *P*: 0.262	*R*: −0.181 $p < 0.001$	*R*: −0.210 $p < 0.001$	*R*: −0.188 $p < 0.001$
Total MEQ scores	*R*: −0.159 $p < 0.001$	*R*: −0.364 $p < 0.001$	*R*: −0.372 $p < 0.001$	*R*: −0.360 $p < 0.001$

Pearson correlation was used. BMI, body mass index; IES-2, eating scale – 2nd edition; MEQ, mindful eating questionnaire.

and consistent in their decisions. People may also become more disciplined as they get older, as they gain more life experience and maturity.

Awareness includes differences such as taste, flavour, smell, and nutritional properties of food, whereas conscious nutrition is expressed as an awareness that involves conscious attention (Framson et al. 2009). Gen Y had the highest scores for "awareness", and "conscious nutrition", whereas baby boomers had the lowest scores. Similarly, a recent study found that "awareness" and "conscious nutrition" scores were higher in Gen Y, and there was a statistically differences between generations (Durukan and Gül 2019). This generation has a huge impact on the world economy due to the number of representatives and their increasing purchasing power, and is slowly becoming the largest consumer segment in history. It has been reported that this generation deals with high ideals about clean earth, getting their voice heard without limits, is eager to prove themselves, is more familiar with technology, and is against traditional general contractors (Kaplan and Aktan 2015). Furthermore, studies showed that age prompted changes in eating habits, such as reducing portion size, or substituting a "proper meal" for a snack (Delaney and McCarthy 2011; Edfors and Westergren 2012). It has also been reported that older people acquire nutrition knowledge through social media or public health campaigns (Banwell et al. 2010; Bloom et al. 2017). In this study, most baby boomers did not use social media. Therefore, baby boomers had lower awareness scores than other generations.

IE and ME promote weight management while reducing emphasis on caloric restriction. Both approaches promote eating in response to internal cues (e.g. hunger/satiety); therefore, each approach incorporates internal awareness- and acceptance-related tenets that may be related to eating behaviours and BMI. According to the literature, these approaches are associated with a lower BMI (Anderson et al. 2016; Durukan and Gül 2019; Demirbas et al. 2021; Linardon et al. 2021; Özkan and Bilici 2021). Similarly, our findings showed that BMI had a weak negative correlation with the total IES-2 and MEQ scores for all participants. These correlational findings is driven by Gen X and Gen Y. Furthermore, the IES-2 subscales "eating for physical rather than emotional reasons" and "reliance on hunger and satiety cues" and MEQ subscales "eating discipline" and "interference" were negatively correlated with BMI in both Gen X and Gen Y. However, no significant correlations were found between BMI and either total IES-2 or MEQ scores, or most of their subscales in both baby boomers and Gen Z. This may be related to the lower levels of "awareness" and "conscious nutrition" in both generations than in others. Another possible explanation is the increasing BMI with age in baby boomers, given the bidirectionality between the associations. Notwithstanding these findings, BMI may serve as a useful measure of intuitive and mindful eating, particularly in certain age groups.

Some researchers have identified dieting as a risk factor for negative psychological and behavioural health outcomes, including depression and disordered eating behaviours. The relationship between dieting and these outcomes has been explained using restraint theory and the spiral model of chronic dieting and eating disorders. The restraint theory suggests that limiting food intake reduces sensitivity to internal hunger signals and increases reliance on external cues, which can result in overeating and obesity. The spiral model suggests that repeated failures in dieting may result in low self-esteem and depression (Hazzard et al. 2021). Indeed, numerous diet plans are known to be ineffective in achieving long-term weight management outcomes. In this context, IE and ME may be promising alternatives to the diet.

Studies have showed that IE and ME are negatively associated with depression, anxiety, and stress symptoms (Duarte et al. 2016; Winkens et al. 2019; Barbosa et al. 2020; Linardon et al. 2021). In this study, a weak correlation was found between the total IES-2 scores and the aspects of depression, anxiety, and stress, whereas a moderate correlation was found between the MEQ scores and the same aspects in the overall population. The relationship between the IES-2 subscale "eating for physical reasons" and depression was consistently negative in each generation, while the MEQ subscale "eating control" was consistently negatively associated with both depression and stress in each generation. These subscales were also significantly negatively associated with anxiety in each generation, except for the baby boomers. These results suggest that both IE and ME may be valuable intervention targets for better psychological and behavioural health.

