



Emotion Regulation Difficulties Strengthen Relationships Between Perceived Parental Feeding Practices and Emotional Eating: Findings from a Cross-Sectional Study

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Abstract

Background People with emotional eating (EE) may experience weight gain and obesity, eating disorder psychopathology, and emotion dysregulation. Limited research has examined experiences in childhood that may be associated with EE in adulthood. Perceived parental feeding practices and emotion regulation difficulties were examined as correlates of negative and positive EE in adulthood.

Methods A cross-sectional study using an online community sample of adults ($N=258$) examined self-reported negative (Emotional Eating Scale-Revised; EE-anger/anxiety, EE-boredom, and EE-depression) and positive (Emotion Appetite Questionnaire; EE-positive) EE, perceived parental feeding practices (Child Feeding Questionnaire), and emotion regulation difficulties (Difficulties in Emotion Regulation Scale).

Results Moderation analyses calculated in PROCESS macro examined emotion regulation difficulties as a moderator of relationships between perceived parental feeding practices and EE. Across all models tested, age, BMI, and gender were entered as covariates. Higher perceptions of parental control (monitoring and restriction) of unhealthy eating behaviors and pressure to eat were more strongly associated with EE-anger/anxiety and EE-positive when emotion regulation difficulties were high. Higher perceptions of parental restriction of unhealthy eating behaviors and pressure to eat were more strongly associated with higher EE-boredom when emotion regulation difficulties were high. No significant interactions between perceived parental feeding practices and emotion regulation difficulties emerged in relation to EE-depression.

Conclusions Perceived controlling parental feeding practices and emotion regulation difficulties may explain meaningful variance in negative and positive EE in adulthood.

Keywords Negative emotional eating · Positive emotional eating · Emotional eating · Emotion regulation difficulties · Parental feeding practices

Introduction

Emotional eating (EE), or the urge to eat in response to emotions in the absence of physiological hunger [1], is a maladaptive eating behavior associated with a range of poor health outcomes. EE has emerged in the eating and weight disorders literature as a distinct eating phenotype. EE occurs in the general population, with some estimates ranging from 20 to 45% of the general population endorsing EE [2]. EE has been

consistently shown to be related to weight gain and obesity [3, 4], with approximately 60% of people with overweight/obesity endorsing EE [5]. These estimates are more troubling given people with EE experience difficulty losing weight [6]. Because overweight/obesity is associated with poor physiological and psychosocial health consequences [7, 8] and economic burden on healthcare systems [9], more research is needed to understand factors related to overweight/obesity including EE. Importantly, research to date has focused on negative EE to the exclusion of positive EE [10]. Understanding correlates of EE across both negative and positive emotional dimensions is important given some research underscores that positive EE occurs at similar rates as negative EE [11]. Furthermore, because positive emotions are not typically screened for in

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clinical and research settings, effects of positive EE on health and wellbeing are unclear.

Negative and Positive Emotional Eating

EE can occur in response to both negative and positive emotions [1, 12]. Traditionally, EE has been defined as the urge to eat in response to negative emotions, with some instruments broadly defining negative EE [12, 13] and others parsing out specific negative EE types such as the urge to eat in response to depression, anger/anxiety, and boredom [14]. This latter type of negative EE assessment may provide more detailed information relevant to researchers and clinicians alike given specific types of negative EE may uniquely influence eating behavior [15]. The prominent hypothesized mechanism of negative EE is maladaptive affect regulation: people experience the urge to eat to regulate (i.e., avoid) the negative emotional state [1]. Alternatively, mechanisms of positive EE remain largely unknown, and thus research mapping correlates of positive EE may identify targets for experimental research to add to this literature. Some research shows similar overlap between negative [16–18] and positive [19] EE and poor psychological (e.g., emotion regulation difficulties) outcomes. This latter effect, overlap between negative and positive EE and emotion regulation difficulties, is further examined in the present study such that emotion regulation difficulties was examined as a moderator of relationships between perceived parental feeding practices and EE.

Parental Feeding Practices

Parental feeding practices used to influence children's eating behavior include a range of strategies that broadly fall into three categories: (1) restriction, (2) pressure, and (3) using food as a reward [20]. A review of parental feeding practices suggests they may impact children's eating behavior and weight status [21]. Existing literature extensively explores controlling feeding practices (e.g., restriction, pressure to eat), while other feeding practices (e.g., monitoring) are less studied or findings are unclear [21]. Therefore, this study seeks to examine a range of parental feeding practices (e.g., monitoring and restriction of unhealthy eating behaviors and pressure to eat) to better understand the relationship between these social correlates and EE.

Evidence for the association between parental feeding practices and EE comes from the developmental literature. Previous research has found that controlling parental feeding practices were associated with negative EE throughout childhood [22, 23], but it is unclear if these effects persist into adulthood. Farrow and colleagues (2015) found that parental restriction and pressure to eat at ages 3–5 years (time 1) was associated with children eating more in response to negative

emotions at ages 5–7 years (time 2). Conversely, another study found that parental restriction was negatively related to EE in children aged 7–12 years [23]. The present study builds on this research by examining bivariate relationships between perceived parental feeding practices and EE in adulthood. The present study also examined emotion regulation difficulties as a moderator of relationships between perceived parental feeding practices and EE.

Emotion Regulation Difficulties as a Moderator of Relationships Between Perceived Parental Feeding Practices and Emotional Eating

Emotion regulation difficulties may be positively related to perceived parental feeding practices and negative and positive EE. Emotion regulation can be conceptualized as the awareness of a range of emotions including the ability to accept, label, and employ advantageous behavioral strategies to cope with emotions in the real world [24]. More specifically, emotion regulation can involve the down-regulation of negative emotions and up-regulation of positive emotions [24]. People with emotion regulation difficulties have also demonstrated higher EE, but the majority of this evidence maps this relationship with negative EE [16–18]. Accumulating evidence for the association between positive EE and emotion regulation difficulties is mixed, with studies showing that people with emotion regulation difficulties also self-report higher [19] and lower [16–18] positive EE. Emotion regulation difficulties may similarly overlap with negative and positive EE but for different reasons. For negative EE, people with emotion regulation difficulties may be less successful in down-regulating negative emotions and thus self-report higher urges to eat in response to negative emotions. For positive EE, people with emotion regulation difficulties may be more successful in up-regulating positive emotions but in an attempt to overcompensate for less down-regulation of negative emotions. Thus, people with emotion regulation difficulties may self-report higher urges to eat in response to negative and positive emotions. The present study builds on this research by examining emotion regulation difficulties and parental feeding practices and correlates of negative and positive EE. Given parental feeding practices such as control of unhealthy eating behaviors were positively related to child EE [22, 23], the present study furthers this research by examining emotion regulation difficulties as a moderator that strengthens relationships between perceived parental feeding practices and negative and positive EE in adulthood.

The majority of evidence for associations between emotion regulation, parental feeding practices, and EE has been found in children. Blissett and colleagues (2010)

found that children of mothers who used food to regulate emotions ate more food to regulate negative emotions in the absence of hunger. Thus, parents' absence of emotion regulation strategies, in tandem with eating to regulate emotions, may have modeled negative EE behavior for their children [25]. Furthermore, Tan and Holub [26] examined the role of children's self-regulation in eating and emotion regulation feeding practices (i.e., using food to regulate emotions) as correlates of parents' and children's EE. This study identified that emotion regulation feeding practices mediated the relationship between parents' and children's EE when children's self-regulation in eating was low, not high [26]. This suggests that parents' use of food to regulate emotions combined with children's lack of self-regulation skills in eating may better explain children's EE, specifically negative EE. In a related effort, one recent study demonstrated that higher perceived childhood invalidation and negative emotional reactivity were associated with emotion regulation difficulties, which in turn was associated with higher negative EE in adults [27]. Taken together, emotion regulation is an important psychological outcome related to social factors such as parental food environment and childhood invalidation. Still, research examining the overlap between perceived parental feeding practices and emotion regulation in relation to negative and positive EE in adulthood remains untested.

The Present Study

The present study builds on a developing evidence base that points to parental feeding practices [22] and emotion regulation difficulties as positive correlates of negative [16–18] and positive [19] EE. Across these bodies of research, positive EE is neglected. To this end, the present study had two overarching exploratory study aims: (1) examine bivariate associations between perceived parental feeding practices and EE and (2) examine emotion regulation difficulties as a moderator that may *strengthen* relationships between perceived parental feeding practices and EE.

Methods

Participants

Recruited through Amazon Mechanical Turk (MTurk; online survey database on Amazon.com) TurkPrime extension, participants completed a cross-sectional study on childhood experiences and a range of eating and health behaviors [27]. Participants were required to be 18 years of age or older, U.S. residents, and fluent in the English language. A total of 638 participants were recruited for the present study; however, 380 participants were excluded for the following reasons: not providing electronic online consent (0.3% of total sample),

presence of a medical condition that could impact appetite and weight (e.g., cancer, 14.6%), current pregnancy/breast-feeding (11.1%), and current (8%) or past anorexia nervosa or bulimia nervosa (10%) eating disorder diagnosis. Anorexia nervosa and bulimia nervosa were considered exclusion criteria given EE was the primary outcome of interest for the parent study [27], and results from this study were framed to inform prevention/treatment efforts for people with EE without clinical eating disorders. Finally, attention checks were implemented throughout the online survey to assist in ensuring data quality, and if participant responding failed to meet criteria for at least two out of three of the attention checks, these participants were also excluded (15.5%).

