A R T I C L E

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A survey of eating styles in eight countries: Examining restrained, emotional, intuitive eating and their correlates

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Abstract

Introduction: Restrained, emotional and intuitive eating were examined in relation to each other and as correlates of participants' weight status, body image and self-esteem. In some past research, restrained and emotional eating have been associated with higher weight status and poorer mental health, while intuitive eating is more frequently linked to lower weight status and more positive well-being. However, these eating styles have rarely been examined together and never in a large cross-country sample.

Method: Six-thousand two-hundred and seventy-two (6272) emerging adults (*M* age = 21.54 years, *SD* = 3.13) completed scales from the Three-Factor Eating Questionnaire, the Eating Disorders Examination Questionnaire, the Intuitive Eating Scale-2, the Multidimensional Body Self Relations Questionnaire, the Rosenberg Self-Esteem Scale, and provided weight and height information that was used to calculate body mass index (BMI). Participants resided in Australia, Belgium, Canada, China, Italy, Japan, Spain and the United States and provided information using an online survey.

Results: Path analyses for the entire sample revealed significant pathways between higher intuitive eating and higher body satisfaction and self-esteem, and lower BMIs among participants. Higher levels of restrained and emotional eating were associated with lower body satisfaction and self-esteem, and higher BMIs among participants. Minor cross-country differences were evident in these patterns of relations, but intuitive eating emerged as a consistent predictor across countries.

Conclusion: Overall, findings suggest that efforts should be made to increase intuitive eating among emerging adults and to support individual and macrolevel interventions to decrease restrained and emotional eating behaviours.

K E Y W O R D S

BMI, body satisfaction, cross-country research, emerging adults, emotional eating, intuitive eating, restrained eating, self-esteem

Statement of Contribution

What is already known on this subject?

- Past research suggests that intuitive eating is positively related to psychological and physical health outcomes (e.g. positive body image).
- Intuitive eating tends to be negatively associated with emotional and restrained eating styles.
- Emotional and restrained eating styles have been found to be related to negative psychological and physical health outcomes (e.g. disordered eating, higher weight).

What does this study add?

- Among nearly 6000 early adults from eight countries, higher intuitive eating tended to be associated with higher body satisfaction and self-esteem and lower BMIs.
- Higher levels of restrained and emotional eating were generally associated with lower body satisfaction and self-esteem.
- Minor cross-country differences in patterns of relations among eating styles and health outcomes were evident, suggesting that past research on eating styles may generalize to some other cultures, but not all.

INTRODUCTION

Individuals' eating styles – including restrained, emotional and intuitive eating – have been linked with physical and psychological health. In particular, restrained and emotional eating have been found to be associated with elevated weight status and poor mental health (Mitchison et al., 2017; Vlahoyiannis & Nifli, 2020). In contrast, intuitive eating has been associated with lower weight status and psychological well-being (Avalos & Tylka, 2006; Lindardon & Mitchell, 2017; Ruzanska & Warschburger, 2019). This study expands this research by examining the extent to which these eating styles are related to psychological well-being (i.e. body satisfaction, self-esteem) and weight, especially in various sociocultural contexts.

The Acceptance Model of Intuitive Eating (Avalos & Tylka, 2006) provides a rationale for positive links between intuitive eating, body satisfaction and mental health. It suggests that intuitive eating is associated with positive feelings about the self and the body, with a likely reciprocal relationship (e.g. positive body image leading to greater instances of intuitive eating and vice versa). The Acceptance Model of Intuitive Eating (Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006) also suggests that restrained and emotional eating should be negatively associated with intuitive eating, with both restrained and emotional eating linked with body dissatisfaction and compromised mental and physical health. One recent study (Smith et al., 2020) found that dietary restraint and emotional eating seem to interfere with participants' ability to eat intuitively. The context (e.g. family, country) of individuals' eating behaviours is likely to contribute to eating habits that may ultimately affect eating styles (Rozin, 2007); however, patterns of associations among these constructs have not received much attention across diverse countries.

Intuitive eating

Intuitive eating is guided by physical hunger and satiety cues, characterized by a rejection of both dietary restraint and the labelling of foods as 'good' or 'bad', and allows for eating experiences that are both enjoyable and nourishing (Tribole & Resch, 2003). Intuitive eating has been found

to be associated with greater weight stability and lower weight status among adults (Ruzanska & Warschburger, 2019), body satisfaction, body appreciation (Avalos & Tylka, 2006; Linardon & Fuller-Tyszkiewicz, 2021; Lindardon & Mitchell, 2017), self-esteem (Tylka, 2006; Tylka & Wilcox, 2006) and overall mental health (Soulliard & Vander Wal, 2019). Those who appreciate their body have been shown to be more aware of their bodily needs such as internal hunger and satiety signals, which seems to lead to both intuitive eating and well-being (Gillen & Markey, 2015; Linardon & Fuller-Tyszkiewicz, 2021).

Recent research has provided additional support for the benefits of intuitive eating, with one study suggesting that an intervention designed to reduce unhealthy dieting behaviours was able to successfully improve intuitive eating, body satisfaction and concerns about eating (Wilson, et al., 2020). Research further suggests that intuitive eating may contribute to eating disorder recovery (Cardosa et al., 2020; Koller et al., 2020). Cross-cultural studies of the correlates and consequences of intuitive eating are limited, except for emerging research examining assessments of intuitive eating in a few European countries and Canada (Camilleri et al., 2015; Carbonneau et al., 2016). This research suggests that intuitive eating is associated with lower rates of disordered eating and higher body satisfaction (Carbonneau et al., 2016).

