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ORIGINAL ARTICLE

Intuitive eating, objective weight status and physical indicators of health

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Summary

Introduction

Intuitive eating (IE) has emerged as a weight-neutral approach to health promotion for those with overweight/obesity. This weight-neutral paradigm has some support, although research thus far has often neglected to control for potential confounds (i.e. objective weight status and demographics) and foundational studies are lacking. The objective of the current study was to observe the unique association of IE with physical health indicators in a sample of adults, independent of objective weight status.

Methods

Participants were 248 adults (32 ± 14 years old, 73% female, 64% White) of all weight categories (18.2–55.3 kg m^{-2}), with an average body mass index (BMI) of 30 ± 8 kg m^{-2}. IE was measured with the Intuitive Eating Scale-2 (IES-2). BMI was objectively measured in-lab. Health indicators included blood pressure (BP) and fasting glucose.

Results

A series of hierarchical linear regressions revealed no significant associations between IE and systolic BP ($\beta = -0.076$, $P = 0.256$), diastolic BP (DBP; $\beta = -0.122$, $P = 0.073$) or fasting glucose ($\beta = 0.047$, $P = 0.500$) after controlling for BMI. All effects sizes were small or below ($f^2 = 0.00$ to -0.04). Sensitivity analyses revealed significantly lower DBP in high intuitive eaters versus low when analysed with a *t*-test, $t(111.651) = 3.602$, $P < 0.001$, Levene corrected; however, after controlling for relevant covariates (i.e. BMI and demographics), analysis of covariance revealed no difference in DBP between groups, $F(1, 116) = 0.330$, $P = 0.567$. No significant differences in systolic BP or fasting glucose were observed between low and high intuitive eaters before or after considering covariates.

Conclusions

In sum, this study investigated associations between IE and common indicators of physical health after controlling for objective weight status. Findings revealed no unique relationship between IE and physical health, and any IE–physical health relationships that were observed were accounted for BMI and/or demographic factors.

Keywords: Blood pressure, eating behaviours, glucose, weight control.

Introduction

Current treatment approaches for obesity most often consist of behavioural weight loss (BWL) interventions, typically characterized by lifestyle intervention focused on decreasing calorie intake and increasing physical activity.(1) Although the current obesity treatment approach often leads to initial losses of weight, approximately 46% of lost weight is regained.(2) The general consensus is that weight loss maintenance from BWL treatments is poor, and individuals typically regain most, if not all, of the weight that they lose.(3–6) Further, although the primary target of BWL interventions is physical health, the treatment can affect many other aspects of individuals' lives. A review of the literature revealed that dietary restraint – a tendency to consciously restrict food intake that is often promoted in BWL calorie reduction plans – is associated with negative psychosocial factors such as excessive body and shape concerns, problematic food-related attitudes and behaviours and impairments in general psychological functioning in some individuals.(7)

As a response to these weaknesses in current obesity treatments, new paradigms that are less focused on weight are being considered,(8,9) particularly in light of evidence suggesting that improvements in physiological markers of health (e.g. blood pressure [BP] and cholesterol) can be found independent of weight loss.(10–13) One such approach that has received substantial attention in research, clinical and popular culture domains is intuitive eating (IE).(11,14) As first defined by Tribole and Resch,(15) IE is an adaptive approach to eating that is based on trusting the body to guide eating decisions rather than adhering to external rules of dietary restraint. It is currently conceptualized as four separate domains, which together refer to eating based on physiological need, choosing foods that provide optimal fuel and removing the restrictions of when and what to eat that are common in traditional diets.(16)

Intuitive eating shares some similarities with traditional non-diet programmes, such as Health at Every Size (HAES).(17) The HAES philosophy includes a weight-neutral approach to health that 'promotes feeling good about oneself; *eating well in a natural, relaxed way*; and being comfortably active' (p. 13, emphasis added).(17) As seen, HAES does include IE-like principles (see italics), but it also captures acceptance of the self and body and aspects of physical activity. IE may also be compared with emerging weight loss paradigms, including acceptance-based treatment (ABT) for weight loss.(18) Compared with IE, ABT approaches to weight loss are more closely aligned with traditional BWL treatments.(18) While IE encourages the release of dietary restrictions and acceptance of internal eating regulation, ABT utilizes acceptance to increase adherence to traditional dietary prescriptions and achieve weight loss through skills such as mindfulness and cognitive defusion.(18) Additionally, both HAES and ABT are larger treatment programmes, while IE is a specific construct. Although there are a variety of interventions/treatment programmes utilizing the weight-neutral/non-diet approach present in the literature, all of these approaches are similar in that they include a focus on eating based on internal cues rather than dietary prescriptions, which is the construct objectively defined as IE.(11,15,18)

