Emotion Regulation Moderates the Associations of Food Parenting and Adolescent Emotional Eating

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ABSTRACT
Objective: To explore parental feeding practices and eating behavior as predictors of the child’s emotional eating (EE) and child’s emotion regulation (ER) as a potential moderator.

Design: Parental eating behavior (emotional, external, and restrained eating), 9 parental feeding practices (restriction, food as reward, food as ER, monitoring, healthy modeling, healthy environment, child control, and child involvement), ER, and EE were analyzed cross-sectionally and 5 parental practices longitudinally (subsample, n = 115).

Setting: Belgium.
Participants: Two hundred eighteen adolescents (aged 13.7 ± 1.77 years) and parent dyads.

Main Outcome Measures: Child’s EE.
Analysis: Linear regression and moderation (cross-sectional) and linear mixed models (longitudinal). Models adjusted for multiple testing with a false discovery rate of 10% (Benjamini-Hochberg), age, sex, body mass index, socioeconomic status, and cohort.

Results: Cross-sectionally but not longitudinally, there was a positive association between predictors restriction and monitoring with the outcome child’s EE (β = 0.19, P = 0.006; β = 0.17, P = 0.01, respectively). Restrained eating of the parent was negatively associated with the child’s EE (β = −0.22, P = 0.003). The child’s maladaptive ER significantly moderated the associations of 5 feeding practices and parental EE with the child’s EE.

Conclusions and Implications: Parents continue to play a role in the eating behavior of their adolescent offspring, not only through their feeding practices (restrictive parenting was most detrimental) but also by displaying restrained eating (beneficial). A child’s ER appears as an important moderator of the established associations; however, more research is needed to better understand these observations.

Key Words: feeding practices, parental eating behavior, emotion regulation, emotional eating, adolescence (J Nutr Educ Behav. 2022;54:808−817.)

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INTRODUCTION

Emotional Eating in Adolescence

Emotional eating (EE) is eating as a mechanism for coping with negative and, according to some researchers, positive emotions or stress. Emotional eating has been consistently linked to inappropriate dietary patterns and weight gain, both in adults and children and adolescents. Adolescence is a time of various physiological and psychological changes, and thus a particular vulnerability for emotional imbalance, and gradually growing independence (eg, in food choices and snacking). As EE emerges in adolescence, it poses a risk for the development of obesity, which can extend to the adult life. Therefore, it seems necessary to study the factors in the adolescent environment which could be particularly associated with the development and prevention of EE.

Parental Influences

Research has shown that EE seems more learned than inherited and that parents’ influence on a child’s eating behavior can translate through parental feeding practices. Feeding practices can be defined as specific behavioral strategies employed by parents to control the quality, quantity, and timing of their child’s food intake and eating behaviors.

Based on the model of Vaughn et al,3 general higher-order food parenting constructs can be
distinguished, namely: coercive control (imposing own will on the child, including such practices as food restriction, pressure to eat, using food as a reward or as emotion regulation [ER]); structure (setting rules and limits—structured practices [eg, instructions on favorable eating patterns, monitoring child’s food consumption]); or lack thereof—unstructured practices (eg, letting the offspring control the food choices), and autonomy support (nurturing the child’s independence in the feeding domain [eg, child involvement in food choices and meal planning and preparation]). Coercive control has been linked to a lower child’s ability to respond to internal hunger, appetite, and satiety cues, whereas autonomy support leads to a more appropriate response. According to a recent review, providing structure and supporting the child’s autonomy brings desirable outcomes for the child’s eating behavior and weight outcomes.

Apart from the parental feeding practices, which have been well studied, an emerging area of interest in relation to the child’s eating behavior is the eating behavior of parents. Parental eating behavior influences the child’s eating behavior by exhibiting specific eating routines (eg, eating in the absence of hunger like emotional or external eating, or demonstrating restraint from eating). Previous studies have shown a positive association between parental EE and child’s EE and parental external eating and child’s EE. However, when studying combined parental factors (ie, feeding practices and eating behavior), evidence that maternal eating behavior was related to less ideal child feeding practices and negative child eating behavior outcomes was mixed and inconsistent, suggesting that more research is needed to fully understand adolescent EE.