Restrained eating

Restrained eating or dietary restraint refers to the rigid restriction of consumption typically with the aim of weight loss or weight maintenance (Kerin et al., 2019; Polivy & Herman, 1985). However, empirical data suggest it is usually ineffective and has paradoxically been shown to contribute to food vigilance (Hollitt et al., 2010) and body preoccupation (Mitchison et al., 2017). Further, restrained eating is theoretically incompatible with intuitive eating and has been found to be negatively related to intuitive eating in past research (Bacon et al., 2005; Denny et al., 2013; Smith et al., 2020). Restrained eaters tend to ignore bodily cues of hunger and satiety with the aim of modifying or maintaining weight. There is evidence that dietary restraint is associated with explicit actual and ideal body image (Glashouwer et al., 2018) and body dissatisfaction (Vartanian et al., 2018).

Some research has suggested that dietary restraint is associated with higher BMI. Individuals with higher BMIs may restrict their eating as an attempt to control their weight or to lose weight; some have argued that this is adaptive and may result in weight loss (e.g. Adams et al., 2019; Schaumberg et al., 2016). However, for some, attempts to restrain oneself from eating certain foods or certain amounts of food may lead to an increased likelihood of food overconsumption and increased weight (Vlahoyiannis & Nifli, 2020). Further, some research suggests that dietary restraint predicts disordered eating (MacLeod et al., 2020), with failures at restraint associated with increased food cravings and emotional eating (Reichenberger et al., 2019); other research suggests that dietary restraint may not lead to disordered eating across time (Stewart et al., 2022). Dieting, which is similar to restrained eating, but differs in that restraint is characterized by long-term chronicity (whereas dieting endeavours usually last for short periods or cycles), has been found to be related to lower body satisfaction, self-esteem and overall well-being (Markey, 2014). In one recent study that experimentally manipulated thoughts about dieting, changes in body shape concerns and self-esteem followed (Sarfan et al., 2019). Cross-cultural examinations of correlates of dietary restraint are limited; however, rewards associated with thinness, such as admiration and social success, may be expected to vary somewhat cross-culturally and perceived rewards are associated with dietary restraint and decisions to diet (Boivin et al., 2008).

Emotional eating

Emotional eating is defined as eating in response to internal emotional signals and is often used to regulate emotions or alleviate the discomfort of particular emotional experiences (e.g. stress; Cappelleri et al., 2009;

Stunkard & Messick, 1985). Emotional eating has been found to be positively associated with overeating and intake of energy-dense foods, which may result in higher weight status (Lopez-Cepero et al., 2019), and is linked to higher body dissatisfaction (Gillen & Markey, 2015). Recent research has suggested that the association between dietary restraint and weight status may be mediated by emotional eating (van Strien et al., 2020). Another study suggested that higher body esteem and self-compassion are associated with less emotional eating (Carbonneau et al., 2020); more positive feelings about the self may reduce emotional eating. Further, emotional eating may be, in part, an emotional response to feeling deprived from food. When patterns of emotional eating are reduced, weight loss has been found to follow (Annesi, 2020). Emotional eating has also been shown to be associated with lower body image flexibility (Duarte & Pinto-Gouveia, 2015), suggesting that improvements in body image may reduce emotional eating.

Cross-cultural examinations of emotional eating behaviours are scarce. One study suggests that women residing in the United States are more likely to engage in emotional eating than are women residing in Japan (Hawks et al., 2003). Comparison of Japanese women living in Japan and the United Kingdom and British women living in the United Kingdom revealed different patterns of associations between emotional eating and eating psychopathology (Waller & Matova, 1999). Specifically, British women were found to be most likely to report levels of emotional eating and eating psychopathology that were associated while Japanese women living in Japan were least likely to. Taken together, these studies may indicate that individuals residing in non-Western countries are less likely to engage in emotional eating than those residing in Western countries, and the correlates of emotional eating may differ cross-culturally.

Aims and hypotheses

Although the constructs examined in this study have been investigated in past research, they are rarely examined in the same study (for an exception, see Smith et al., 2020). Thus our understanding of the relations among all of these constructs remains limited. Further, these eating styles and their possible correlates have not been examined *at all* in several of the countries included in our research. Thus, using a large, eight-country sample of emerging adult men and women, this study examined the associations among emotional, restrained and intuitive eating. Emerging adults are our focus because during this developmental period following adolescence and preceding adulthood, youth experience social and psychological transitions and appear to be at risk of body dissatisfaction (Arnett et al., 2014). Further, this developmental period is associated with an increase in weight as well as with changes in lifestyle habits (e.g. eating higher calorie foods, sleeping less; Villatte & Aimé, 2020).

Given past research, we expected that emotional eating would be positively associated with restrained eating, whereas intuitive eating would be negatively related to both emotional eating and restrained eating. Further, we predicted that emotional eating and restrained eating would be associated with higher weight status (BMI) and intuitive eating would be related to lower weight status (BMI; see Figure 1). We also anticipated that emotional eating and restrained eating would be associated with lower body satisfaction and self-esteem (included as a measure of overall well-being) while intuitive eating would be related to higher body satisfaction and self-esteem. These associations were also examined to determine whether these relationships are equivalent across countries.

METHOD

Participants and procedure

A total of 6272 emerging adults completed the study survey. The mean age of the participants was 21.54 years ($SD = 3.13$, range 18–30 years). See Table 1 for further demographics for the entire sample and for each individual country.
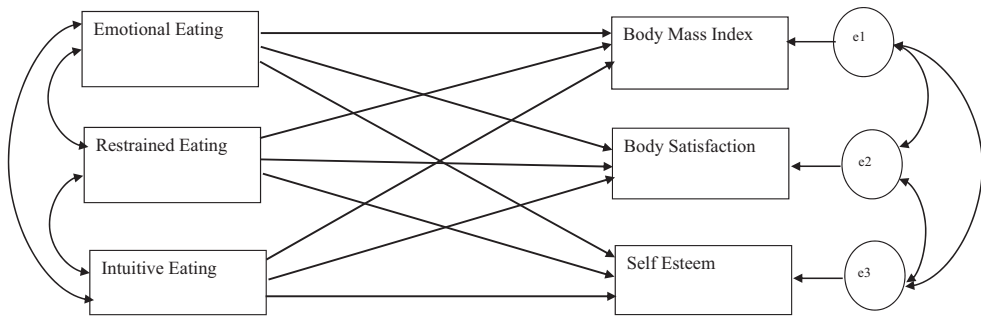
FIGURE 1 Starting model for path analysis