Measures

Anthropometry. Body mass index (BMI; kg/m²), assessed with self-reported height in feet and weight in pounds, was calculated for the present study.

Demographics. Age, gender, education level, race/ethnicity, relationship status, employment status, and current earned income were self-reported.

Child Feeding Questionnaire. The child version of the Child Feeding Questionnaire (CFQ; [28]) assesses children's perceptions of parental feeding control. In this study, the child version of the CFQ was used as a retrospective recall to assess participants' perceptions of their parents' feeding practices towards them as a child, which has been done in previous research (e.g., [29, 30]). The modified CFQ consists of 15 items in total and three subscales: parental restriction (eight items), parental pressure to eat (four items), and parental monitoring (three items). These subscales were chosen to maximize the validity of these items as well as to support the use of these items in a retrospective nature, consistent with previous research [29, 30]. Items were modified to reflect the appropriate wording and tense. For example, an original item reads, "When you are at home, how often do your parents feed you?" and a modified item reads, "When you were at home, how often did your parents feed you?" All three subscales are measured on a 5-point Likert scale but scale anchors vary between subscales. The perceived parental monitoring scale anchors range from *never* (1) to *always* (5). The parental restriction and parental pressure to eat scale anchors range from *disagree* (1) to *agree* (5). Higher scores were indicative of greater perceptions of parental feeding practices during childhood.

Difficulties in Emotion Regulation Scale-Short Form. The Difficulties in Emotion Regulation Scale-Short Form (DERS-SF; [31]) is a self-report measure assessing emotion regulation. It consists of 18 items, and items are measured on a Likert scale ranging from *almost never* (1) to *almost always* (5). The DERS-SF measures six facets of emotion regulation: (1) non-acceptance of emotional responses (e.g.,

“When I’m upset, I feel guilty for feeling that way”), (2) difficulty engaging in goal-directed behavior (e.g., “When I’m upset, I have difficulty getting work done”), (3) impulse control difficulties (e.g., “When I’m upset, I lose control over my behavior”), (4) emotional awareness (e.g., “When I’m upset, I acknowledge my emotions”), (5) limited access to emotion regulation strategies (e.g., “When I’m upset, I believe there is nothing I can do to make myself feel better”), and (6) lack of emotional clarity (e.g., “I am confused about how I feel”). Composite scores are calculated by summing all items to create a total score. Higher scores were indicative of greater emotion regulation difficulties.

Emotional Appetite Questionnaire. The Emotional Appetite Questionnaire (EMAQ; [12]) assesses how positive and negative emotional states and situations impact eating behavior; however, this study used the EMAQ to assess positive EE only (e.g., “Please tell us how your eating behavior is affected by certain emotional states and situations... When you are: Confident [emotional state]; When falling in love [situation]”; 5 items for positive emotional states, 3 items for positive emotional situations). Negative EE was assessed with the Emotional Eating Scale-Revised (see below). The EMAQ was measured on a scale ranging from *much less food intake than usual* (1) to *much more food intake than usual* (9) with *the same food intake as usual* (5) as the midpoint. For each item, there were also two response options for participants to indicate if an item *does not apply* or they *don’t know*, but these responses were not included in scoring. Higher scores were indicative of greater positive EE.

Emotional Eating Scale-Revised. The Emotional Eating Scale-Revised (EES-R; [14]) is a 25-item instrument assessing EE in response to anger/anxiety, boredom, and depression. Previous research [14] on the validity and reliability of the EES-R discussed examining negative emotional eating with use of subscale scores, not overall scores; thus, we examined negative emotional eating with use of the EES-R anger/anxiety, boredom, and depression subscales. Example items include eating in response to feeling “on edge” and “irritated” (e.g., EES-R anger/anxiety), “disinterested” (e.g., EES-R boredom), and “sad” and “upset” (e.g., EES-R depression). Items were measured on a 5-point Likert scale ranging from *no desire to eat* (1) to *an overwhelming desire to eat* (5). Higher scores were indicative of greater negative EE.

Procedure

The present study, approved by the university’s Institutional Review Board prior to data collection, was advertised on MTurk’s TurkPrime extension. Online electronic consent was collected prior to participation, and the survey took participants approximately 30 minutes to complete. The conclusion of the survey debriefed participants and gave them contact information should they have questions or

concerns related to their participation in the present study. Each participant earned \$1.25 for completing the survey.

Analytic Plan

First, descriptive statistics including mean, standard deviation, range, skew and kurtosis, internal consistency (Cronbach’s alpha and McDonald’s omega), and bivariate correlations were calculated across primary study variables. Next, assumptions of multiple regression were examined to determine homoscedasticity, normality, and linearity, as well as potential outliers in these data. Finally, moderation analyses, specifically model 1 multiple moderation analyses, were calculated in PROCESS macro in SPSS 21 [32]. Analyses were bootstrapped with 5000 replications to calculate 95% confidence intervals and standard errors. Three moderation analyses were calculated for each outcome variable (EE-anger/anxiety, EE-boredom, EE-depression, and EE-positive). Across models tested, emotion regulation difficulties was the moderator variable. Finally, age, BMI, and gender were entered as covariates for all models tested. BMI and gender were added as covariates because previous research suggests these covariates impact variance in EE [33, 34], and age was added as a covariate because some of the primary independent variables (e.g., CFQ) in the present study were retrospectively self-reported and thus age of participants could influence outcomes.

Results

Preliminary Results

Two participants (0.78%) reported implausible age values and 20 participants (7.75%) reported either unlikely height and weight values (e.g., weight of 3 lb) or values consistent with moderate to severe thinness (i.e., BMI < 17; [35]). Participants with moderate to severe thinness were excluded because they could have possessed eating pathology not reported and because BMI was used as a covariate across models tested. Pairwise deletion was used to retain participant demographic data for missing variables but eliminate those from primary analyses. Participants ($N = 258$) were evenly split across men ($n = 127$) and women ($n = 130$), and 1 participant reported their gender as “Other.” On average, participants were 36.5(11) years of age, overweight (BMI = 26.9 (7.1)), Caucasian (64.7%), married (45.3%), employed full-time (75.6%), and earned an income between \$20,000 and \$50,000. See [27] for more information on participant characteristics.

Descriptive statistics, internal consistency, and bivariate correlations were presented in Table 1. Residual variability was confirmed via visual inspection of histograms, Q-Q plots, and scatterplots. Collinearity diagnostics revealed no

Table 1 Descriptive statistics, internal consistency, and bivariate correlations among primary study variables

	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	Range	Skew(<i>se</i>)	Kurtosis(<i>se</i>)	<i>α</i>	<i>ω</i>	1	2	3	4	5	6	7
1. EE-AA	2.09	1.00	1.0	4.75	3.75	0.65(0.15)	-0.73(0.30)	0.92	0.92	-						
2. EE-B	2.48	0.99	1.0	4.75	3.75	0.28(0.15)	-0.91(0.30)	0.92	0.92	0.69**	-					
3. EE-D	2.36	1.07	1.0	4.67	3.67	0.31(0.15)	-1.12(0.30)	0.94	0.94	0.78**	0.75**	-				
4. PEE	5.42	1.67	1.0	9.00	8.00	-0.06(0.16)	0.12(0.31)	0.93	0.93	0.48**	0.23**	0.21**	-			
5. M	2.84	1.27	1.0	5.00	4.00	-0.08(0.16)	-1.18(0.31)	0.93	0.93	0.42**	0.18**	0.36**	0.34**	-		
6. P	3.09	0.96	1.0	5.00	4.00	-0.23(0.16)	-0.49(0.31)	0.68	0.70	0.42**	0.36**	0.39**	0.30**	0.47**	-	
7. R	3.08	0.97	1.0	5.00	4.00	-0.27(0.16)	-0.66(0.31)	0.86	0.86	0.46**	0.27**	0.39**	0.36**	0.72**	0.48**	-
8. ERD ^a	44.09	15.54	18.00	75.00	57.00	0.14(0.15)	-1.10(0.30)	0.93	0.94	0.62**	0.51**	---	0.29**	0.36**	0.45**	0.43**

M = mean, *SD* = standard deviation, *Min.* = minimum, *Max.* = maximum, *se* = standard error, *α* = Cronbach's alpha, *EE-AA* = emotional eating-anger/anxiety, *EE-B* = emotional eating-boredom, *EE-D* = emotional eating-depression, *PEE* = positive emotional eating, *M* = perceived parental monitoring of unhealthy eating behaviors, *P* = perceived parental pressure to eat, *R* = perceived parental restriction of unhealthy eating behaviors, *ERD* = emotion regulation difficulties

***p* < 0.01

^aERD bivariate correlational data with EE-D were presented in the parent study [27]

issues of multicollinearity (tolerance > 0.20, variance inflation factor < 5; [36]).

Exploratory Study Aim 1: Examine Bivariate Associations Between Perceived Parental Feeding Practices and Emotional Eating

Significant positive relationships emerged between perceptions of parental monitoring ($r=0.42, p<0.01$) and restriction ($r=0.46, p<0.01$) of unhealthy eating behaviors and pressure to eat ($r=0.42, p<0.01$) and EE-anger/anxiety, between perceptions of parental monitoring ($r=0.18, p<0.01$) and restriction ($r=0.27, p<0.01$) of unhealthy eating behaviors and pressure to eat ($r=0.36, p<0.01$) and EE-boredom, and between perceptions of parental monitoring ($r=0.36, p<0.01$) and restriction ($r=0.39, p<0.01$) of unhealthy eating behaviors and pressure to eat ($r=0.39, p<0.01$) and EE-depression. Similarly, significant positive relationships emerged between perceptions of parental monitoring ($r=0.34, p<0.01$) and restriction ($r=0.36, p<0.01$) of unhealthy eating behaviors and pressure to eat ($r=0.30, p<0.01$) and EE-positive.