Intuitive eating has been positively associated with a broad range of psychological and behavioural factors.(7,19–21) Specifically, IE has been found to have a positive relationship with general psychological well-being, body image and self-esteem, and pleasure from eating. Additionally, IE has displayed a negative relationship with preoccupation with food and disordered eating. Despite these psychological benefits, it may be premature to promote IE as a health-promoting alternative to dieting if there are limited benefits to physical health.

Unfortunately, the research on IE and physical health indicators is less developed. To begin, IE is consistently negatively associated with body mass index (BMI) in cross-sectional studies,(20,22–27) and weight-neutral interventions are often associated with either a maintenance of or a decrease in weight.(10,13,28–32) Fewer studies include biomarkers other than BMI or weight, and available results are mixed. For example, Hawks and colleagues found that individuals high in IE displayed lower BMI, higher high-density lipoprotein (HDL) cholesterol, lower triglycerides and lower cardiovascular risk than individuals low in IE in a cross-sectional study.(22) Other investigations in this area have been conducted to evaluate non-dieting interventions. Recent reviews of these studies have suggested that these interventions may positively impact BP and blood lipids.(12,33,34) Specific findings across the literature include improvements in the levels of total cholesterol,(10,13,31,32) HDL cholesterol,(28) LDL cholesterol,(10,13,31,32) triglycerides,(13) systolic BP (SBP)(10,13,30,32,35) and diastolic BP (DBP).(28,30,32,35) However, there is also at least one published study that did not observe an effect for each one of these variables,(10,13,28,31,32,36,37) and none of these studies considered the impact of BMI on the IE–physical health relationships.

Taken together, the aforementioned findings suggest that IE and the weight-neutral paradigm may contribute to both psychological and physical benefits. However, several gaps and methodological limitations are present in the current literature (e.g. non-representative samples, inconsistent study designs and a lack of foundational research) that limit conclusions about the physical health benefits of IE and whether they are independent of weight status. Thus, the objective of the current study was to observe the unique baseline association of IE with physical health indicators in a sample of adults, independent of weight status. The primary study aims were (a) to determine whether IE is associated with better overall physical health (as measured using BP and glucose measurements) and (b) to evaluate whether these relationships remain after adjusting for BMI. Due to lack of consilience in the extant literature, we made no a priori hypotheses.

Method

Overview

Data used in the current analyses came from compiling baseline data from multiple studies that included the Intuitive Eating Scale (IES-2), measured BMI, BP and fasting glucose measurements. Baseline data from two larger trials of BWL in adults with obesity – Cognitive and Self-Regulatory Mechanisms of Obesity Study (COSMOS) (18) and Pilot of Weight Reduction in Underserved Populations (POWER-UP) – were used as well as data from community and laboratory conducted studies. Compilation of data from these sources allowed for a diverse sample of individuals from all weight statuses, from underweight to obese.

Participants

Participants included adults with obesity from the community enrolled in a weight loss trial (i.e. COSMOS and POWER-UP), community members of all weight statuses and college students enrolled at a large public university. Inclusion criteria for this study were (a) aged ≥21 years and ≤65 years, (b) speak English fluently, (c) completed the IES-2 and (d) completed BMI, BP and glucose assessments. Exclusion criteria were as follows: (a) individuals out of the stated age range, (b) those who were currently pregnant, (c) history of a neurological disorder and/or (d) non-English speaking. Using G*Power version 3,(38) we estimated that a sample size of at least 156 participants would be needed to have an 80% chance to detect a significant small effect (f^2 = 0.051) at the 5% level (one-tailed).

Measures

Intuitive eating (IES-2)

The IES-2(16) is a 23-item self-report instrument that measures an individual's tendency to eat based on his or her body's internal cues. Responses to each question range from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) and are averaged to provide the total IE score. Higher scores represent higher levels of IE. The IES-2 has previously displayed good reliability and validity in both women and men.(16) Specifically, Cronbach's coefficient alphas for internal consistency were 0.87 and 0.89 for women and men, respectively. In the current study, the IES-2 total score displayed good reliability as well (women α = 0.84; men α = 0.79).