Participants were recruited from university research sites and online forums located in each of the collaborating countries: Australia (N = 597), Belgium (N = 618), Canada (N = 768), China (N = 669), Italy (N = 661), Japan (N = 622), Spain (N = 821) and the United States (N = 1516). People participated online using Qualtrics survey software. Informed consent was collected online prior to beginning the survey. In some cases, course credit or a chance to win a nominal financial reward was used to encourage participation (i.e. in Australia, Canada and the United States, a few randomly chosen participants received $100 gift cards). The entire online survey took between 60 and 90 minutes to complete. Ethics approval for the project and data management were obtained (approval number: 2017-259E) from the coordinating site in Australia and from at least one university ethics committee in each of the seven other countries. Data collection occurred between July 2018 and March 2019 (for more information, see McCabe et al., 2019).

Measures

Demographic information

Participants from all countries were asked to self-report their age, sex (coded 0 for men, 1 for women, those reporting they were nonbinary, trans or of another gender identification were coded as 2), height and weight, and socioeconomic status (SES). Perceived SES was estimated by participants' use of a scale ranging from 1 to 10; participants were asked to represent themselves on this scale where 1 represented the people who have the least money, least education and the least respected jobs or no job and 10 represented the people who have the most money, the most education, and the most respected jobs (Operario et al., 2004). Participants' mean SES score was 6.56 (SD = 1.51, range 1–10).

Eating styles

Restrained eating
The Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994), Dietary Restraint subscale, was used to assess participants' restrained eating. This scale was chosen for its brevity and because it can be used to assess disordered eating behaviours. It is comprised of five items including, 'Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)'? Participants responded to items on a rating scale ranging from 0 = no days to 6 = every day. The total score was calculated by averaging the responses from the five items, with higher scores representing greater restrained eating. The reliability of these five items was acceptable in the entire sample (Cronbach's α = .85) and when the subsamples by country were considered (Cronbach's

TABLE 1 Demographic information about participants

Demographic variable	Total sample, n (%)	Australia, n (%)	Belgium, n (%)	Canada, n (%)	China, n (%)	Italy, n (%)	Japan, n (%)	Spain, n (%)	USA, n (%)
Gender									
Male	1931 (30.8)	204 (34.2)[a]	229 (37.2)[a]	145 (18.9)[a]	292 (44.7)[a]	171 (14.3)[a]	89 (14.3)[a]	336 (41.0)[a]	465 (30.7)[a]
Female	4222 (67.6)	382 (64.0)[a]	385 (62.5)[b]	611 (79.6)[b]	325 (49.8)[b]	483 (73.5)[b]	527 (84.9)[b]	480 (58.5)[b]	1029 (68.0)[a]
Other gender	92 (1.5)	11 (1.8)[a]	2 (0.3)[b]	11 (1.4)[a,b]	36 (5.5)[c]	3 (0.5)[a]	5 (0.8)[a,b]	4 (0.5)[b]	20 (1.3)[a]
Relationship status									
Single	3821 (61.3)	345 (57.8)[a]	325 (52.8)[a]	402 (52.4)[a]	513 (78.7)[a]	250 (38.0)[a]	462 (74.8)[a]	629 (76.9)[a]	895 (59.2)[a]
In a relationship (e.g. de facto)	2151 (34.5)	225 (37.7)[a]	263 (42.8)[b]	269 (35.1)[a]	127 (19.5)[b]	400 (60.8)[b]	144 (23.3)[b]	171 (20.9)[b]	552 (36.5)[a,b]
Married	151 (2.4)	20 (3.4)[a]	10 (1.6)[a,b]	42 (5.5)[b]	10 (1.5)[a,b]	3 (0.5)[a]	11 (1.8)[a,b]	3 (0.2)[c]	53 (3.5)[b]
Other	115 (1.8)	7 (1.2)[a]	17 (2.8)[a,b]	54 (7.0)[c]	2 (0.3)[b]	5 (0.8)[a]	1 (0.2)[b]	4 (2.0)[a,b]	13 (0.9)[c]
Employment status									
Full-time	910 (14.7)	102 (17.1)[a]	149 (24.7)[a]	180 (23.5)[a]	33 (5.1)[a]	72 (11.1)[a,b]	58 (9.6)[a]	15 (1.8)[a]	301 (19.9)[a]
Part-time/casual	2183 (35.2)	311 (52.1)[a]	66 (10.9)[b]	387 (50.5)[a]	49 (7.5)[a]	153 (23.5)[b]	342 (56.3)[b]	249 (30.4)[b]	626 (41.4)[a]
Unemployed	2083 (33.6)	156 (26.1)[b]	107 (17.7)[c]	129 (16.8)[b]	387 (59.4)[b]	312 (47.9)[c]	154 (25.4)[a]	404 (49.4)[c]	434 (28.7)[b]
Other	1031 (16.61)	28 (4.7)[c]	282 (46.7)[d]	71 (9.3)[b]	182 (28.0)[b]	114 (17.5)[a]	53 (8.7)[a]	150 (18.3)[b]	151 (10.0)[c]
Study status									
Full-time	4997 (79.8)	409 (68.5)[a]	438 (71.3)[a]	543 (70.8)[a]	606 (92.9)[a]	485 (73.8)[a]	537 (87.0)[a]	758 (92.4)[a]	1201 (79.4)[a]
Part-time	410 (6.6)	54 (9.0)[b]	11 (1.8)[b]	87 (11.3)[b]	25 (3.8)[b]	52 (7.9)[a,b]	6 (1.0)[b]	62 (7.6)[a]	113 (7.5)[a,b]
Not currently in school	757 (12.1)	124 (20.8)[b]	150 (24.4)[c]	128 (16.7)[b]	20 (3.1)[c]	107 (16.3)[b]	64 (10.4)[b]	0 (0)[b]	164 (0.8)[a]
Other	92 (1.5)	10 (1.7)[a,b]	15 (2.4)[a,c]	9 (1.2)[a,b]	1 (0.2)[b,c]	13 (2.0)[a,b]	10 (1.6)[b]	0 (0)[b]	34 (2.2)[b]

Note: a,b,c,d represent a column proportion that does not significantly differ from others in the same row at $p < .05$. Comparisons were made using the Z-test in the crosstabs function of SPSS with a Bonferroni correction.