Exploratory Study Aim 2: Examine Emotion Regulation Difficulties as a Moderator of Relationships Between Perceived Parental Feeding Practices and Emotional Eating

Predicting Negative Emotional Eating

Emotional Eating-Anger/Anxiety

Perceived Parental Monitoring of Unhealthy Eating Behaviors. The overall model assessing perceived parental monitoring of unhealthy eating behaviors and emotion regulation difficulties on EE-anger/anxiety was significant ($R^2 = 0.44, p < 0.001$). The interaction between perceived parental monitoring of unhealthy eating behaviors and emotion regulation difficulties on EE-anger/anxiety was significant ($b = 0.01, p < 0.001$), which accounted for a significant proportion of the variance in EE-anger/anxiety, $\Delta R^2 = 0.04, \Delta F(1, 222) = 14.92, p < 0.001$. Conditional moderation effects were observed such that higher perceived parental monitoring of unhealthy eating behaviors was significantly associated with higher EE-anger/anxiety when emotion regulation difficulties was average ($b = 0.15, p < 0.001$) and 1 SD above average ($b = 0.29, p < 0.001$) (see Fig. 1). Emotion regulation difficulties did not moderate the association between perceived parental monitoring of unhealthy eating behaviors and EE-anger/anxiety when emotion regulation difficulties was 1 SD below average

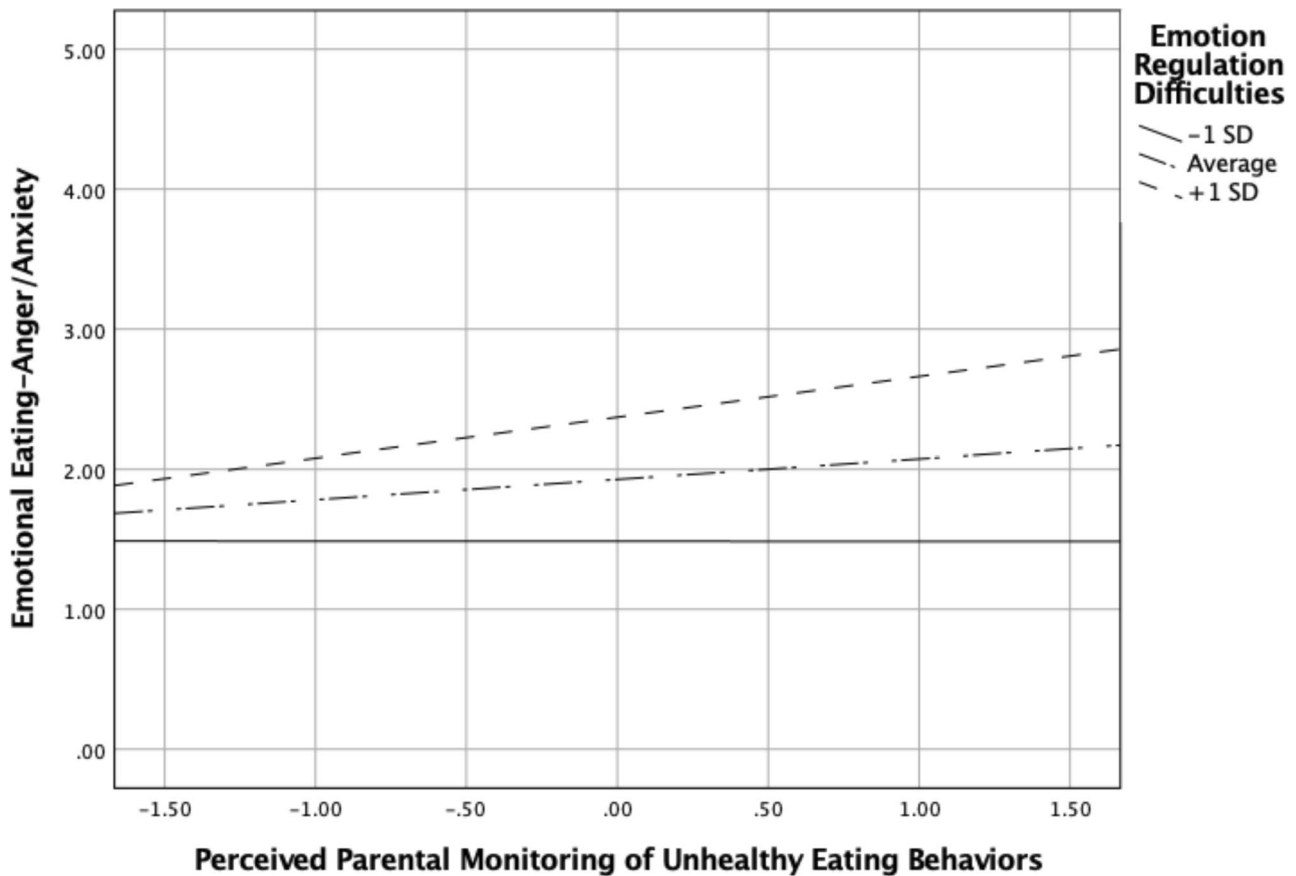


Fig. 1 Moderation of perceived parental monitoring of unhealthy eating behaviors and emotional eating-anger/anxiety by emotion regulation difficulties

($b = -0.00$, $p = 0.99$). Conditional moderation remained significant with the inclusion of age ($b = -0.01$, $p = 0.05$), BMI ($b = 0.01$, $p = 0.25$), and gender ($b = 0.08$, $p = 0.42$) covariates. In sum, perceived parental monitoring of unhealthy eating behaviors was more strongly associated with EE-anger/anxiety when emotion regulation difficulties was average and 1 SD above average.

Perceived Parental Pressure to Eat. The overall model assessing perceived parental pressure to eat and emotion regulation difficulties on EE-anger/anxiety was significant ($R^2 = 0.40$, $p < 0.001$). The interaction between perceived parental pressure to eat and emotion regulation difficulties on EE-anger/anxiety was significant ($b = 0.01$, $p = 0.02$), which accounted for a significant proportion of the variance in EE-anger/anxiety, $\Delta R^2 = 0.01$, $\Delta F(1, 222) = 5.43$, $p = 0.02$. Conditional moderation effects were observed such that higher perceived parental pressure to eat was significantly associated with higher EE-anger/anxiety when emotion regulation difficulties was average ($b = 0.20$, $p < 0.005$) and 1 SD above average ($b = 0.32$, $p < 0.001$) (see Fig. 2). Emotion regulation difficulties did not moderate the association between perceived parental pressure to eat and EE-anger/

anxiety when emotion regulation difficulties was 1 SD below average ($b = 0.07$, $p = 0.35$). Conditional moderation remained significant with the inclusion of age ($b = -0.01$, $p < 0.005$), BMI ($b = 0.01$, $p = 0.17$), and gender ($b = 0.19$, $p = 0.06$) covariates. In sum, perceived parental pressure to eat was more strongly associated with EE-anger/anxiety when emotion regulation difficulties was average and 1 SD above average.

Perceived Parental Restriction of Unhealthy Eating Behaviors. The overall model assessing perceived parental restriction of unhealthy eating behaviors and emotion regulation difficulties on EE-anger/anxiety was significant ($R^2 = 0.45$, $p < 0.001$). The interaction between perceived parental restriction of unhealthy eating behaviors and emotion regulation difficulties on EE-anger/anxiety was significant ($b = 0.02$, $p < 0.001$), which accounted for a significant proportion of the variance in EE-anger/anxiety, $\Delta R^2 = 0.06$, $\Delta F(1, 223) = 23.48$, $p < 0.001$. Conditional moderation effects were observed such that higher perceived parental restriction of unhealthy eating behaviors was significantly associated with higher EE-anger/anxiety when emotion regulation difficulties was average ($b = 0.24$, $p < 0.001$) and 1 SD above