Role of ER as a Novel Aspect

Given EE’s definition as a coping mechanism with stressful or negative situations, a central aspect of the relationship between parental feeding practices and eating behavior with a child’s eating behavior is the child’s ER. Emotion regulation can be broadly defined as strategies encompassing upregulation and down-regulation of positive and negative emotions per regulation-related goals. In children and adolescents, studying ER is a rather new but essential domain. It turns out to be an important predictor of psychopathologies, particularly those related to emotional problems.

People can use many different ER strategies. Employing these in a flexible and context-specific manner (ie, best suited for the given situation is currently believed to be the most efficient way of ER). In addition, a distinction can be made between adaptive and maladaptive ER strategies. Adaptive ER strategies (such as reappraisal, acceptance, or problem solving) are often linked to decreased negative emotions and better resilience, whereas maladaptive ER (such as rumination, avoidance, or suppression) are linked to increased negative emotions and psychopathology. Emotional eating has been consistently seen as a maladaptive way of coping with stress and negative emotions and a pathway to obesity. People can use many different ER strategies. Employing these in a flexible and context-specific manner (ie, best suited for the given situation is currently believed to be the most efficient way of ER). In addition, a distinction can be made between adaptive and maladaptive ER strategies. Adaptive ER strategies (such as reappraisal, acceptance, or problem solving) are often linked to decreased negative emotions and better resilience, whereas maladaptive ER (such as rumination, avoidance, or suppression) are linked to increased negative emotions and psychopathology. Emotional eating has been consistently seen as a maladaptive way of coping with stress and negative emotions and a pathway to obesity.

Theoretical Model and Study Hypotheses

The tested model (Figure 1) builds on existing knowledge in the area of the impact of the family on the child’s adjustment (ie, the influence of food parenting practices and parental eating behavior on the adolescent’s EE), while now taking into account the adolescent’s ER as moderator. Relying on cross-sectional and longitudinal data, this study aimed to test 3 main hypotheses.

As the first hypothesis (H1), based on previous research, we expected to observe the following cross-sectional associations of feeding practices with adolescent’s EE: negative for the feeding practice within the autonomy domain, negative or positive for practices within a structure (depending on whether it would practice involving a set structure or lack of structure, respectively), positive for controlling practices (H1, A). In addition, a positive association was expected between unfavorable parental eating behavior and the adolescent’s EE (H1, B).

Our second hypothesis (H2) assumed the following associations of feeding practices with adolescents’ EE: for controlling practices, a positive association; for practices within a structure, a negative association for practices involving setting structure, and a positive one for practices in which less structure is provided.

In the third hypothesis (H3) (also cross-sectional), we expected that the adolescent’s ER would moderate the association of parental feeding practices (H3, A) and eating behavior (H3, B) with adolescents’ EE. More specifically, we hypothesized that high adaptive ER levels would decrease and high maladaptive ER levels would enhance the positive association of unfavorable feeding practices (controlling and unstructured practices) and/or eating behavior of the parent (eg, high levels of parental EE) with the adolescent’s EE. The opposite effect of ER strategies (adaptive and maladaptive) was expected for the practice from the autonomy domain and practices involving providing more structure in eating.

METHODS

Participants and Recruitment

The hypotheses in the current study were tested on the basis of a cross-sectional sample and a longitudinal subsample (Supplementary Figure S1).

Cross-sectional sample. From 3 of our research group’s cohorts in medium-sized cities in the Flemish region of Belgium (Aalter, Deinze, and Geraardsbergen), all previous participants aged between 10 and 18 years (n = 660), initially recruited via schools, were invited by post and/or email to participate in the study.
Two hundred forty-six adolescents and 1 of their parents/caregivers volunteered for the current study. The following dropout was related to factors such as no interest in participating in the new wave of the study, contact details changed (and therefore the information did not reach the participants), or not showing up for the appointment during the new wave. Following the initial screening of available data, 28 participants were excluded because of missing questionnaire information. Therefore, the final study sample encompassed 218 adolescent–parent dyads.