Our study has several limitations. First, the study design was cross-sectional, which does not allow for the determination of cause-and-effect relationships or directionality between findings. In other words, people who are currently depressed may be less likely to adhere to mindful/intuitive eating. Second, the evaluation of both IE and ME relies solely on self-reported recall, which may result in biased results owing to the potential for inaccurate reporting. Third, the possibility that participants who identified themselves as having an ME or IE style wanted to eat this way cannot be ignored. It is important to examine the degree of agreement between reported and actual eating styles. Fourth, the analyses were conducted only among Turkish consumers and socio-cultural factors may have influenced the results. Our study does not provide an opportunity to compare consumers from different generations in different countries. Conversely, the main strength of this study is its broad generational scope, from baby boomers to Gen Z. Researchers studying generations have typically focused on the two most recent generations. Additionally, conducting an online survey has some advantages such as anonymity of the participants, creation of an automatic database, and geographical dissemination.

Conclusion

The interest in non-dieting approaches such as mindful/intuitive eating is increasing. This study is probably one of the few to evaluate the relationship between IE/ME and BMI, depression, anxiety, and stress among generations. Our study demonstrated a weak negative correlation between IES-2/MEQ scores and BMI for all participants. BMI may be a useful measure of mindful and intuitive eating, although consistent findings have not been obtained for each generations. There was also a negative correlation between IES-2/MEQ scores and the components of depression, anxiety, and stress for all participants. For each generation, the relationships between the subscales "eating for physical reasons" or "eating control" and depression was found to be consistently negative, while the subscale "eating control" showed a similar negative correlation with stress. Therefore, mindful/intuitive eating may also have an impact on mental health.

Acknowledgments

This study was orally presented as an abstract at the 6th International Izmir Congress on Medicine, Nursing, Midwifery, and Health Sciences on October 11–13, 2024.

Ethics statement

All procedures were performed according to the Principles of the Declaration of Helsinki. The study was approved (Number: 2023-09) at Istanbul Gelisim University on 20.11.2023. Written and verbal informed consent was obtained from all subjects.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The authors reported there is no funding associated with the work featured in this article.

ORCID

Hatice Merve Bayram http://orcid.org/0000-0002-7073-2907
Murat Gürbüz http://orcid.org/0000-0001-7778-7524

References

Anderson LM, Reilly EE, Schaumberg K, Dmochowski S, Anderson DA. 2016. Contributions of mindful eating, intuitive eating, and restraint to BMI, disordered eating, and meal consumption in college students. Eat Weight Disord. 21(1):83–90. doi: 10.1007/s40519-015-0210-3.

Avalos LC, Tylka TL. 2006. Exploring a model of intuitive eating with college women. J Couns Psychol. 53(4):486–497. doi: 10.1037/0022-0167.53.4.486.

Banwell C, Dixon J, Broom D, Davies A. 2010. Habits of a lifetime: family dining patterns over the lifecourse of older Australians. Health Sociol Rev. 19(3):343–355. doi: 10.5172/hesr.2010.19.3.343.

Barbosa MR, Penaforte FRDO, Silva AFDS. 2020. Mindfulness, mindful eating and intuitive eating in the approach to obesity and eating disorders. Revista Eletrônica Saúde Mental Álcool e Drogas. 16(3):118–135.

Bas M, Karaca KE, Saglam D, Arıtıcı G, Cengiz E, Köksal S, Buyukkaragoz AH. 2017. Turkish version of the intuitive eating Scale-2: validity and reliability among university students. Appetite. 114:391–397. doi: 10.1016/j.appet.2017.04.017.

Bevelander KE, Anschütz DJ, Creemers DH, Kleinjan M, Engels RC. 2013. The role of explicit and implicit self-esteem in peer modeling of palatable food intake: a study on social media interaction among youngsters. PLoS One. 8(8):e72481. doi: 10.1371/journal.pone.0072481.

Bloom I, Lawrence W, Barker M, Baird J, Dennison E, Sayer AA, Cooper C, Robinson S. 2017. What influences diet quality in older people? A qualitative study among community-dwelling older adults from the Hertfordshire Cohort Study, UK. Public Health Nutr. 20(15):2685–2693. doi: 10.1017/S1368980017001203.

Campbell WK, Campbell SM, Siedor LE, Twenge JM. 2015. Generational differences are real and useful. Ind Organ Psychol. 8(3):324–331. doi: 10.1017/iop.2015.43.

Delaney M, McCarthy M. 2011. Food choice and health across the life course: a qualitative study examining food choice in older Irish adults. J Food Prod Mark. 17(2–3):114–140. doi: 10.1080/10454446.2011.548717.

Demirbas N, Kutlu R, Kurnaz A. 2021. The relationship between mindful eating and body mass index and body compositions in adults. Ann Nutr Metab. 77(5):262–270. doi: 10.1159/000518675.

Dorsey J. 2018. Generation FAQs. [cited 2024 Feb 2]. https://jasondorsey.com/about-generations/generations-birth-years/.

Duarte C, Gouveia JP, Mendes A. 2016. Psychometric properties of the Intuitive Eating Scale-2 and association with binge eating symptoms in a Portuguese community sample. Int J Psychol Psychol Ther. 16(3):329–341.