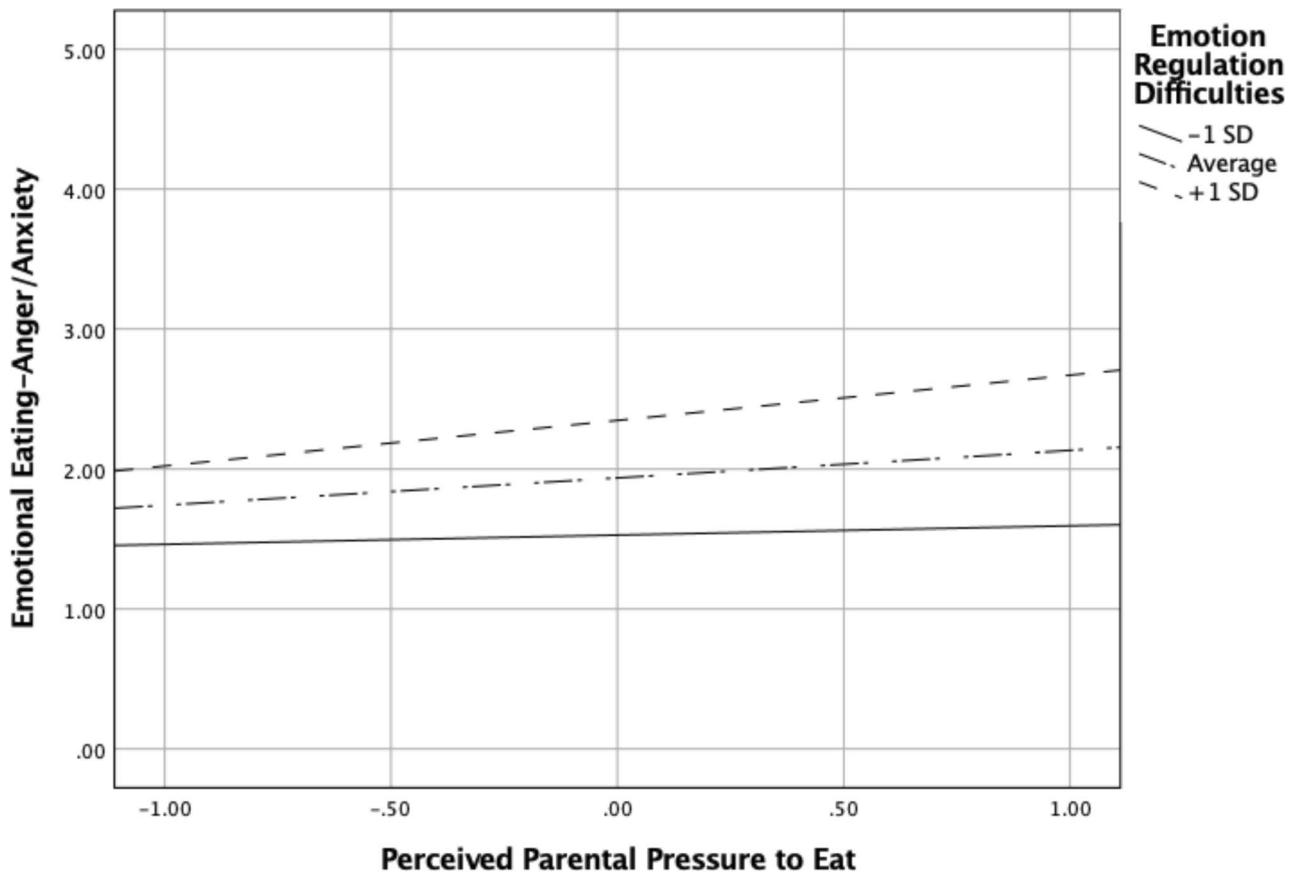


Fig. 2 Moderation of perceived parental pressure to eat and emotional eating-anger/anxiety by emotion regulation difficulties

average ($b=0.48$, $p<0.001$) (see Fig. 3). Emotion regulation difficulties did not moderate the association between perceived parental restriction of unhealthy eating behaviors and EE-anger/anxiety when emotion regulation difficulties was 1 SD below average ($b=0.00$, $p=0.98$). Conditional moderation remained significant with the inclusion of age ($b=-0.01$, $p=0.02$), BMI ($b=0.01$, $p=0.26$), and gender ($b=0.13$, $p=0.17$) covariates. In sum, perceived parental restriction of unhealthy eating behaviors was more strongly associated with EE-anger/anxiety when emotion regulation difficulties was average and 1 SD above average.

Emotional Eating-Boredom

Perceived Parental Monitoring of Unhealthy Eating Behaviors. No significant interactions or conditional moderation effects were observed between perceived parental monitoring of unhealthy eating behaviors and emotion regulation difficulties in relation to EE-boredom (see Table 2).

Perceived Parental Pressure to Eat. The overall model assessing perceived parental pressure to eat and emotion regulation difficulties on EE-boredom was significant

($R^2=0.30$, $p<0.001$). The interaction between perceived parental pressure to eat and emotion regulation difficulties on EE-boredom was not significant ($b=0.01$, $p=0.08$). However, conditional moderation effects were observed such that higher perceived parental pressure to eat was significantly associated with higher EE-boredom when emotion regulation difficulties was average ($b=0.20$, $p<0.005$) and 1 SD above average ($b=0.31$, $p<0.005$) (see Table 2). Emotion regulation difficulties did not moderate the association between perceived parental pressure to eat and EE-boredom when emotion regulation difficulties was 1 SD below average ($b=0.09$, $p=0.23$). Conditional moderation remained significant with the inclusion of age ($b=-0.00$, $p=0.46$), BMI ($b=0.02$, $p=0.02$), and gender ($b=0.26$, $p=0.02$) covariates. In sum, perceived parental pressure to eat was more strongly associated with EE-boredom when emotion regulation difficulties was average and 1 SD above average.

Perceived Parental Restriction of Unhealthy Eating Behaviors. The overall model assessing perceived parental restriction of unhealthy eating behaviors and emotion regulation difficulties on EE-boredom was significant ($R^2=0.28$, $p<0.001$). The interaction

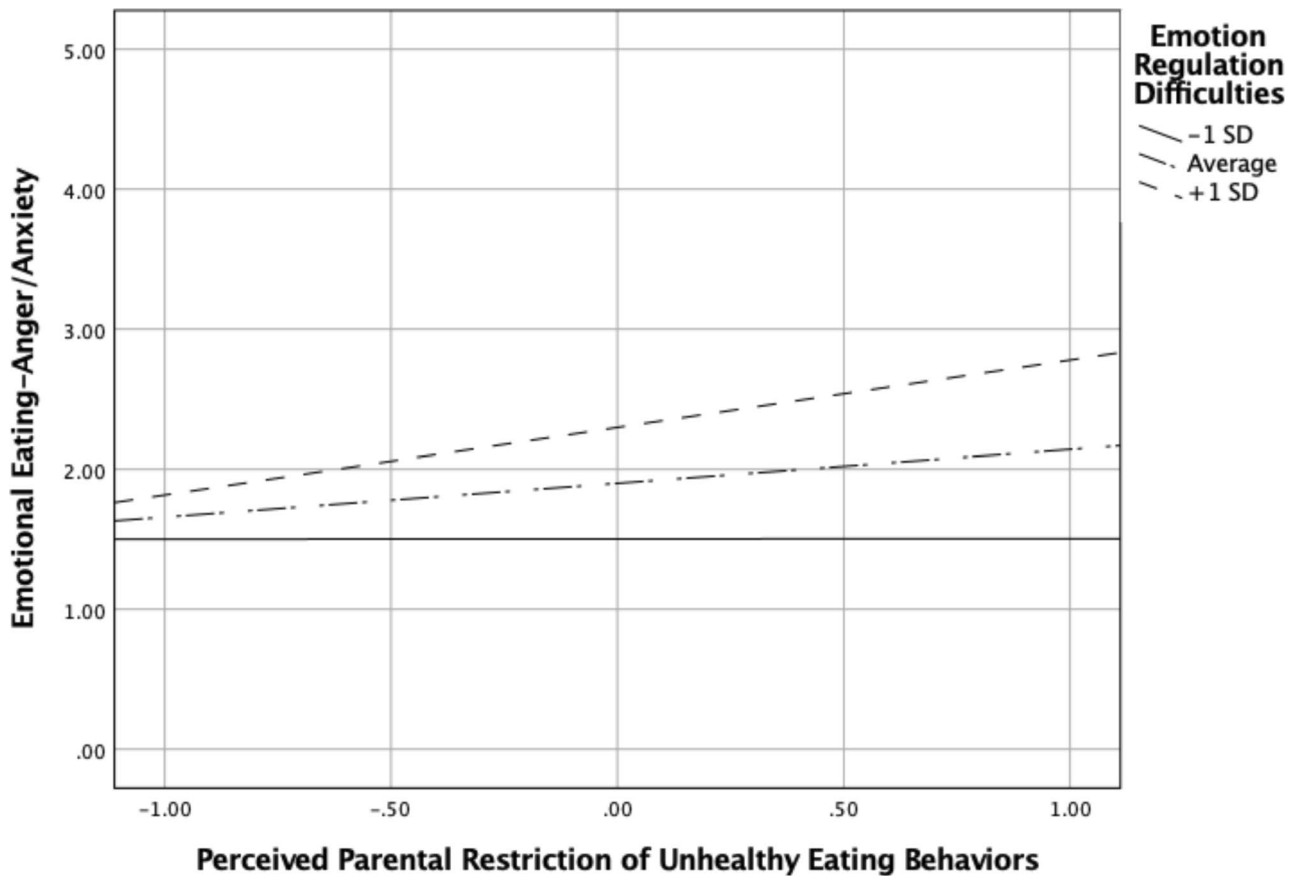


Fig. 3 Moderation of perceived parental restriction of unhealthy eating behaviors and emotional eating-anger/anxiety by emotion regulation difficulties

between perceived parental restriction of unhealthy eating behaviors and emotion regulation difficulties on EE-boredom was significant ($b = 0.01$, $p = 0.03$), which accounted for a significant proportion of the variance in EE-boredom, $\Delta R^2 = 0.02$, $\Delta F(1, 223) = 4.96$, $p = 0.03$. Conditional moderation effects were observed such that higher perceived parental restriction of unhealthy eating behaviors was significantly associated with higher EE-boredom when emotion regulation difficulties was 1 SD above average ($b = 0.20$, $p = 0.03$; see Fig. 4). Emotion regulation difficulties did not moderate the association between perceived parental restriction of unhealthy eating behaviors and EE-boredom when emotion regulation difficulties was 1 SD below average ($b = -0.06$, $p = 0.46$) and average ($b = 0.07$, $p = 0.26$). Conditional moderation remained significant with the inclusion of age ($b = -0.00$, $p = 0.66$), BMI ($b = 0.02$, $p = 0.07$), and gender ($b = 0.20$, $p = 0.08$) covariates. In sum, perceived parental restriction of unhealthy eating behaviors was more strongly associated with EE-boredom when emotion regulation difficulties was 1 SD above average.