α = .89 for Australia, .81 for Belgium, .85 for Canada, .87 for China, .84 for Italy, .85 for Japan, .84 for Spain, .85 for the U.S.).

Emotional eating

The 21-item Three-Factor Eating Questionnaire (TFEQ-R21; Cappelleri et al., 2009) is a measure used to assess three domains of eating behaviour: cognitive restraint (CR), uncontrolled eating (UE) and emotional eating (EE). In the present study, the 6-item emotional eating subscale was employed. Items include, 'When I feel sad, I often eat too much' and 'If I feel nervous, I try to calm down by eating'. Participants respond to items on a response scale ranging from 1 = definitely true to 4 = definitely false, with higher total emotional eating scores indicative of more emotional eating (i.e. overeating more due to negative mood). A total score was calculated by averaging the responses from the 6 items with higher scores indicating higher levels of emotional eating. The reliability of this measure was acceptable in the entire sample (Cronbach's α = .92) and when the subsamples by country were considered (Cronbach's α = .93 for Australia, .92 for Belgium, .92 for Canada, .92 for China, .90 for Italy, .91 for Japan, .91 for Spain, .92 for the United States).

Intuitive eating

The Intuitive Eating Scale-2 (Tylka & Kroon Van Diest, 2013), Reliance on Hunger and Satiety Cues subscale, was used to assess participants' intuitive eating. This scale consists of six items including, 'I trust my body to tell me when to eat' and 'I rely on my hunger signals to tell me when to eat'. Participants responded to items on a Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The score was calculated by averaging the responses for the 6 items with higher scores indicative of greater intuitive eating (i.e. reliance on hunger and satiety cues). The reliability of this measure was acceptable in the entire sample (Cronbach's α = .86) and when the subsamples by country were considered (Cronbach's α = .88 for Australia, .82 for Belgium, .88 for Canada, .85 for China, .86 for Italy, .85 for Japan, .86 for Spain, .86 for the United States).

Outcomes

Body mass index

BMI was used as a measure of weight status. Participants reported their weight and height and indicated the metric they were using (e.g. inches or centimetres). Self-reported weight and objective weight of individuals have been found to be highly correlated (Pursey et al., 2014). The mean BMI of the participants was 23.40 (*SD* = 4.97, range 15.03–49.95).

Body image

The Multidimensional Body Self Relations Questionnaire (MBSRQ; Cash, 2000) was used to assess participants' body image. Specifically, the 9-item Body Areas Satisfaction scale was used. This scale queried participants about the extent to which they were satisfied (1 = very dissatisfied to 5 = very satisfied) with particular body parts (e.g. face, hair, weight). Items were averaged to create a total score with higher scores indicative of greater body satisfaction. Cronbach's alphas revealed acceptable reliability scores across the entire sample (α = .85) and all eight countries (Australia = .87, Belgium = .78, Canada = .83, China = .89, Italy = .80, Japan = .81, Spain = .87 and the United States = .84).

Self-esteem

Self-esteem was measured using five items from the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). This measure is designed to assess the degree to which individuals feel they have self-worth and positive qualities. The five items chosen were all framed positively, including 'I am able to do things as well as most other people'. And 'I feel that I'm a person of worth'. Items were responded to on a

TABLE 2 Means and standard deviations for entire sample and each country

Variables	Total sample	Australia	Belgium	Canada	China	Italy	Japan	Spain	USA
Emotional eating	2.17 (0.82)	2.34 (0.86); Be, Ja, Sp	2.00 (0.78); Au, Ca, Ch, It, US	2.28 (0.90); Be, Ja, Sp	2.21 (0.75); Be, Ja, Sp	2.22 (0.75); Be, Ja, Sp	2.04 (0.81); Au, Ca, Ch, It, US	2.01 (0.76); Au. Ca, Ch, It, US	2.22 (0.83); Be, Ja, Sp
Restrained eating	1.30 (1.42)	1.75 (1.74); Be, Ca, Ch, It, Ja, Sp, US	0.84 (1.08); Au, Ca, It, Sp, US	1.23 (1.43); Au, Be, US	1.02 (1.18); Au, It, Sp, US	1.40 (1.37); Au, Be, Ch, Ja	1.09 (1.30); Au, It, Sp, US	1.39 (1.44); Au, Be, Ch, Ja	1.49 (1.47); Au, Be, Ca, Ch, Ja
Intuitive eating	3.19 (0.83)	3.00 (0.92); Be, Ca, It, Sp, US	3.24 (0.73); Au, Ch	3.26 (0.91); Au, Ch, Ja	3.09 (0.73); Be, Ca, It, US	3.29 (0.79); Au, Ch, Ja	3.11 (0.81); Ca, It, Us	3.16 (0.85); Au	3.26 (0.84); Au, Ch, Ja
Body mass index	23.55 (8.19)	24.43 (7.11); Be, Ch, It, Ja, Sp	22.49 (3.35); Au, Ca, Ja, US	25.43 (15.31); Be, Ch, It, Ja, Sp	22.35 (6.72); Au, Ca, Ja, US	22.27 (3.85); Au, Ca, Ja, US	20.53 (2.48); Au, Be, Ca, Ch, It, Sp, US	22.81 (3.54); Au, Ca, Ja, US	25.36 (9.32); Be, Ch, It, Ja, Sp
Body satisfaction	3.19 (0.74)	3.01 (0.79); Be, Ca, Ch, It, Ja, Sp, US	3.40 (0.58); Au, Ca, Ch, It, Ja, US	3.20 (0.72); Au, Be, Ja, Sp	3.14 (0.77); Au, Be, Ja, It, Sp	3.27 (0.68); Au, Be, Ch, Ja, Sp	2.65 (0.65); Au, Be, Ca, Ch, It, Sp, US	3.50 (0.72); Au, Ca, Ch, It, Ja, Sp, US	3.19 (0.71); Au, Be, Ja, Sp
Self-esteem	15.31 (3.37)	14.42 (3.45); Be, Ca, Ch, It, Ja, Sp, US	15.93 (2.62); Au, Ch, Ja	16.28 (3.53); Au, Ch, It, Ja, US	15.06 (2.79); Au, Be, Ca, Ja, Sp	15.45 (2.96); Au, Ca, Ja, Sp	13.11 (3.13); Au, Be, Ca, Ch, It, Sp, US	16.08 (3.53); Au, Ch, Ja, It, US	15.51 (3.46); Au, Ca, Ja, Sp