Data collection was carried out between April and July, 2017 within an interdisciplinary project called Obesity Prevention through Emotion Regulation in Adolescents. The data (anthropometric measurements) were collected during a single appointment. The protocol of this study was approved by the Ghent University Hospital Ethics Committee. Participants’ parents or legal guardians and participants aged at least 12 years provided written consent, whereas verbal assent was provided by participants aged < 12 years.

Longitudinal sample. Longitudinal data were available in the Aalter cohort on 5 parenting practices (as previously mentioned) and the child’s EE. More specifically, the first phase (preadolescence [T1]) of the data collection took place in 2013,33 and the second phase in 2017 ([T2] as described above). The final subsample for longitudinal data analyses included 115 study subjects.

Instruments

To test our 3 posed hypotheses, we employed scales from questionnaires to assess food parenting and adolescents’ EE and ER. Cronbach’s α was given in parentheses after each scale. In addition, the ranges of possible scores and the classification of Vaughn’s higher-order food parenting constructs can be found in Table 1.

Parental feeding practices. From the parent-reported Child Feeding Questionnaire,35 3 feeding practices were assessed cross-sectionally and longitudinally: monitoring (Cronbach α = 0.90), restriction (Cronbach α = 0.68), and pressure to eat (Cronbach α = 0.58). The latter scale was not included in the results and discussion because of lower reliability. From the Comprehensive Feeding Practices Questionnaire66 6 scales were used in the cross-sectional study: healthy food modeling (ie, coaching28) (Cronbach α = 0.82), providing a healthy food environment (Cronbach α = 0.71), letting the child control their food decisions (Cronbach α = 0.62), child involvement (Cronbach α = 0.72), using food as reward (Cronbach α = 0.75), and using food as ER (Cronbach α = 0.84). Only the healthy modeling and healthy environment scales were available for longitudinal analyses. Parents rated each item on a 5-point Likert scale, and mean scores were calculated for each subscale, with higher scores indicating greater use of the feeding practice.

Emotional eating and parental eating behavior. The participating adolescents and 1 of their parents completed the Dutch Eating Behavior Questionnaire (DEBQ)17 (adolescents: the validated in children DEBQ-C37) at mid-adolescence (T2) and children at T1. The DEBQ measures eating behaviors rated on a 5-point Likert scale, with higher scores indicating more problems in these behaviors. In this study, the EE subscale measuring (over)eating in response to negative emotions (eg, stress, angeriness, or boredom) was utilized to assess the EE of the adolescent (Cronbach α = 0.95) and the parent (Cronbach α = 0.96). In addition, parents completed 2 other subscales: external eating (ie, eating in response to external cues) (Cronbach α = 0.84), and restrained eating (ie, restraining one’s consumption) (Cronbach α = 0.93).
Emotion regulation. Emotion regulation was assessed with the Dutch version of the child-reported Fragebogen Zur Erhebung Der Emotionsregulation Bei Kindern Und Jugendlichen (FEEL-KJ) questionnaire, a reliable and valid instrument for measuring the adaptive and maladaptive ER strategies in children and adolescents. In the current study, adaptive ER is calculated as the mean of 7 strategies (Cronbach $\alpha = 0.95$): problem solving, distraction, forgetting, humor enhancement, acceptance, cognitive problem solving, and revaluation. Maladaptive ER is calculated as the mean of 5 strategies (Cronbach $\alpha = 0.85$): rumination, self-

Table 1. Descriptive Characteristics of Belgian Adolescents During 2 Waves of the Study (2013 and 2017) and Changes in the Variables Over Time