Emotional Eating-Depression

No significant interactions or conditional moderation effects were observed between perceived parental feeding practices and emotion regulation difficulties in relation to EE-depression (see Table 2).

Predicting Positive Emotional Eating

Perceived Parental Monitoring of Unhealthy Eating Behaviors

The overall model assessing perceived parental monitoring of unhealthy eating behaviors and emotion regulation difficulties on EE-positive was significant ($R^2 = 0.17$, $p < 0.001$). The interaction between perceived parental monitoring of unhealthy eating behaviors and emotion regulation difficulties on EE-positive was significant ($b = 0.01$, $p = 0.02$), which accounted for a significant proportion of the variance in EE-positive, $\Delta R^2 = 0.02$, $\Delta F(1, 216) = 5.11$, $p = 0.02$. Conditional moderation effects were observed such that higher perceived parental monitoring of unhealthy eating

Table 2 Emotion regulation difficulties as a moderator of relationships between perceived parental feeding practices and negative emotional eating

Independent variables	Beta	se	t value	p value	LLCI	ULCL
Emotional eating-anger/anxiety						
Monitoring of unhealthy eating behaviors						
Monitoring of unhealthy eating behaviors	0.15	0.04	3.63	0.00***	0.07	0.22
Emotion regulation difficulties	0.03	0.00	8.74	0.00***	0.02	0.04
Interaction	0.01	0.00	3.86	0.00***	0.00	0.01
– 1 standard deviation	– 0.00	0.06	– 0.02	0.99	– 0.11	0.11
Avg. emotion regulation difficulties	0.15	0.04	3.63	0.00***	0.07	0.22
+ 1 standard deviation	0.29	0.05	5.48	0.00***	0.19	0.4
Covariate: age	– 0.01	0.00	– 2.01	0.05*	– 0.02	– 0.00
Covariate: BMI	0.01	0.01	1.16	0.25	– 0.01	0.02
Covariate: gender	0.08	0.1	0.81	0.42	– 0.11	0.27
Pressure to eat						
Pressure to eat	0.2	0.06	3.38	0.00**	0.08	0.31
Emotion regulation difficulties	0.03	0.00	7.24	0.00***	0.02	0.03
Interaction	0.01	0.00	2.33	0.02*	0.00	0.02
– 1 standard deviation	0.07	0.07	0.93	0.35	– 0.07	0.21
Avg. emotion regulation difficulties	0.2	0.06	3.38	0.00**	0.08	0.31
+ 1 standard deviation	0.32	0.09	3.69	0.00***	0.15	0.5
Covariate: age	– 0.01	0.00	– 2.98	0.00***	– 0.02	– 0.00
Covariate: BMI	0.01	0.01	1.38	0.17	– 0.00	– 0.03
Covariate: gender	0.19	0.01	1.91	0.06	– 0.01	0.38
Restriction of unhealthy eating behaviors						
Restriction of unhealthy eating behaviors	0.24	0.05	4.55	0.00***	0.14	0.35
Emotion regulation difficulties	0.03	0.00	7.75	0.00***	0.02	0.03
Interaction	0.02	0.00	4.85	0.00***	0.01	0.02
– 1 standard deviation	0.00	0.07	0.02	0.98	– 0.13	0.14
Avg. emotion regulation difficulties	0.24	0.05	4.55	0.00***	0.14	0.35
+ 1 standard deviation	0.48	0.08	6.34	0.00***	0.33	0.63
Covariate: age	– 0.01	0.00	– 2.31	0.02*	– 0.02	– 0.00
Covariate: BMI	0.01	0.01	1.14	0.26	– 0.01	0.02
Covariate: gender	0.13	0.09	1.37	0.17	– 0.06	0.32
Emotional eating-boredom						
Monitoring of unhealthy eating behaviors						
Monitoring of unhealthy eating behaviors	– 0.02	0.05	– 0.41	0.68	– 0.11	0.07
Emotion regulation difficulties	0.03	0.00	7.81	0.00***	0.02	0.04
Interaction	0.00	0.00	1.55	0.12	– 0.00	0.01
Pressure to eat						
Pressure to eat	0.2	0.06	3.18	0.00**	0.08	0.33
Emotion regulation difficulties	0.02	0.00	5.84	0.00***	0.02	0.03
Interaction	0.01	0.00	1.78	0.08	– 0.00	0.01
– 1 standard deviation	0.09	0.08	1.2	0.23	– 0.06	0.25
Avg. emotion regulation difficulties	0.2	0.06	3.18	0.00**	0.08	0.33
+ 1 standard deviation	0.31	0.1	3.21	0.00**	0.12	0.5
Covariate: age	– 0.00	0.01	– 0.73	0.46	– 0.01	0.01
Covariate: BMI	0.02	0.01	2.29	0.02*	0.00	0.04
Covariate: gender	0.26	0.11	2.38	0.02*	0.04	0.47
Restriction of unhealthy eating behaviors						
Restriction of unhealthy eating behaviors	0.07	0.06	1.12	0.26	– 0.05	0.19
Emotion regulation difficulties	0.03	0.00	6.94	0.00***	0.02	0.04
Interaction	0.01	0.00	2.23	0.03*	0.00	0.02
– 1 standard deviation	– 0.06	0.08	– 0.73	0.46	– 0.22	0.1

Table 2 (continued)

Independent variables	Beta	se	<i>t</i> value	<i>p</i> value	LLCI	ULCL
Avg. emotion regulation difficulties	0.07	0.06	1.12	0.26	− 0.05	0.19
+ 1 standard deviation	0.2	0.09	2.24	0.03*	0.02	0.38
Covariate: age	− 0.00	0.01	− 0.43	0.66	− 0.01	0.01
Covariate: BMI	0.02	0.01	1.82	0.07	− 0.00	0.03
Covariate: gender	0.2	0.11	1.76	0.08	− 0.02	0.42
Emotional eating-depression						
Monitoring of unhealthy eating behaviors						
Monitoring of unhealthy eating behaviors	0.14	0.05	2.99	0.00**	0.05	0.23
Emotion regulation difficulties	0.03	0.00	9.22	0.00***	0.03	0.04
Interaction	0.00	0.00	1.07	0.28	− 0.00	0.01
Pressure to eat						
Pressure to eat	0.19	0.06	2.91	0.00**	0.06	0.31
Emotion regulation difficulties	0.03	0.00	8.13	0.00***	0.03	0.04
Interaction	0.00	0.00	0.1	0.92	− 0.01	0.01
Restriction of unhealthy eating behaviors						
Restriction of unhealthy eating behaviors	0.19	0.06	3.12	0.00**	0.07	0.31
Emotion regulation difficulties	0.03	0.00	8.58	0.00***	0.03	0.04
Interaction	0.00	0.00	1.23	0.22	− 0.00	0.01

Emotional eating-anger/anxiety, monitoring of unhealthy eating behaviors: $R^2=0.44$; $n=229$. Emotional eating-anger/anxiety, pressure to eat: $R^2=0.40$; $n=229$. Emotional eating-anger/anxiety, restriction of unhealthy eating behaviors: $R^2=0.45$; $n=230$. Emotional eating-boredom, monitoring of unhealthy eating behaviors: $R^2=0.27$; $n=229$. Emotional eating-boredom, pressure to eat: $R^2=0.30$; $n=229$. Emotional eating-boredom, restriction of unhealthy eating behaviors: $R^2=0.28$; $n=230$. Emotional eating-depression, monitoring of unhealthy eating behaviors: $R^2=0.40$; $n=229$. Emotional eating-depression, pressure to eat: $R^2=0.40$; $n=229$. Emotional eating-depression, restriction of unhealthy eating behaviors: $R^2=0.40$; $n=230$. Data for covariates were presented in moderation models with significant interactions

se = standard error, *LLCL* = lower level confidence interval, *ULCL* = upper level confidence interval

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

behaviors was significantly associated with higher EE-positive when emotion regulation difficulties was average ($b=0.26$, $p < 0.005$) and 1 SD above average ($b=0.44$, $p < 0.001$; see Fig. 5). Emotion regulation difficulties did not moderate the association between perceived parental monitoring of unhealthy eating behaviors and EE-positive when emotion regulation difficulties was 1 SD below average ($b=0.08$, $p=0.53$). Conditional moderation remained significant with the inclusion of age ($b=-0.02$, $p=0.03$), BMI ($b=-0.01$, $p=0.56$), and gender ($b=-0.35$, $p=0.09$) covariates. In sum, perceived parental monitoring of unhealthy eating behaviors was more strongly associated with EE-positive when emotion regulation difficulties was average and 1 SD above average. See Table 3.

Perceived Parental Pressure to Eat

The overall model assessing perceived parental pressure to eat and emotion regulation difficulties on EE-positive was significant ($R^2 = 0.17$, $p < 0.001$). The interaction between perceived parental pressure to eat and emotion regulation difficulties on EE-positive was significant ($b = 0.02$, $p < 0.005$), which accounted for a significant proportion of the variance in EE-positive, $\Delta R^2 = 0.04$, $\Delta F(1, 216) = 10.26$,

$p < 0.005$. Conditional moderation effects were observed such that higher perceived parental pressure to eat was significantly associated with higher EE-positive when emotion regulation difficulties was average ($b=0.34$, $p=0.01$) and 1 SD above average ($b=0.70$, $p < 0.001$; see Fig. 6). Emotion regulation difficulties did not moderate the association between perceived parental pressure to eat and EE-positive when emotion regulation difficulties was 1 SD below average ($b = -0.02$, $p=0.87$). Conditional moderation remained significant with the inclusion of age ($b = -0.03$, $p < 0.005$), BMI ($b = -0.00$, $p=0.55$), and gender ($b = -0.25$, $p=0.13$) covariates. In sum, perceived parental pressure to eat was more strongly associated with EE-positive when emotion regulation difficulties was average and 1 SD above average. See Table 3.