Note: Tukey HSD post-hoc comparisons with $p < .001$ are shown. Au = Australia, Be = Belgium, Ca = Canada, Ch = China, It = Italy, Ja = Japan, Sp = Spain, US = USA.

4-point rating scale (1 = strongly agree to 4 = strongly disagree); however, to ease interpretation of the summed score, these values were reverse scored and higher scores are indicative of higher self-esteem. The Cronbach's alphas across the entire sample (α = .92) and all eight countries were acceptable (Australia = .92, Belgium = .90, Canada = .93, China = .89, Italy = .87, Japan = .87, Spain = .93 and the United States = .93). See McCabe et al., 2019; Strodl et al., 2020 for additional psychometric information and translation protocol for this and other measures.

Data analytic strategy

Missing data ranged from 0.1% (gender) to 5.5% (Self-Esteem), and were handled (for descriptive statistics) using pair-wise deletion and (for path models) using full information maximum likelihood estimation (FIML). The means for each of the predictor and dependent variables were compared across the eight countries using analysis of variance, with Tukey's HSD tests used for post-hoc testing.

Path analyses were conducted using AMOS version 27. Path analyses were chosen given that our model contained multiple independent and dependent variables that we aimed to examine simultaneously. More practical measures of fit were included as measures of model fit in addition to chi-square/ degrees of freedom (CMIN/df) because it is well known that model fit is misrepresented by chi-square in large samples (Shi et al., 2019). Chi-square was supplemented with the following measures of goodness of fit: Comparative Fit Index (CFI: Bentler, 1990), and Root Mean Squared Error of Approximation (RMSEA; Steiger, 1990). The cut-offs for an acceptable fit of the model based upon the CFI were > .95 (Hu & Bentler, 1999). A score on the RMSEA of <.06 was considered a good fit (Hu & Bentler, 1999), and a score of <.08 was considered a reasonable fit (Jöreskog & Sörbom, 1993). The only modifications required to the starting model in order to improve the model fit was the deletion of the covariance between the error terms for Body Mass Index and Self-Esteem.

Once the path analysis model was confirmed for the entire sample, a multigroup analysis was performed to test the invariance of the model across countries. The unconstrained baseline model (M1) was compared across countries to the constrained structural weights model with the paths from the predictors to the outcomes fixed at equality across countries (M2). The M2 model was in turn compared with the constrained structural means model (M3). The M3 model was compared with the constrained structural residuals model (M4), which was compared with the constrained structural covariance model (M5) with the variances of each model fixed at equality across countries. Comparisons were made using Chi-square, as well as changes (Δ) in CFI and RSMEA. We interpreted measurement invariance when Δ CFIs $\leq$ .01 and Δ RMSEAs $\leq$ .015 (Chen, 2007; Cheung & Rensvold, 2002). Finally, we tested the path analysis model for each country individually.

RESULTS

Comparisons of variables across countries

Means for modelled variables for the total sample and for each country are listed in Table 2. There was a significant difference between the countries on Emotional Eating ($F_{[7,5893]}$ = 16.37, p < .001, η_p^2 = .019), Restrained Eating ($F_{[7,5859]}$ = 27.35, p < .001, η_p^2 = .032), Intuitive Eating ($F_{[7,5907]}$ = 10.34, p < .001, η_p^2 = .012), BMI ($F_{[7,6189]}$ = 37.27, p < .001, η_p^2 = .040), Body Satisfaction ($F_{[7,6048]}$ = 87.65, p < .001, η_p^2 = .092) and Self-Esteem ($F_{[7,5827]}$ = 62.727, p < .001, η_p^2 = .070). Post-hoc comparisons are shown in Table 2.

Examination of the bivariate correlations between the study variables for the entire sample and per country indicated significant associations between all variables except between BMI and self-esteem (see Tables 3 and 4). As expected, emotional eating and restrained eating were positively correlated

with BMI, while negatively correlated with body satisfaction and self-esteem. In contrast, intuitive eating was negatively correlated with BMI but positively correlated with body satisfaction and self-esteem. These associations appeared to be similar across countries with variations in the strength of the associations. The only exceptions were that restrained eating was not associated with intuitive eating in China, while emotional eating was not associated with intuitive eating in Japan and Spain.

Testing the model for the entire sample

The path analysis model for the entire sample is shown below in Figure 2. The model provided a reasonable fit of the data (χ^2/df = 26.78, p < .001, CFI = .993, RMSEA = .064). In accordance with the hypotheses, emotional eating and restrained eating maintained an independent positive association with BMI and independent negative associations with body satisfaction and self-esteem. Similarly, emotional eating and restraint eating maintained an independent negative association with BMI, while also exhibiting unique positive associations with body satisfaction and self-esteem.