Health indicators

Multiple measures that have been shown to be related to physical health were examined in this study. Specifically, these measures are predictive of negative health outcomes commonly associated with obesity (e.g. hypertension, type 2 diabetes and cardiovascular disease).

Body mass index

Body mass index was measured continuously as a function of participants' height and weight. Participants' height (cm) and weight (kg) were measured directly by research personnel using research-grade scales: Tanita scale (TANITA Body Fat Analyzer Model TBF-105 K930599) or seca scale (Model 813).

Blood pressure

Systolic blood pressure and DBP (mmHg) were measured with an electronic sphygmomanometer by a research personnel. When multiple readings were available, the average of the first three readings was taken.

Fasting glucose

Fasting glucose levels were obtained via clinic blood draw (COSMOS sample) or via fingerstick and a glucometer (for all other participants). All glucose measurements were taken following a fast of at least 8 h.

Demographic factors and covariates

Participants completed a questionnaire assessing demographic variables, including gender, age, race and education level. These demographic variables were included as covariates in the data analysis.

Procedure

All data were collected from the baseline visit of the larger, ongoing studies across multiple settings. All participants signed informed consent documents approved by the university's Institutional Review Board and were adequately compensated. IE was measured during the baseline visit via self-report using the IES-2.(16) Demographic factors and covariates (i.e. age, gender, race and education level) were self-reported. BMI and BP were objectively measured by a trained research personnel. Fasting glucose levels were measured via glucometer or clinic blood draw.

Data analysis

All data were reviewed prior to analysis to assure completion and adequacy based on the assumptions for statistical normality, and tests for homogeneity of variance were conducted (i.e. Levene's). Missing data were imputed via within-person within-scale mean imputation when ≤20% of scale responses were missing. Outliers were retained unless they impacted the normality of the data.

A series of hierarchical linear regression analyses were performed to evaluate whether IES-2 total scores predicted health indicators when adjusting for BMI. A separate analysis was conducted to evaluate IES-2 total scores on each of the outcome variables (i.e. SBP, DBP and fasting glucose). For all analyses, covariates included age, gender, race and education level. All covariates were entered in Step 1, IES-2 total was entered in Step 2 and BMI was entered in Step 3. A partial Bonferroni correction was performed according to SISA guidelines,(39) which revealed a corrected alpha level of 0.028 to account for multiple testing of interrelated outcomes. Therefore, this alpha level (i.e. 0.028) was used as the criteria for statistical significance for all primary outcome variables. Of note, given that study participants came from several settings, stratified analyses were performed to assure that there were no different patterns of results among the treatment-seeking and non-treatment-seeking samples.

To further probe the relationship between IE and health indicators and pursue a clinical application of IE scores, sensitivity analyses were performed. First, *t*-tests were performed to analyse differences in SBP, DBP and fasting glucose between individuals high and low in IE. Second, analyses of covariance (ANCOVAs) were performed to analyse these differences after controlling for the previously stated covariates (i.e. BMI, sex, race/ethnicity and education). Based on previous literature,(22) individuals were categorized as high and low IE based on quartile; high IE was defined as a score ≥75th percentile in the sample, and low IE was defined as a score ≤25th percentile in the sample.

Results

Participants

Participants were included in the final sample if they met all eligibility criteria and had complete data for all demographic and IES-2 measures. Three individuals were excluded due to ineligibility (i.e. age >65), and 31 individuals were excluded due to missing demographic or IES-2 values. One individual was excluded only from fasting glucose analysis due to an out-of-range fasting glucose value. The final sample consisted of 248 adults who were 32.2 ± 14.3 years old, 73% female, and 64% White. Because of missing data on outcome variables, the analysed samples for BP and fasting glucose analyses included 243 and 212 participants, respectively. Participants had a mean BMI of 30.4 ± 7.6 kg m^{-2}, and all weight categories were represented (BMI range 18.2–55.3 kg m^{-2}). Mean values for other collected biomarkers (i.e. BP and glucose) were within the normal range on average. At the group level, participants displayed IE scores of 3.3 ± 0.5 on average for the 1–5 scale. Total IE displayed a moderate-to-large effect size in association with BMI ($r = -0.448$). Detailed demographic and descriptive data can be found in Table 1. Stratified analyses confirmed no differences between study samples (i.e. treatment-seeking versus non-treatment-seeking); therefore, all results presented below are from the aggregate sample.