Perceived Parental Restriction of Unhealthy Eating Behaviors

The overall model assessing perceived parental restriction of unhealthy eating behaviors and emotion regulation difficulties on EE-positive was significant ($R^2 = 0.20$, $p < 0.001$). The interaction between perceived parental restriction of unhealthy eating behaviors and emotion

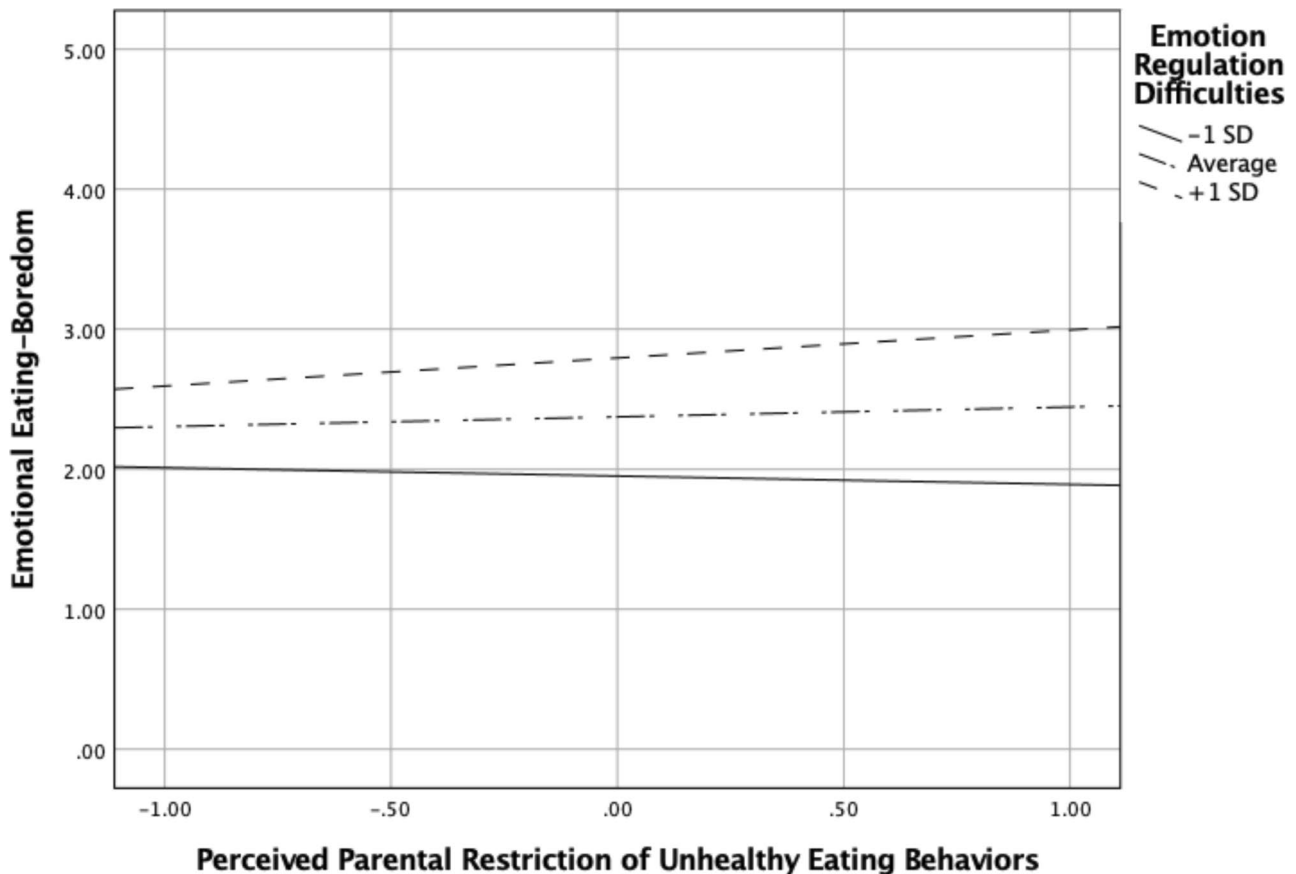


Fig. 4 Moderation of perceived parental restriction of unhealthy eating behaviors and emotional eating-boredom by emotion regulation difficulties

regulation difficulties on EE-positive was significant ($b = 0.02$, $p < 0.005$), which accounted for a significant proportion of the variance in EE-positive, $\Delta R^2 = 0.04$, $\Delta F(1, 217) = 10.93$, $p < 0.005$. Conditional moderation effects were observed such that higher perceived parental restriction of unhealthy eating behaviors was significantly associated with higher EE-positive when emotion regulation difficulties was average ($b = 0.41$, $p < 0.001$) and 1 SD above average ($b = 0.76$, $p < 0.001$; see Fig. 7). Emotion regulation did not moderate the association between perceived parental restriction of unhealthy eating behaviors and EE-positive when emotion regulation difficulties was 1 SD below average ($b = 0.06$, $p = 0.68$). Conditional moderation remained significant with the inclusion of age ($b = -0.02$, $p = 0.02$), BMI ($b = -0.01$, $p = 0.51$), and gender ($b = -0.29$, $p = 0.15$) covariates. In sum, perceived parental restriction of unhealthy eating behaviors was more strongly associated with EE-positive when emotion regulation difficulties was average and 1 SD above average. See Table 3.

Discussion

The present study examined perceived parental feeding practices and emotion regulation difficulties as correlates of EE in adulthood. In total, we proposed two overarching exploratory study aims: (1) examine bivariate associations between perceived parental feeding practices and EE and (2) examine emotion regulation difficulties as a moderator that may *strengthen* relationships between perceived parental feeding practices and EE. Results for the first exploratory study aim revealed significant positive relationships between perceived parental monitoring and restriction of unhealthy eating behaviors and pressure to eat across both negative and positive EE. These findings overlap with research identifying a positive relationship between control of unhealthy eating behaviors and negative EE in children [22] and extend similar relationships into adulthood. These findings also demonstrate similar relationships between controlling parental feeding practices and positive EE styles, which add to the EE

Table 3 Emotion regulation difficulties as a moderator of relationships between perceived parental feeding practices and positive emotional eating

Independent variables	Beta	se	<i>t</i> value	<i>p</i> value	LLCI	ULCL
Monitoring of unhealthy eating behaviors						
Monitoring of unhealthy eating behaviors	0.26	0.08	3.03	0.00**	0.09	0.42
Emotion regulation difficulties	0.01	0.01	2.06	0.04*	0.00	0.03
Interaction	0.01	0.01	2.26	0.02*	0.00	0.02
– 1 Standard deviation	0.08	0.12	0.63	0.53	– 0.16	0.31
Avg. emotion regulation difficulties	0.26	0.08	3.03	0.00**	0.09	0.42
+ 1 standard deviation	0.44	0.11	3.86	0.00***	0.21	0.66
Covariate: age	– 0.02	0.01	– 2.20	0.03*	– 0.04	– 0.00
Covariate: BMI	– 0.01	0.21	– 0.59	0.56	– 0.04	0.02
Covariate: gender	– 0.35	0.02	– 1.71	0.09	– 0.76	0.05
Pressure to eat						
Pressure to eat	0.34	0.12	2.84	0.01**	0.10	0.57
Emotion regulation difficulties	0.01	0.01	1.15	0.25	– 0.01	0.02
Interaction	0.02	0.01	3.2	0.00**	0.01	0.04
– 1 standard deviation	– 0.02	0.15	– 0.16	0.87	– 0.31	0.26
Avg. emotion regulation difficulties	0.34	0.12	2.84	0.01**	0.1	0.57
+ 1 standard deviation	0.7	0.18	3.89	0.00***	0.34	1.05
Covariate: age	– 0.03	0.01	– 3.03	0.00**	– 0.05	– 0.01
Covariate: BMI	– 0.00	0.2	– 0.22	0.55	– 0.04	0.03
Covariate: gender	– 0.25	0.02	– 1.22	0.13	– 0.64	0.15
Restriction of unhealthy eating behaviors						
Restriction of unhealthy eating behaviors	0.41	0.11	3.62	0.00***	0.19	0.63
Emotion regulation difficulties	0.01	0.01	1.41	0.16	– 0.00	0.02
Interaction	0.02	0.01	3.31	0.00**	0.01	0.04
– 1 standard deviation	0.06	0.15	0.41	0.68	– 0.23	0.35
Avg. emotion regulation difficulties	0.41	0.11	3.62	0.00***	0.19	0.63
+ 1 standard deviation	0.76	0.16	4.69	0.00***	0.44	1.08
Covariate: age	– 0.02	0.01	– 2.43	0.02*	– 0.04	– 0.00
Covariate: BMI	– 0.01	0.02	– 0.66	0.51	– 0.04	0.02
Covariate: gender	– 0.29	0.20	– 1.46	0.15	– 0.69	0.10