Testing the invariance of the model across countries

Multigroup analyses are summarized in Table 5. The results indicated that there was a significant difference across the countries between the unconstrained baseline model and the constrained structural weights model (i.e. Δ CFIs > .01 and Δ RMSEAs > .015). Similarly, a significant difference emerged between the constrained structural weights model and the constrained structural means model, which in turn significantly differed from the constrained structural residual model. Finally, the difference between the constrained structural residual model and the constrained structural covariance model also varied across countries.

Testing models by country

Path analyses results for each country are presented in Table 6. The model fit for each country was good, with the exception that the RMSEA was larger than the acceptable cut-off of 0.08 when the model was tested among Belgian participants.

There was a high degree of variability in the strength of the standardized regression weights across countries. Emotional eating was associated with higher BMIs in all countries with the exception of China and Spain. Emotional eating was associated with lower body satisfaction in all countries. Emotional eating was significantly and negatively related to lower self-esteem in all countries except Australia and Canada.

TABLE 3 Correlations for study variable for entire sample

	Emotional eating	Restrained eating	Intuitive eating	Body mass index	Body satisfaction	Self esteem
Emotional eating	–					
Restrained eating	.24[***]	–				
Intuitive eating	−.23[***]	−.29[***]	–			
Body mass index	.17[***]	.18[***]	−.12[***]	–		
Body satisfaction	−.28[***]	−.30[***]	.29[***]	−.12[***]	–	
Self esteem	−.16[***]	−.22[***]	.18[***]	−.02	.45[***]	–

***p < .001.

Restrained eating was not significantly associated with BMI in Canada, China, and Italy; but it was associated with higher BMIs in Australia, Belgium, Japan, Spain and the United States. In contrast, restrained eating was significantly and negatively associated with lower body satisfaction and self-esteem in all countries.

With respect to intuitive eating, there was no significant association with BMI in Australia, China, Spain and the United States, but there was a negative association between these variables in Belgium, Canada, Italy and Japan. There was a positive and significant relationship between intuitive eating and higher body satisfaction in all countries except Spain. Finally, there was not a significant association between intuitive eating and self-esteem in participants from China, Italy, Belgium and Spain; while there was a significant and positive association between intuitive eating and self-esteem among participants from Australia Canada, Japan and the United States.

Cross-country differences were also noted in terms of the size of the squared multiple correlations. The amount of variance explained in BMI, body satisfaction and self-esteem by the model was lowest among participants from China and highest in BMI in those from Canada, and highest in body satisfaction and self-esteem in those from Australia. These results suggest the associations found among the variables studied varied depending on the country.

DISCUSSION

The aim of this study was to examine associations among eating styles – emotional eating, restrained eating and intuitive eating – and potential correlates of these eating styles: BMI, body satisfaction and self-esteem. These associations were examined across emerging adult participants from eight countries and also within each country. Our results suggest that intuitive eating was related to lower weight and higher body image and self-esteem. Further, intuitive eating was found to be related to a lower BMI and higher body satisfaction and self-esteem across countries. In contrast, restrained and emotional eating were associated with higher BMI and lower body satisfaction and self-esteem. When countries of residence were taken into consideration, it appeared that the strength of the associations between these three eating styles, BMI, body satisfaction and self-esteem varied. For example, some associations were not found in non-Western countries like China and Japan.

Correlational analyses that considered the entire sample of participants found significant associations among these variables in the expected directions. Participants from the entire sample who engaged in higher levels of emotional eating were more likely to also report engaging in higher levels of restrained eating. Some research (Polivy & Herman, 1999) has suggested that individuals who try to avoid eating certain types or amounts of food and engage in chronic, restrained eating are also likely to feel pulled towards emotional eating as they break their dietary restraint. Further, these two eating styles may reflect disordered eating patterns ranging from chronic dieting to binge eating (Frayn & Knäuper, 2018). However, participants who engaged in more intuitive eating practices were less likely to report engaging in emotional eating and dietary restraint. By definition, these eating patterns are somewhat opposed, with intuitive eating characterized by eating that is consonant with the experience of hunger and emotional eating characterized by eating regardless of hunger but due to emotional cues, while restrained eating is characterized by the chronic denial of hunger.

Both the correlational analyses and the path analysis model showed that participants who were more likely to eat intuitively were also more likely to have lower BMIs, as well as higher body satisfaction and self-esteem. In contrast, participants reporting higher emotional and restrained eating styles were more likely to have higher BMIs and lower body satisfaction and self-esteem. These findings are consistent with what would be predicted by the Acceptance Model of Intuitive Eating (Augustus-Horvath & Tylka, 2011). According to this model, individuals who trust their bodies eat adaptively in response to hunger cues; they are not preoccupied with food because it is not forbidden but viewed as both physical and psychological nourishment. Intuitive eating could be associated with a positive sense of self and one's body and perhaps lower weight because eating

TABLE 4 Correlations for emotional, restrained, and intuitive eating for 8 countries

|	Emotional	Restrained	Intuitive	Emotional	Restrained	Intuitive	Emotional	Restrained	Intuitive	Emotional	Restrained	Intuitive
Emotional	—	*Australia;* .208***	*Australia;* −.358***	—	*Canada;* .188***	*Canada;* −.294***	—	*Italy;* .313***	*Italy;* −.280***	—	*Spain;* .212***	*Spain;* −.015
Restrained	*Belgium;* .282***	—	*Australia;* −.484***	*China;* .216***	—	*Canada;* −.395***	*Japan;* .272***	—	*Italy;* −.320***	*USA;* .236***	—	*Spain;* −.242***
Intuitive	*Belgium;* −.243***	*Belgium;* −.327***	—	*China;* −.112**	*China;* −.050	—	*Japan;* −.055	*Japan;* −.103*	—	*USA;* −.356***	*USA;* −.308***	—