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2017 With Cross-sectional Data (n = 218)</th>
<th>2013 With Longitudinal Data (n = 115)</th>
<th>2013/2017</th>
<th>P (Comparison)$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child characteristics</td>
<td></td>
<td></td>
<td>n = 115</td>
<td></td>
</tr>
<tr>
<td>Age, y, mean ± SD</td>
<td>13.7 ± 1.8</td>
<td>14.0 ± 1.7</td>
<td>10.5 ± 1.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Sex, % females</td>
<td>51</td>
<td>46</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Adjusted BMI z-scores, mean ± SD</td>
<td></td>
<td></td>
<td>0.05 ± 0.90</td>
<td>0.46 ± 0.91</td>
</tr>
<tr>
<td>BMI, %</td>
<td></td>
<td></td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Normal weight</td>
<td>70</td>
<td>77</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Overweight/obesity</td>
<td>16</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>14</td>
<td>16</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Family characteristics</td>
<td></td>
<td></td>
<td>0.140</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status, %</td>
<td></td>
<td></td>
<td>43</td>
<td>45</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>43</td>
<td>45</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>44</td>
<td>38</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Lower-middle and lower</td>
<td>13</td>
<td>17</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Sex of the parent, % $^b$</td>
<td></td>
<td></td>
<td>76</td>
<td>73</td>
</tr>
<tr>
<td>Female</td>
<td>76</td>
<td>73</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>14</td>
<td>17</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Parental feeding practices (score, 1−5)</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coercive control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>3.0 ± 0.6</td>
<td>3.1 ± 0.6</td>
<td>3.1 ± 0.5</td>
<td>0.675</td>
</tr>
<tr>
<td>Food as reward</td>
<td>1.9 ± 0.7</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Food as emotion regulation</td>
<td>1.5 ± 0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>3.2 ± 0.9</td>
<td>3.3 ± 0.9</td>
<td>3.8 ± 0.9</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Healthy modeling</td>
<td>3.9 ± 0.7</td>
<td>3.8 ± 0.7</td>
<td>4.1 ± 0.7</td>
<td>0.004</td>
</tr>
<tr>
<td>Healthy environment</td>
<td>3.7 ± 0.6</td>
<td>3.7 ± 0.7</td>
<td>3.7 ± 0.5</td>
<td>0.750</td>
</tr>
<tr>
<td>Child control</td>
<td>2.3 ± 0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child involvement</td>
<td>3.8 ± 0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental eating behavior (score, 1−5)</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional eating</td>
<td>2.4 ± 0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External eating</td>
<td>2.8 ± 0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained eating</td>
<td>2.9 ± 0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child’s eating behavior (score, 1−5)</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional eating</td>
<td>2.2 ± 0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child’s emotion regulation (score, 6−30)</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional eating</td>
<td>19.1 ± 3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptive strategies</td>
<td>15.5 ± 3.2</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

BMI indicates Body Mass Index.

Tests performed to compare the sample differences between the years 2013 and 2017; $t$ tests for continuous variables, and McNemar-Bowker’s test of symmetry for categorical variables with > 2 categories; a $P$ value (continuous variables) or asymptotic significance (categorical variables) of $< 0.05$ was considered significant; as linear mixed models allow data missing at random, the $t$ test results for variables included in this table were calculated case-wise and therefore allowed varying sample size; $^b$Sex was of the parent who filled in the questionnaires.
devaluation, giving-up, withdrawal, and aggressive actions. Higher scores corresponded to a higher adaptive and maladaptive ER level, respectively.

Statistical Analyses

The statistical analyses were completed using the SPSS software (version 24.0, IBM Corp, 2016). The initial interdependencies between all study variables were tested first via Pearson’s correlations (point biserial correlations with the dichotomous parameter of sex). The first hypothesis was tested via linear regression (Supplementary Table S1). Further, the moderations (as in Figure 1) were tested with the PROCESS macro. For significant moderations, the relation between the independent variables and the outcome variable was depicted via the Johnson-Neyman plot, and areas of significance were indicated.