Primary results

Intuitive eating and health indicators

Associations of IES-2 total scores with SBP, DBP and fasting glucose – following the inclusion of covariates and BMI – were examined. Although there was a significant association between IE and DBP in Step 2 (β =

Table 1 Participant characteristics

	Max (*N* = 248) M (SD) or *N* (%)
Demographics and history	
Age	32.18 (14.29)
Gender (female)	182 (73.4)
Education level	
Some high school	7 (2.8)
High school	31 (12.5)
Some college	76 (30.6)
Bachelor's degree	70 (28.2)
Graduate or professional degree	64 (25.8)
Race/ethnicity	
African American	13 (5.2)
American Indian/Alaska Native	37 (14.9)
Asian/Pacific Islander	7 (2.8)
Caucasian	159 (64.1)
Hispanic	7 (2.8)
Other	5 (2.0)
Multiple	20 (8.1)
Biomarkers and obesity indicators	
BMI (kg/m^{-2})	30.41 (7.56)
Blood pressure (mmHg)	
SBP	116.06 (13.15)
DBP	74.64 (10.14)
Fasting glucose (mg/dL^{-1})	95.68 (26.83)
Intuitive eating (IES-2)	3.27 (0.51)

BMI, body mass index; DBP, diastolic blood pressure; IES-2, Intuitive Eating Scale-2; SBP, systolic blood pressure; SD, standard deviation.

−0.191, P = 0.003), IE showed a non-significant relationship with BP levels (SBP β = −0.076, P = 0.256; DBP β = −0.122, P = 0.073) after the inclusion of BMI. IE was not significantly related to levels of fasting glucose (β = 0.047, P = 0.500). In line with these results, effect sizes of IES-2 with health indicators were in the range of small effects or below (f^2 = 0.00 to 0.04). A detailed review of these results can be seen in Table 2.

Sensitivity analyses

In order to provide clinical information for certain thresholds of IE, additional analyses were performed. As observed by the t-test, no differences in SBP between high and low IE were found, t(109.788) = 0.974, P = 0.332, Levene corrected. This was supported by the ANCOVA, which controlled for the effects of BMI, sex, race/ethnicity and education, F(1, 116) = 0.015, P = 0.902, partial η^2 = 0.000. Significant differences in DBP between high IE and low IE were observed, t(111.651) = 3.602, $P < 0.001$, Levene corrected. However, after controlling for relevant covariates, the ANCOVA revealed non-significant effects, F(1, 116) = 0.330, P = 0.567, partial η^2 = 0.003. These contrasting results are pictured in Figure 1. Lastly, no differences in fasting glucose between high IE and low IE were found by the t-test, t(103) = 1.302, P = 0.196, or the ANCOVA, F(1, 98) = 2.414, P = 0.123, partial η^2 = 0.024.

Discussion

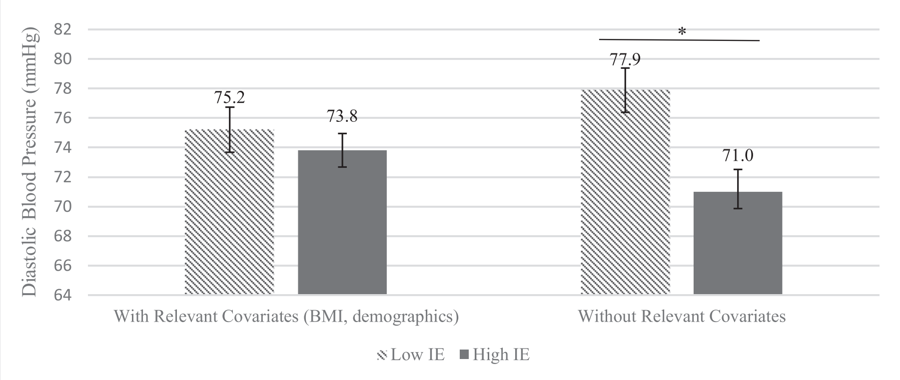
The objective of the current study was to observe the unique association of IE with physical health indicators, independent of weight status. Overall, the observed results suggest that IE does not have a unique cross-sectional relationship with specific physical health indicators after adjusting for BMI. Specifically, no unique associations between IE and BP (i.e. SBP or DBP) or fasting glucose were observed. Although the relationship between IE and DBP was significant prior to considering BMI, the relationship did not persist after the inclusion of BMI into the model. This pattern suggests that differences in objective weight status likely explained the observed relationship between IE and DBP.