*p < .05.; **p < .01.; ***p < .001.
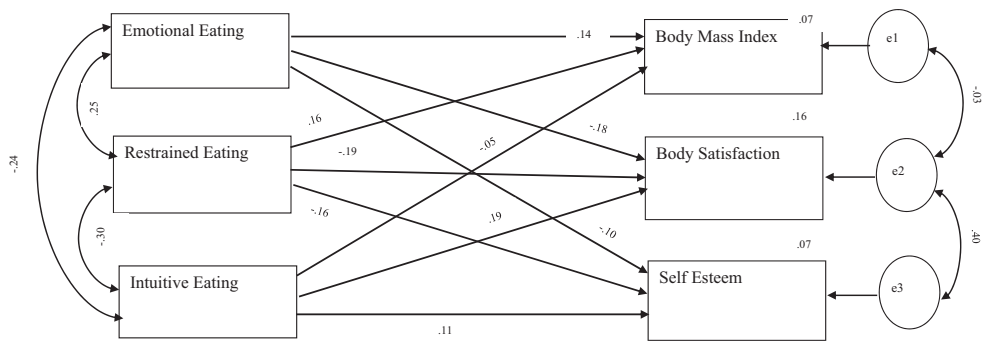
FIGURE 2   Final path analysis model for total sample

TABLE 5   Multigroup analysis of unconstrained model

Model comparison	Δdf	CMIN	Δp	ΔCFI	ΔRMSEA
M1	8	20.28	.03	.997	.016
M2 vs. M1	63	206.81	<.001	.036	−.003
M3 vs. M2	42	1593.04	<.001	.384	−.030
M4 vs. M3	42	456.14	<.001	.102	.002
M5 vs. M4	35	4027.24	<.001	.475	−.025

Note: M1 = unconstrained baseline model; M2 = constrained structural weights model; M3 = constrained structural means model; M4 = constrained structural covariances model; M5 = constrained structural residuals model.

habits that result from intuitive eating may be more connected to bodily needs (Tylka & Kroon Van Diest, 2013). Moreover, as stated earlier, restrained and emotional eating could be perceived as two sides of the same coin (Reichenberger et al., 2019).

When our model was examined among participants from each of the eight countries separately, the general patterns were mostly similar to what we found when the entire sample was examined. In particular, emotional, restrained and intuitive eating were predictive of body satisfaction in all countries, except Spain. Because body satisfaction is a psychological construct that encompasses affect and cognitions about one's body, it is sensical that feeling positively about one's body is associated with nourishing one's body in an adaptive manner – responding to physiological cues and enjoying food (Tribole & Resch, 2003).

Emotional, restrained and intuitive eating were not significantly associated with participants' self-esteem and weight status in all of the countries considered. This suggests that, although BMI and self-esteem may be influenced by eating styles in some of the countries we studied, they could also depend on other variables such as cultural norms. Similarly, other research examining a large study sample drawn from 200 countries found that BMI means for adult men and women varied from one country to another. In fact, mean BMI tended to be lower in central Africa and South Asia and higher in high-income English-speaking countries. Moreover, increases in BMI over a thirty-year period were more likely to be observed in high-income English-speaking countries than in continental Europe, central Europe, south-western Europe and high-income Asia Pacific countries (NCD Risk Factor Collaboration, 2016). In our study, emotional and intuitive eating did not predict Spanish participants' BMIs. Furthermore, none of the eating styles predicted BMI among Chinese participants. These findings are consonant with BMI trends worldwide. They are further supported by results in a 2021 report indicating that Chinese adults are not as likely to experience elevated weight status as adults in most other industrialized countries (World Population Review, 2021).

TABLE 6 Comparison of model across 8 countries

	Australia, N = 597	Belgium, N = 618	Canada, N = 768	China, N = 669	Italy, N = 661	Japan, N = 622	Spain, N = 821	USA, N = 1516
Model fit indices								
CMIN/df (p)	0.003 (.955)	8.965 (.003)	6.303 (.012)	0.138 (.71)	3.501 (.061)	0.219 (.640)	0.903 (.342)	0.782 (.377)
CFI	1.000	.984	.991	1.000	.994	1.000	1.000	1.000
RMSEA	.000	.114	.083	.000	.062	.000	.000	.000
Standardized regression weights								
EE→BMI	.227***	.084*	.331***	.014	.225***	.125**	.044	.085**
EE→BS	−.157***	−.241***	−.145***	.129**	−.230***	−.172***	−.166***	−.203***
EE→SE	−.059	−.148***	−.003	−.087*	−.114**	−.139***	−.148***	−.134***
RE→BMI	.124**	.194***	.026	.056	.070	.124**	.301***	.132***
RE→BS	−.326***	−.205***	−.251***	−.122**	−.149***	−.262***	−.294***	−.136***
RE→SE	−.335***	−.192***	−.238***	−.145***	−.124**	−.097*	−.138***	−.148***
IE→BMI	.042	−.144***	−.155***	−.057	−.130**	−.120**	−.062	−.052
IE→BS	.213***	.153***	.245***	.175***	.137**	.132***	.033	.281***
IE→SE	.146**	.009	.179***	−.035	.069	.132***	.031	.123***
Squared multiple correlations								
BMI	.068	.099	.176	.007	.108	.059	.111	.040
Body image	.288	.190	.234	.076	.146	.150	.141	.216
Self-esteem	.198	.077	.122	.034	.052	.058	.053	.087

Note: $*p < .05$, $**p < .01$, $***p < .001$. Significant planned Comparisons (*z*-tests) are designated by a country's corresponding letter under each reference country. All highlighted comparisons were significant at $p < .01$ to $p < .001$.