The longitudinal associations of the change in parental feeding practices with the change in adolescent’s EE were analyzed by a linear longitudinal mixed model regression (a multilevel technique considering time as a separate level and allowing a random intercept) by including predictor and outcome factors of the 2 time points and thus considering change over time while considering the baseline variables. All regression models were adjusted for age, sex, body mass index, and socioeconomic status. The cross-sectional regression models shown in Table 2 were also adjusted for cohort (see below for methodology on the confounders). The missingness at random of the variables included in the longitudinal models was confirmed with Little’s Missing Completely at Random test ($\chi^2 = 302.3$, degrees of freedom = 341, $P = 0.94$), which allowed inclusion in the analyses of the subjects with missing data on some of the tested variables. To gain further insights on parental feeding practices at baseline as predictors of change in EE over time, repeated measures ANOVA was conducted as an alternative to the main approach tested with mixed models. In principle, $P < 0.05$ was considered significant. However, to control for the potential inflation of the type 1 error resulting from performing multiple tests, the Benjamini-Hochberg correction with a false discovery rate (the expected proportion of potential errors among the rejected null hypotheses) of 10% was applied separately per hypothesis. Because of the rather explorative character of the current analysis, a less stringent procedure than the Bonferroni correction was chosen.

The $P$ values which remained significant after the correction are bolded.

Confounders

The adolescents indicated their sex via the Tanner pubertal stage scale, in which they had a choice to indicate their pubertal stage for 1 of the 2 categories: boys or girls. The adolescents’ body weight and height were measured by the researchers with validated equipment. Body mass index was calculated and adjusted using the adjusted Flemish charts. For descriptive purposes, the International Obesity Task Force cutoffs were used to categorize the patients as underweight, normal weight, overweight, and obese. The Hollingshead Index, taking into account parents’ education and profession and the family composition/parents’ civil state, was calculated as a proxy for the family’s socioeconomic status.

RESULTS

Descriptive Data

The characteristics of the study sample in the cross-sectional analyses and the subsample in the longitudinal analyses are shown in Table 1.
Associations of Parental Feeding Practices and Parental Eating Behavior With Adolescents’ EE (H1 and H2)

Regarding the parental feeding practices, restriction and monitoring were positively associated with adolescents’ EE (P = 0.006; P = 0.01, respectively) (Table 2). Among the 3 tested parental eating behavior types, only restrained eating was associated with adolescents’ EE (P = 0.003). By including all significant parental feeding practices and eating behaviors (and confounders) in 1 model, 2 predictors remained significant: restrained eating of the parent (P < 0.001) and restriction (P = 0.01). The model explained 11% of the EE variance (adjusted $r^2$).

Over the 4 years between 2013 and 2017, covering the time from late childhood and early adolescence toward middle adolescence, changes occurred in some parental practices and the adolescents’ EE (Table 1). Namely, parents reported higher monitoring and healthy modeling levels, whereas the reported levels of restriction and the healthy environment remained unchanged. Adolescents reported a considerable increase in EE from below the average in 2013 to above the average in 2017, according to the norms for the Dutch population.

Regarding longitudinal associations, none of the 5 parental feeding practices tested via mixed models (their change over time) (Supplementary Table S3) or repeated measures ANOVA (baseline practices as predictors) (data not shown) was significantly related to the change in adolescent’s EE.

Moderating Role of Adolescents’ ER on the Association of Parental Feeding Practices and Eating Behavior With Adolescent’s EE (H3)

The adolescents’ maladaptive ER turned out to be positively associated with their EE (P < 0.001), whereas adaptive ER did not (P = 0.93). After correction for multiple testing, adolescents’ maladaptive ER moderated several associations of (H3, A) parental feeding practices with adolescent’s EE (food as ER, child control, food as reward, child involvement, and healthy modeling), and (H3, B) parental EE with adolescent’s EE (Figure 2), whereas no moderation effects were observed with adaptive ER as the moderator (Supplementary Table S4).