Emotional eating-positive, monitoring of unhealthy eating behaviors: $R^2=0.17$; $n=223$. Emotional eating-positive, pressure to eat: $R^2=0.17$; $n=223$. Emotional eating-positive, restriction of unhealthy eating behaviors: $R^2=0.20$; $n=224$

se = standard error, *LLCL* = lower level confidence interval, *ULCL* = upper level confidence interval

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

literature that considers negative and positive EE as unique constructs. Correlational findings are consistent with previous models suggesting that when parents monitor and restrict their children's food intake, the child experiences difficulty learning how to regulate sensations of hunger/fullness [37]. In turn, these children may eat for reasons other than true hunger (e.g., EE), which may influence EE into adulthood. It is also possible that parents of children who are prone to EE may engage in monitoring and restriction of unhealthy eating behaviors in an effort to curb the child's EE behavior. Though not specific to parental feeding practices, previous research has demonstrated that negative EE was more closely associated with negative psychological outcomes (e.g., emotion regulation difficulties) than positive EE [e.g., 16, 38]. Taken together, the present findings contribute important

information to this literature base, suggesting similar overlap between controlling parental feeding practices and negative and positive EE, and thus future research testing the parameters of these effects across the lifespan should be inclusive of both negative and positive EE. Importantly, the retrospective nature of parental feeding practices and cross-sectional study design temper interpretations of our findings; nonetheless, the present study contributes useful information on psychosocial correlates of EE in adulthood. Because perceived parental feeding practices were positively related to negative and positive EE, and given some research suggests that emotion regulation difficulties overlap with negative and positive EE [16–19], it could be the case that emotion regulation difficulties *strengthen* relationships between perceived parental feeding practices and negative and positive EE.

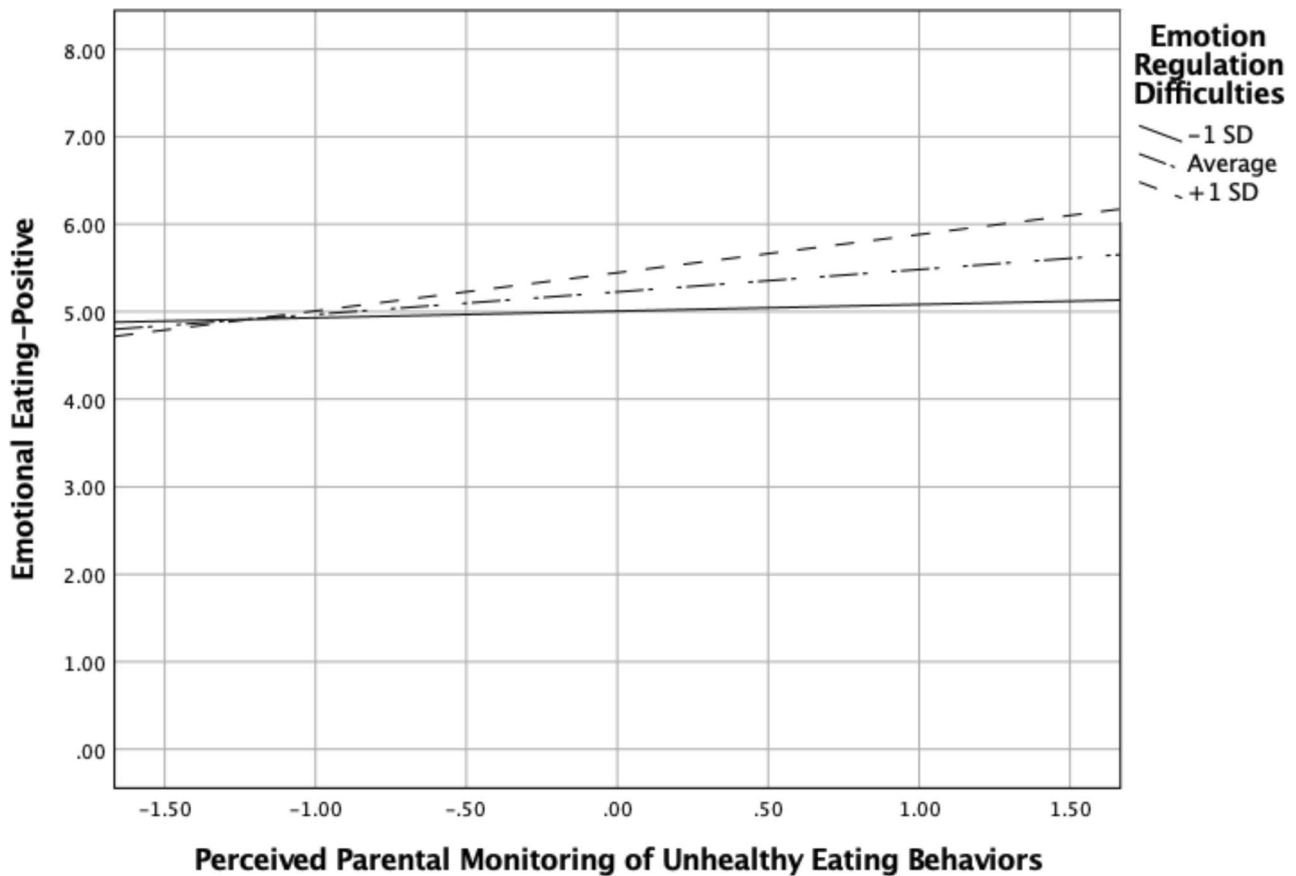


Fig. 5 Moderation of perceived parental monitoring of unhealthy eating behaviors and emotional eating-positive by emotion regulation difficulties

The second exploratory study aim examined if emotion regulation difficulties strengthened relationships between perceived parental feeding practices and EE. We found partial evidence for these research questions across negative EE. More specifically, adults who self-reported higher perceptions of parental restriction of unhealthy eating behaviors and pressure to eat also self-reported higher EE-anger/anxiety and EE-boredom when emotion regulation difficulties were high. Furthermore, adults who self-reported higher perceptions of parental monitoring of unhealthy eating behaviors also self-reported higher EE-anger/anxiety when emotion regulation difficulties were high. Interestingly, no significant interactions emerged between perceived parental feeding practices and emotion regulation difficulties in relation to adults' EE-depression. These findings build on research mapping positive associations between controlling parental feedings practices and negative EE [22] by suggesting that in adulthood, current emotion regulation difficulties strengthen relationships between perceived controlling feeding practices and EE-anger/anxiety and EE-boredom, but not EE-depression. To date, research mapping

relationships between parental feeding practices and negative EE have conceptualized negative EE broadly and, to the understanding of the authors, no data exist mapping relationships between these psychosocial correlates and negative EE types such as EE-anger/anxiety, EE-boredom, and EE-depression. Considering emotion regulation theory [24], one interpretation of this effect holds that among those with higher recall of controlling parental feeding practices and higher emotion regulation difficulties, more difficulty in down-regulating negative emotions relevant to anxiety and anger and boredom may be present, which may be related to higher urges to eat in response to these emotions. Importantly, the cross-sectional nature of the present findings prevents temporal attributions across study variables; nonetheless, findings set the stage for experimental and longitudinal designs to make causal determinations about parental feeding practices, emotion regulation difficulties, and negative EE.

Still, relevant research has mapped relationships between negative EE types and a range of psychological outcomes. For example, one recent study [16] demonstrated that EE-depression, instead of EE-anger/anxiety and EE-boredom, was most closely