Further, additional analyses were performed to evaluate differences between high and low intuitive eaters. Once again, no differences in SBP or fasting glucose

Table 2 Associations between total IE and health indicators

	Systolic blood pressure (n = 243)			Diastolic blood pressure (n = 243)			Fasting glucose (n = 212)		
Step 1	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF
	0.210	–	15.808*	0.138	–	9.493*	0.242	–	16.527*
	β	P		β	P		β	P	
Age	0.267	<0.001*		0.361	<0.001*		0.474	<0.001*	
Sex	−0.379	<0.001*		−0.101	0.104		0.085	0.168	
Race/ethnicity	−0.060	0.312		−0.002	0.980		0.059	0.348	
Education	−0.108	0.079		−0.104	0.106		−0.109	0.090	
Step 2	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF
	0.217	0.007	2.119	0.168	0.031	8.749*	0.243	0.001	0.298
	β	P		β	P		β	P	
Age	.237	<0.001*		0.297	<0.001*		0.487	<0.001*	
Sex	−0.399	<0.001*		−0.143	0.023*		0.093	0.143	
Race/ethnicity	−0.060	0.317		0.000	0.999		0.061	0.331	
Education	−0.111	0.069		−0.111	0.078		−0.108	0.093	
TOT IE	−0.091	0.147		−0.191	0.003**		0.036	0.585	
Step 3	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF
	0.218	0.001	0.430	0.198	0.030	8.773*	0.244	0.001	0.269
	β	P		β	P		β	P	
Age	0.216	0.002*		0.201	0.005*		0.468	<0.001*	
Sex	−0.397	<0.001*		−0.132	0.033*		0.094	0.140	
Race/ethnicity	−0.062	0.301		−0.010	0.870		0.057	0.370	
Education	−0.102	0.102		−0.071	0.263		−0.100	0.133	
BMI	0.048	0.512	f^2	0.220	0.003*	f^2	0.041	0.605	f^2
TOT IE	−0.076	0.256	0.00 (no effect)	−0.122	0.073	0.04 (small effect)	0.047	0.500	0.00 (no effect)

*Significant at $P < 0.05$ for omnibus statistics and covariates.
**Significant at $P < 0.028$ for primary outcomes (bolded).
BMI, body mass index; TOT IE, Intuitive Eating Scale-2 total score.



Note: *$p < .05$; IE = Intuitive Eating as measured by Intuitive Eating Scale-2; Error bars represent standard error estimates from the mean.

Figure 1 Differences in diastolic blood pressure between high and low intuitive eaters with and without controlling for relevant covariates

were observed between individuals displaying low and high levels of IE. Individuals high in IE did display lower levels of DBP, suggesting better resting BP than low intuitive eaters, but this was only the case when covariates were not considered. After controlling for BMI, sex, race/ethnicity and education, there were no differences in DBP between IE groups. In sum, it appears that significant, cross-sectional IE–physical health relationships are only observed when other relevant factors (i.e. BMI and demographics) are not considered – at least for BP and fasting glucose health indicators.

These results are somewhat consistent with previous literature. While there is some evidence for the association of adaptive eating patterns with BP and fasting glucose, there are also multiple studies that have not found support for the IE–physical health relationship.(11,12,34,40) Of note, Hawks and colleagues performed a similar study in which they evaluated associations between IE and health in college women.(22) That study found that IE was negatively correlated with BMI, triglycerides and cardiovascular risk and was positively correlated with HDL cholesterol. Further, significant differences were observed between high and low intuitive eaters on all of these indicators, with individuals high in IE displaying better health. However, Hawks *et al*. did not control for covariates or potential confounds, and they also measured IE with a different self-report instrument than the one used in the present study. Although the current study did not evaluate the same indicators of physical health or the exact same IE scale, a similar pattern of results emerged. When using similar methodology to Hawks *et al*. (e.g. *t*-test), a relationship between IE and health (i.e. DBP) was observed; however, the current study suggests this relationship is explained by the third variable of objective body weight and/or other demographic variables. The strong influence of relevant covariates on observed results is highlighted in Figure 1.