Food as reward was negatively associated with adolescents’ EE at higher maladaptive ER levels. An opposite moderation effect was observed for lower maladaptive ER levels (Figure 2, C); adolescents’ EE would also increase with increased food as reward. A 2-sided moderation was also observed for child involvement (Figure 2, D). This means that at lower values of maladaptive ER, the association between child involvement and adolescents’ EE was negative (ie, with growing levels of child involvement), and their EE decreased, whereas it increased at higher values of maladaptive ER. In addition, the moderation effect of maladaptive ER was significant for the associations of food as ER (Figure 2, A), child control (Figure 2, B), and parental EE (Figure 2, F) with...
adolescents’ EE (negative effect), and for healthy modeling with adolescent’s EE (Figure 2, E) (positive effect), in the latter case only for very high levels of maladaptive ER.

DISCUSSION

The current study explored the feeding practices and eating behavior of parents in the context of their offspring’s EE, taking into account the potential moderating impact of their ER. In addition, changes in available longitudinally parental practices and children’s EE in a period between early adolescence and mid-adolescence were investigated in a subsample. From the main findings of the present research regarding parental factors, food restriction and restrained eating styles emerged as factors affecting adolescents’ EE. In addition, adolescents’ maladaptive ER appears to have played a role in the relation between parental factors and adolescents’ EE.

Regarding the parental feeding practices, restriction (coercive control construct) and monitoring (structure construct) were positively associated with adolescents’ EE. Research in young children has shown that maternal restrictive feeding was positively associated with children’s EE. However, there is a certain heterogeneity in the association between restriction and healthy and unhealthy child eating behaviors. In addition, the restriction has been consistently positively associated with the child’s body mass index, pointing toward reverse causality. Similarly to restriction, monitoring turned out to be also positively associated with EE. Monitoring, being a structure construct-related parenting practice, could be potentially a favorable practice in the context of the adolescent’s EE. However, in a longitudinal study, it was observed that persisting maintenance of monitoring levels by parents might be linked to the adolescent’s tendency to overeat, which might explain the current observation. Going back to the conceptual analysis of parental feeding practices, the provision of structure may occur in an autonomy-supporting or coercive and controlling way. More in-depth information on how the monitoring was being exerted by parents could elucidate the specific link with adolescents’ EE. Contrary to present findings, according to some investigations, it is especially the emotional feeding practices in parents that are related to EE in children and adolescents.

Concerning parental eating behavior, against theoretical assumptions, parental EE and external eating were not associated with adolescents’ EE. There was cooccurrence of the 2 independent constructs, EE and external eating in parents, in accordance with the existing evidence. Interestingly, parental restrained eating was negatively associated with adolescents’ EE. High dietary restraint has been linked to increased EE, especially in dieters. However, it is likely that the adolescents perceived the restrained eating of their parents as a health-oriented behavior (making healthy food choices and limiting the consumption, and availability at home, of highly palatable but energy-dense foods) and that this aspect was balancing out the more maladaptive aspect of this eating behavior. After all, parental restrained eating and healthy environment were correlated (Supplementary Table S2).

Compared with the T1, a significant rise in EE was observed 4 years later in T2 (Table 1). This is in line with existing research, pointing out the difference between low levels of EE in childhood compared with high levels in adulthood, designating adolescence as a high-risk developmental stage.

Unexpectedly, the change over time in parental feeding practices was not significantly related to the change in adolescents’ EE. This may suggest that other influences are promoting the development of EE during adolescence (eg, external influences such as appearance teasing by peers or parents or internal influences such as social anxiety or body dissatisfaction). The results of this study suggest that adolescents’ characteristics, especially ER, play a considerable role in adolescents’ EE. The correlation results showed that maladaptive ER was positively associated with adolescents’ EE. This observation confirmed previous findings of a study in young elementary school-aged children, in which reactivity (ie, children’s contextually or culturally inappropriate emotional expression) as 1 type of maladaptive ER contributed to the variance in EE (positive association). As a novel finding of this study, adolescents maladaptive ER constituted a significant moderator in the pathway from parental feeding practices or parental EE to adolescents’ EE. This moderating effect was observed for all 3 categories of parental practices (ie, controlling [food as ER and food as reward], structure [child control, healthy modeling], and autonomy support [child involvement]).