Abbreviations: BMI, Body Mass Index; BS, Body Satisfaction; EE, Emotional Eating; IE, Intuitive Eating; *ns*, not significant; RE, Restrained Eating; SE, Self-Esteem.

Given that one's weight gain or maintenance is influenced by an interaction between genetic predisposition and lifestyle factors such as nutritional choices, physical activity and sleep habits (Hruby et al., 2016), it seems plausible that BMI trends may be quite different from one country to another, as well as from one individual to another. Research indicates that the pleasure derived from eating differs cross-culturally, with Americans finding less pleasure from eating than Germans or Indians (Sproesser et al., 2018). Pleasure derived from eating actually seems to correlate negatively with health metrics (e.g. waist circumference). Further, no matter one's eating style, the likelihood of presenting a significantly higher or lower BMI may depend somewhat on the country of residence.

We'd also expect that self-esteem – included in this study as an assessment of general well-being – would be influenced by a number of factors, not just one's ability to eat while attending to hunger and satiety cues. For example, recent research has highlighted the relevance of social relationships with parents and peers (Sánchez-Queija et al., 2017) as well as emotional intelligence (Cheung et al., 2015) in predicting higher self-esteem in emerging adults. These factors are likely relevant to our study sample, which was comprised of emerging adults from countries that varied in terms of social bonds and community orientation.

Limitations

The samples from each of the eight participating countries were comprised of adults who may not be representative of all adults in these countries given our sample was relatively educated and financially stable emerging adults. Further, we did not assess cultural intricacies (e.g. traditions, food rituals, belief systems surrounding eating and meals) that may account for the unique patterns of associations among our variables that we found across these countries. Qualitative research may be better able to determine cultural explanations for associations between eating styles and BMI, body satisfaction, and self-esteem than we can with data from this study. Future studies that replicated these finding with additional, more thorough quantitative measures (e.g. The Dutch Eating Behaviour Questionnaire) will also expand this area of study. Finally, the cross-sectional nature of these data prevent causal and temporal interpretations. Our findings are consistent with the Acceptance Model of Intuitive Eating (Augustus-Horvath & Tylka, 2011) and past research (Lindardon & Mitchell, 2017; Tylka & Wilcox, 2006), but it is possible that individuals with higher self-esteem or body satisfaction find themselves more easily motivated to maintain adaptive, more intuitive eating habits, for example. Since individuals with higher BMIs were found to report lower body satisfaction, we cannot rule out the possibility that BMI contributes to the association between eating styles and body satisfaction or self-esteem. It is also likely, although difficult to capture in a single study, that there is a reciprocal relationship between individuals' eating styles and their psychological health and weight.

CONCLUSIONS

Individuals' eating styles appear to be relevant to their well-being. Individuals who eat more intuitively, by definition, are able to enjoy food and allow themselves to eat when they feel hungry or desire a particular food (Augustus-Horvath & Tylka, 2011). In contrast, individuals who try to avoid certain types or amounts of food – that is, engaging in restrained eating – may find themselves constantly monitoring their thoughts and behaviours, suppressing hunger cues and trying to distract themselves from meeting their basic need of nourishment (Polivy et al., 2020). Emotional eaters may rely on food as a source of comfort, and yet not necessarily derive comfort from the experience. Some research (Mann, 2017) suggests that guilt is a likely outcome of emotional eating, not comfort.

The findings from this study extend past research by considering three eating styles (intuitive, emotional and restrained) and relevant correlates in the same study and by doing so using a large, cross-country sample of emerging adults. Results suggest that these eating styles are likely to be associated

with how people feel about their bodies (body satisfaction) and, to a certain extent, themselves in general (self-esteem). Further, we can deduce that these eating styles may affect individuals' actual consumption, given the association sometimes found with weight status (BMI). However, individuals' country of residence also appears to be worthy of further examination, in particular in terms of how eating styles may be associated with weight status and self-esteem. Some cultural contexts may support and encourage certain approaches to eating more than others as the correlates of these eating styles differ somewhat from country to country.

AUTHOR CONTRIBUTIONS

Esben Strodl: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing – original draft; writing – review and editing. **Annie Aimé:** Data curation; project administration; writing – original draft; writing – review and editing. **Marita McCabe:** Conceptualization; data curation; investigation; methodology; project administration; writing – review and editing. **Rachel Rodgers:** Conceptualization; data curation; methodology; writing – review and editing. **Alvaro Sicilia:** Data curation; investigation; methodology; writing – review and editing. **Gianluca Lo Coco:** Conceptualization; data curation; investigation; writing – review and editing. **Jacinthe Dion:** Conceptualization; data curation; investigation; writing – review and editing. **David Mellor:** Conceptualization; data curation; investigation; methodology; writing – review and editing. **Giada Pietrabissa:** Conceptualization; data curation; investigation; methodology; writing – review and editing. **Salvatore Gullo:** Conceptualization; data curation; investigation; writing – review and editing. **Antonio Granero-Gallegos:** Conceptualization; data curation; investigation; methodology; writing – review and editing. **Christophe Maïano:** Conceptualization; data curation; investigation; methodology; writing – review and editing. **Catherine Bégin:** Conceptualization; data curation; investigation; methodology; writing – review and editing. **Manuel Alcaraz-Ibáñez:** Conceptualization; data curation; investigation; methodology. **Marie-Eve Blackburn:** Conceptualization; data curation; investigation; methodology. **Marie L. Caltabiano Caltabiano:** Conceptualization; data curation; investigation; methodology. **Gian Mauro Manzoni:** Conceptualization; data curation; investigation; methodology. **Gianluca Castelnuovo:** Conceptualization; data curation; investigation; methodology. **Naomi Hayami-Chisuwa:** Conceptualization; data curation; investigation; methodology. **Qiqiang He:** Conceptualization; data curation; investigation; methodology. **Matthew Fuller-Tyszkiewicz:** Conceptualization; data curation; formal analysis; investigation; methodology; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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