Durukan A, Gül A. 2019. Mindful eating: differences of generations and relationship of mindful eating with BMI. Int J Gastron Food Sci. 18:100172. doi: 10.1016/j.ijgfs.2019.100172.

Edfors E, Westergren A. 2012. Home-living elderly people's views on food and meals. J Aging Res. 2012:761291–761299. doi: 10.1155/2012/761291.

Framson C, Kristal AR, Schenk JM, Littman AJ, Zeliadt S, Benitez D. 2009. Development and validation of the mindful eating questionnaire. J Am Diet Assoc. 109(8):1439–1444. doi: 10.1016/j.jada.2009.05.006.

Grider HS, Douglas SM, Raynor HA. 2021. The influence of mindful eating and/or intuitive eating approaches on dietary intake: a systematic review. J Acad Nutr Diet. 121(4):709–727.e1. doi: 10.1016/j.jand.2020.10.019.

Hawkins L, Farrow C, Thomas JM. 2021. Does exposure to socially endorsed food images on social media influence food intake? Appetite. 165:105424. doi: 10.1016/j.appet.2021.105424.

Hazzard VM, Telke SE, Simone M, Anderson LM, Larson NI, Neumark-Sztainer D. 2021. Intuitive eating longitudinally predicts better psychological health and lower use of disordered eating behaviors: findings from EAT 2010–2018. Eat Weight Disord. 26(1):287–294. doi: 10.1007/s40519-020-00852-4.

Hoare JK, Lister NB, Garnett SP, Baur LA, Jebeile H. 2022. Mindful and intuitive eating imagery on instagram: a content analysis. Nutrients. 14(18):3834. doi: 10.3390/nu14183834.

Kaplan M, Aktan D. 2015. Mindful consumption and generation Y: comprehension, conceptualization, and communication. 20th International Conference on Corporate and Marketing Communications, Izmir, Turkey.

Linardon J, Tylka TL, Fuller-Tyszkiewicz M. 2021. Intuitive eating and its psychological correlates: a meta-analysis. Int J Eat Disord. 54(7):1073–1098. doi: 10.1002/eat.23509.

Lovibond S, Lovibond P. 1995. Manual for the depression anxiety stress scales. Sydney: Sydney Psychology Foundation of Australia.

Lowe MR. 2015. Dieting: proxy or cause of future weight gain? Obes Rev. 16 Suppl 1(S1):19–24. doi: 10.1111/obr.12252.

Köse G, Tayfur M, Birincioğlu İ, Dönmez A. 2016. Yeme Farkındalığı Ölçeği'ni Türkçeye Uyarlama Çalışması. JCBPR. 3:125–134.

Masuda A, Hill ML. 2013. Mindfulness as therapy for disordered eating: a systematic review. Neuropsychiatry. 3(4):433–447. doi: 10.2217/npy.13.36.

Nelson JB. 2017. Mindful eating: the art of presence while you eat. Diabetes Spectr. 30(3):171–174. doi: 10.2337/ds17-0015.

Özkan N, Bilici S. 2021. Are anthropometric measurements an indicator of intuitive and mindful eating? Eat Weight Disord. 26(2):639–648. doi: 10.1007/s40519-020-00904-9.

Sala M, Shankar Ram S, Vanzhula IA, Levinson CA. 2020. Mindfulness and eating disorder psychopathology: a meta-analysis. Int J Eat Disord. 53(6):834–851. doi: 10.1002/eat.23247.

Tylka TL. 2006. Development and psychometric evaluation of a measure of intuitive eating. J Couns Psychol. 53(2):226–240. doi: 10.1037/0022-0167.53.2.226.

Tylka TL, Kroon Van Diest AM. 2013. The Intuitive eating scale-2: item refinement and psychometric evaluation with college women and men. J Couns Psychol. 60(1):137–153. doi: 10.1037/a0030893.

Sarıçam H. 2018. The psychometric properties of Turkish version of depression anxiety stress scale-21 (DASS-21) in health control and clinical samples. JCBRP. 7:19–30.

Warren JM, Smith N, Ashwell M. 2017. A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: effectiveness and associated potential mechanisms. Nutr Res Rev. 30(2):272–283. doi: 10.1017/S0954422417000154.

Winkens LHH, Van Strien T, Brouwer IA, Penninx BWJH, Visser M. 2019. Mindful eating and change in depressive symptoms: mediation by psychological eating styles. Appetite. 133:204–211. doi: 10.1016/j.appet.2018.11.009.

Zeren HZ, Bali EB, Demir H. 2023. Nutritional habits comparison of the baby boomer, X, Y, and Z generations located at a private college in Muğla, Türkiye. Czech J Food Sci. 41(6):436–445.