First, higher parental use of food as reward was associated with higher EE of the adolescent in case of very low maladaptive ER, whereas the opposite association was true for very high maladaptive ER. Using food as reward has been claimed to have a negative impact on the child’s hunger and satiety cues. Hence, this practice was hypothesized to stimulate EE, especially when high in maladaptive ER (instead of low maladaptive ER as in the current study). Indeed, an investigation of this relationship in preschool children showed it to be partially mediated by child self-regulation in eating.

Second, letting the children control their food choices was related to lower EE of the adolescent at higher levels of maladaptive strategies. This finding could suggest that nurturing the children’s growing autonomy by allowing them to make their own food choices in a very free manner, seen by younger children as too indulgent or uninvolved, might be positively related to emotion management and coping of adolescents. However, this observation may be related to reverse causality: parents of adolescents showing less EE (even at high maladaptive ER) may allow their children more freedom in their choices than adolescents who show more EE.

Third, regarding the parental practice we investigated within the autonomy support construct (ie, child involvement), no moderation...
was found for adaptive ER. Concurrently, in previous research, maternal autonomy support was associated with increases in adolescent adaptive ER strategies and subsequent adjustment, and involving the child in meal preparation specifically was related to increased positive feelings in children. An opposite observation could be expected for maladaptive ER. However, at high maladaptive ER levels, higher involvement was associated positively with adolescents’ EE in our study. A question arises on the directionality of the association; possibly, the more EE the child is displaying, the more the parent is trying to involve them in food preparation. The negative correlation between child involvement and maladaptive ER, especially at higher maladaptive ER levels, seems to play a bigger role than the parental feeding practice of child involvement.

Finally, ER turned out to be an important moderator in the relationship between parental EE and adolescents’ EE. In this study, an unexpected negative effect was observed between parents’ and adolescents’ EE at higher levels of adolescents’ maladaptive ER. Because this was the first study testing ER as a moderator in this association, further investigation would be required to understand it.

A considerable strength of the current study was the concurrent assessment of both food parenting practices and parental eating behaviors regarding EE in the less studied adolescent population. Moreover, in this study, the role of ER was explored and confirmed in the context of parental feeding practices and eating behavior vs adolescents’ EE. Another advantage was the longitudinal observation of changes in parental feeding practices in a subsample. Two time points representing late childhood/early adolescence (T1) and mid-adolescence (T2) captured very well the moment when EE is developing (a high increase was observed from T1 to T2). Unfortunately, not all variables of interest (eg, ER) were available for both time points, and the longitudinal sample accounted for only about 53% of the cross-sectional sample. In addition, causal effects were not established, as this would require a longitudinal observation at an ideally minimum of 3 time points. However, the insights obtained from this study shed light on the important role of adolescents’ ER in the studied relations, which suggests a new interesting direction for future research. Another limitation is related to a certain selection bias related to the study population; therefore, the findings need to be treated with caution when applied to the general population.

IMPLICATIONS FOR RESEARCH AND PRACTICE

This study suggests that parents continue to play an important role in their adolescent offspring’s eating behavior. This study showed a positive link between parental restriction and adolescents’ EE. It could be interesting to investigate in the future the specific character of structure-related feeding practices and less controlled practices via qualitative research to better understand these observations, specifically in adolescents. Within parental eating behavior, only parental restrained eating, less studied so far in this context, seemed to lower EE. One possible explanation could be that parenting is conditional on the specific family situation or the adolescent’s perception of them. Namely, EE occurs in situations related to negative emotions, like stress, which the parent would be less prone to show to their child (as in not to give a bad example), although in families with many tensions/high-stress levels, the modeling of the parents’ EE style may be more prominent than the more health-oriented restrained style. As few studies investigated this in adolescents, the current observations became highly relevant.

Maladaptive ER strategies, in particular, appeared as an important moderator in the relationship of parental feeding practices and eating behavior with the EE of adolescents, but the effect’s directionality often turned out rather unexpected. Studies involving a longitudinal design could elucidate the observed effects’ directionality and, as such, they could aid in identifying the focus for education against undesirable eating behaviors.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jneb.2022.05.002.

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