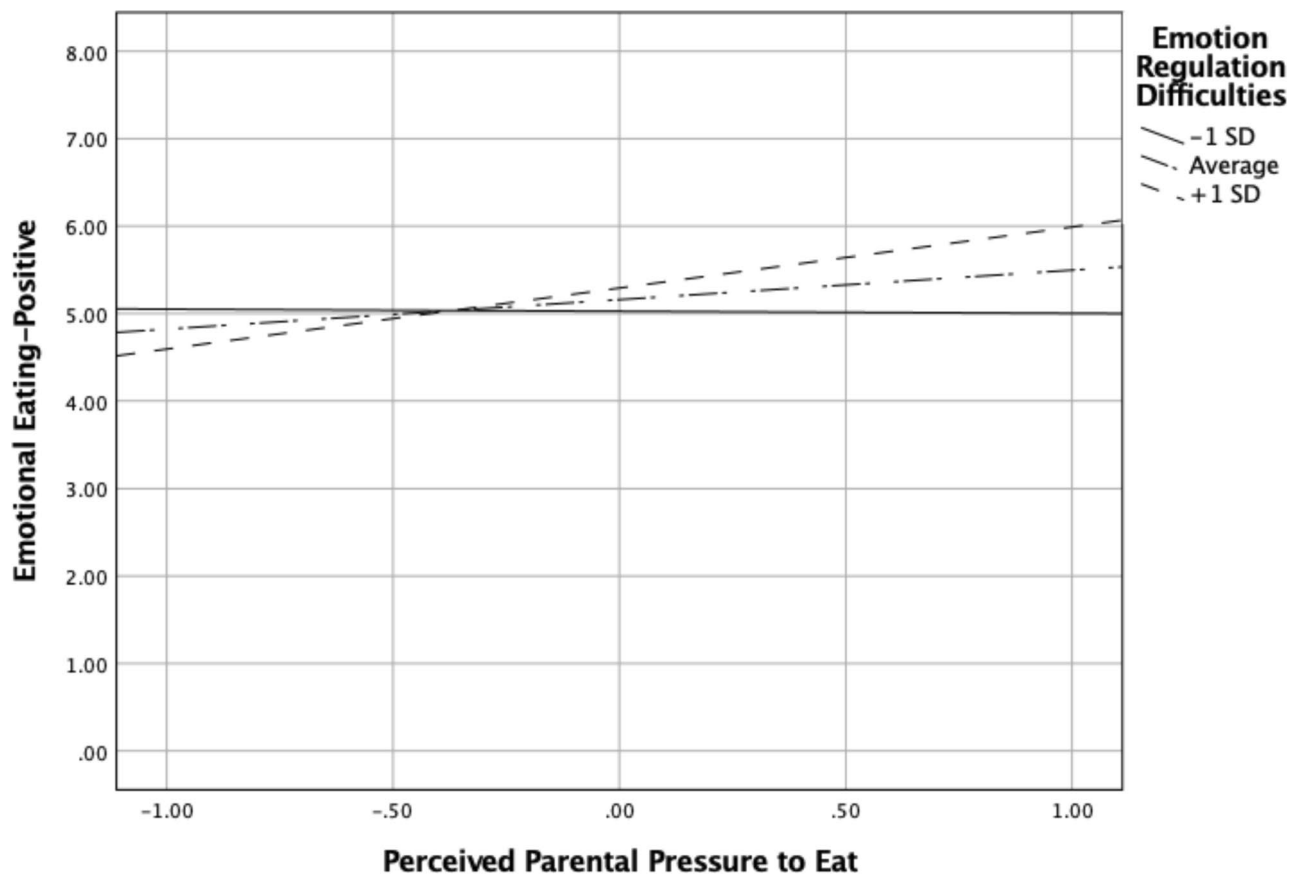


Fig. 6 Moderation of perceived parental pressure to eat and emotional eating-positive by emotion regulation difficulties

associated with emotion regulation difficulties, disordered eating, and poor psychological well-being. Furthermore, this same study builds on this idea that unique relationships emerge across negative EE types such that EE-depression may be more closely associated with higher psychopathology than EE-anger/anxiety and EE-boredom, which may inform the present findings. More specifically, it could be the case that more severe presentations of controlling feeding practices and emotion regulation difficulties explain variance in EE-depression, or it may also be the case that the temporal nature of parental feeding practices (e.g., during childhood or recalled in adulthood) plays a role in the differential effects across these negative EE types. It is important to note, however, that significant positive relationships emerged between perceived parental feeding practices and EE-depression, which complicates this latter interpretation. What is more clear is that the present findings introduce the need for future research to continue examining parental feeding practices and emotion regulation difficulties, including severity of presentation of each, as correlates of broad and specific negative EE types across the lifespan.

Building on effects with negative EE, the present results also revealed that adults who self-reported higher perceptions of parental monitoring and restriction of

unhealthy eating behaviors and pressure to eat also self-reported higher EE-positive when emotion regulation difficulties were high. Considering emotion regulation theory [24], up-regulation of positive emotions may play a role in these findings. More specifically, among adults with higher recall of controlling parental feeding practices and higher emotion regulation difficulties, more up-regulation of positive emotions may be present, in part, to compensate for less down-regulation of negative emotions (e.g., anger/anxiety, boredom), which may be related to higher urges to eat in response to positive emotions. Again, like interpretations of negative EE, it is impossible to determine the temporal order of these variables due to the cross-sectional design of the present study. Findings introduce an intriguing line of future research, especially given the sparsity of data available on correlates of positive EE. One valuable avenue for future research would employ a mixed methods research design to examine qualitative assessments of the experience of negative and positive emotions in relation to eating, in tandem with quantitative assessments, thereby providing a more complete picture on the regulation of negative and positive emotions as antecedents to eating behavior. Still,

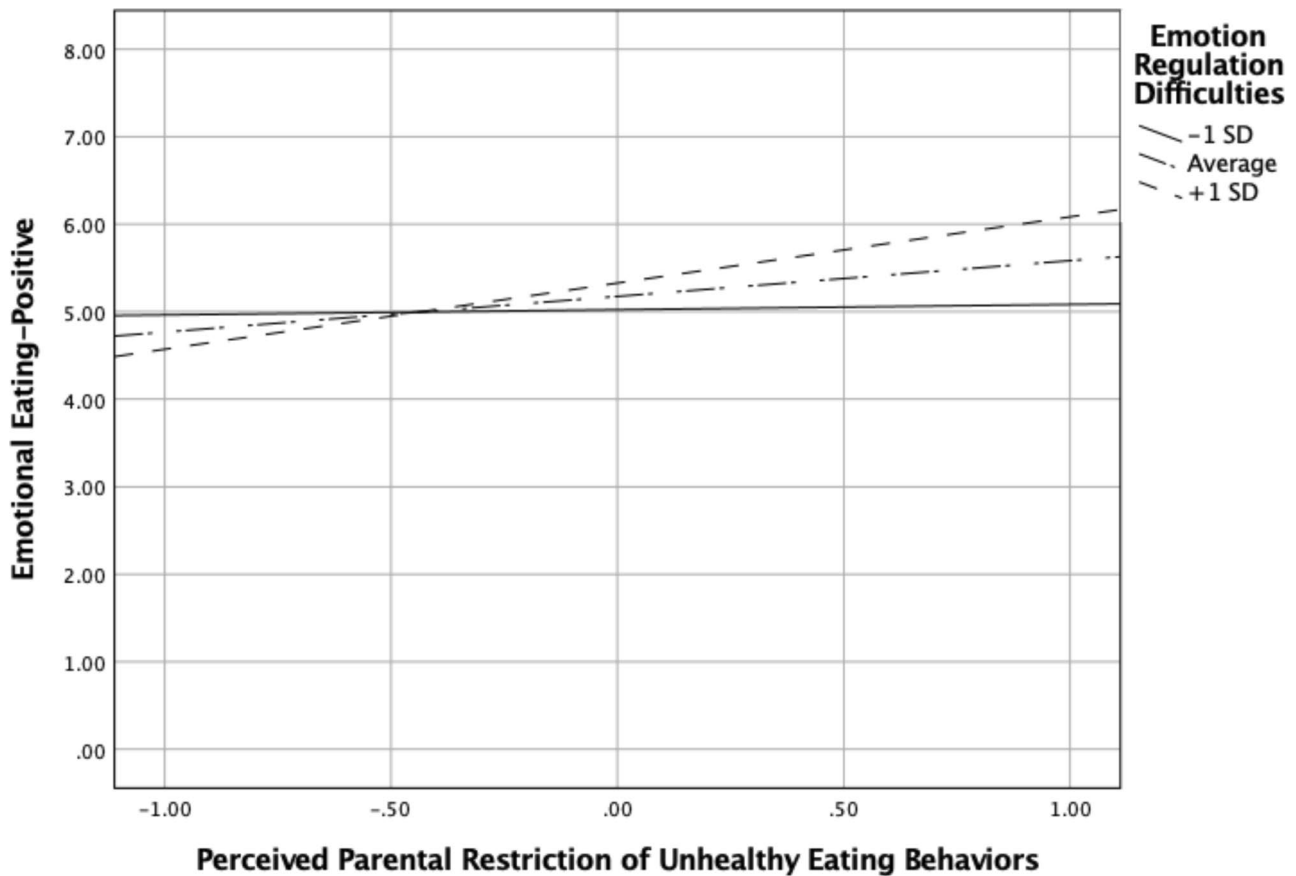


Fig. 7 Moderation of perceived parental restriction of unhealthy eating behaviors and emotional eating-positive by emotion regulation difficulties

these findings are important because some estimates hold that negative and positive EE occur at similar rates in the general population [11], and thus the negative health consequences associated with EE such as weight gain and obesity [3, 4] may go undetected if research is focused on negative EE. These discrepancies aside, there are several important limitations and future directions of the present study.

Limitations and Future Directions

First, we relied on retrospective recall of parental feeding practices which may compromise validity of results. It could be the case that adults engaging in EE have biased memory of parental feeding practices. That said, research has used retrospective variants of the Child Feeding Questionnaire with predictive and psychometric success in adult populations [29, 30]. Longitudinal studies examining parental feeding practices, emotion regulation difficulties, and EE could mitigate issues of retrospective recall. Second, attributions of causality between study variables cannot be made. Experimental paradigms could

be useful in discerning the causal role of these psychosocial correlates on EE. Third, because the parent study [27] was interested in informing prevention/treatment efforts for people with EE without clinical eating disorder presentations, people with clinical eating disorder diagnoses were excluded from present analyses. Future research using clinical eating disorder populations could be useful in determining overlap with these psychosocial correlates. Fourth, the present results examined positive EE more broadly and it could be the case that unique results may emerge across specific facets of positive EE like that observed with negative EE. Future research replicating these data with EE instruments that tease out specific positive EE facets (e.g., Salzburg Emotional Eating Scale [39]) could be useful in furthering this line of research. Finally, while the present study did capture a diverse, online community sample, participant demographics were still largely WEIRD: Western, Educated, Industrialized, Rich, and Democratic [40]. Thus, findings from the present analyses were limited to these populations and should not be generalized to populations outside of these parameters. Future research utilizing diverse, clinical samples could identify potential constraints on generality [41], a critical next step in advancing this line of research.

Conclusions

Perceived parental feeding practices intended to promote health in childhood, in tandem with emotion regulation difficulties, may be positive correlates of negative and positive EE in adulthood. Clinicians and researchers interested in relationships between parental feeding practices and EE should consider emotion regulation difficulties as a factor that may strengthen these relationships. Future experimental and longitudinal research delineating the temporal order of these psychosocial correlates on negative and positive EE throughout the lifespan could identify parental feeding practices and emotion regulation as potential treatment targets for people with negative and positive EE.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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