The overarching aim of this study was to increase knowledge of IE's basic and unique cross-sectional relationships with physical health indicators, in order to serve as a foundation for continuing to refine longitudinal IE studies that could justify IE's utility as an alternative/adjunctive obesity treatment. Unfortunately, the results of this study did not support the presence of a cross-sectional IE–physical health relationship that is independent of the effects of BMI. Additionally, the current study contained greater participant diversity in terms of age, race/ethnicity and weight status than many of the previous studies, which allowed for the observation that weight status and demographic characteristics are important potential confounds to consider in the IE–physical health relationship. Recent work has also suggested that BMI may serve as a moderator of IE–physical health associations, such that relationships between IE and body image function differently within individuals of different weight statuses.(21) It is imperative for future studies to continue to work to disentangle the complex relationships between eating behaviours, body weight and health.

Given that some researchers and clinicians have called for a paradigm shift in obesity treatment, in which the IE/weight-neutral approach is utilized over traditional BWL consisting of diet and exercise,(8,11,17) the results of this study have a variety of clinical and research implications. We suggest that – in order for IE to be recommended as a viable physical health promotion tool among those with excess adiposity – it should improve other physical health indicators even if it does not lead to a decrease in weight.(34) However, our study did not reveal that higher IE was associated with better health using basic biomarkers commonly associated with negative consequences of obesity. This finding, in conjunction with the absence of consistent support of a unique IE–physical health relationship in previous literature, does not support IE's potential as a stand-alone obesity treatment if the goal is improvement in physical health indicators.

Despite the current findings, there are still multiple ways in which IE might serve as an effective health promotion/weight management technique. First, IE displayed a moderate-large negative correlation with BMI in the present sample, which has previously been found in numerous studies.(12,34) This suggests that – even if IE does not help to improve physical health status independent of weight loss – having an intuitive approach to eating is associated with having a lower baseline weight. Therefore, IE may be well suited as an obesity prevention technique. Focusing on encouraging young people to attend to their body's physical needs over emotional, social or environmental cues for eating may help to decrease the incidence of obesity development. Future research on the utility of an IE intervention for obesity prevention is warranted. Second, IE may still have psychological benefit for individuals who have experienced psychological or behavioural detriments of dieting in the past (e.g. chronic dieting and disordered eating), particularly because IE is consistently linked to positive psychological indices (e.g. self-esteem).(7,19) Thus, future research might investigate whether IE could serve as protective pre-treatment to standard obesity treatments, especially for those with risk for eating pathology or history of unhealthy restricting. IE may help these individuals establish healthier relationships with food and foster positive feelings about the self, which may increase the ability to adhere to a healthful eating plan and to be successful at losing and maintaining weight. Lastly, IE may be able to play a role in improving the maintenance of weight loss. Many studies of IE-based interventions have revealed an attenuation of weight gain within populations with overweight/obesity.(12,34) This finding, along with the previously mentioned psychological and behavioural benefits of IE, supports additional research on the impact of IE for individuals who have successfully improved their health via weight loss and are attempting to establish a sustainable pattern of adaptive eating.

In discussing the implications of these findings on IE utility, various limitations of the current study must be considered. Firstly, there are no validated clinical cut-offs available to separate high and low intuitive eaters. Developing these cut-offs may be a useful next step; however, it is not possible in this study because of the lack of a clinical sample. With the addition of these clinical cut-offs, future research can investigate the psychological and physical consequences of being both high and low in IE. Additionally, based on the cross-sectional study design, conclusions regarding causality or the study variables' relationships over time may not be made. Furthermore, as a self-report instrument, the IES-2 may be prone to some error because of difficulty accurately reporting typical eating behaviours or social desirability. Lastly, this study examined BMI as a covariate or confound in the IE–physical health relationship; future studies may consider alternative ways to conceptualize the role of BMI, such as a potential mediator between IE and physical health outcomes.

In brief summary, this study investigated baseline associations between IE and common indicators of physical health after controlling for objective weight status. Findings revealed no unique relationship between IE and physical health, and any IE–physical health relationships that were observed were accounted for BMI and/or demographic factors. These results display the importance of considering relevant contextual factors, such as objective weight status, in research on IE, and they do not support the recent motion for an IE-based approach to obesity treatment if physical health indicators are the intervention targets. However, IE may be beneficial for health promotion in terms of obesity prevention, weight loss pre-treatment to promote or protect psychological health and/or weight loss maintenance. Further, additional research is imperative to disentangle the complex relationships between IE, body weight and physical/mental health.

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Conflict of Interest Statement

The authors declared no conflict of interest.

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