

Anxiety, parental feeding and preadolescent eating

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Perceptions of parental pressure to eat and eating behaviours in preadolescents: The mediating role of anxiety

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Abstract

Previous research suggests that parental controlling feeding practices are associated with children's over-eating and under-eating behaviours. However, there is limited research addressing the link between children's mental health symptoms (specifically anxiety and depression) and their reports of eating behaviours, despite knowledge that these psychopathologies often co-exist. The current study aimed to identify the relationships between preadolescents' perceptions of their parents' feeding practices with reports of their own anxiety, depression and eating behaviours. Three hundred and fifty six children (mean age 8.75 years) completed questionnaires measuring their dietary restraint, emotional eating and external eating, as well as their perceptions of their parents' use of pressure to eat and restriction of food. Children also completed measures of general anxiety, social anxiety and depression symptomology. Results indicated that preadolescents' eating behaviours were associated with their perceptions of the controlling feeding practices their parents used with them. Preadolescents' dietary restraint, emotional eating and external eating behaviours were positively associated with their reports of general and social anxiety, and depression symptomology. In addition, perceptions of parental pressure to eat were positively related to preadolescents' anxiety and depression levels. Child anxiety (general and social) was found to mediate the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours (dietary restraint, emotional eating and external eating). The results suggest that greater anxiety in preadolescents may explain why children who perceive greater pressure to eat by their parents are more likely to exhibit maladaptive eating behaviours.

Keywords: dietary restraint; emotional eating; external eating; children's eating behaviours; parental feeding practices; child feeding; pressure to eat; restriction; anxiety; depression

Perceptions of parental pressure to eat and eating behaviours in preadolescents: The mediating role of anxiety

There are multiple people who influence children's food intake; however two key groups of individuals are peers and parents (e.g., Houldcroft, Haycraft & Farrow, 2014; Salvy, de la Haye, Bowker & Hermans, 2012; Scaglioni, Salvioni & Galimberti, 2008). Parents and caregivers are, in particular, responsible for shaping children's eating attitudes and behaviours through the feeding environments they provide (including the food choices they make for their children and the foods they select and model eating) and the feeding practices they employ with their children (e.g., Faith et al., 2004; Wardle & Carnell, 2007). It has been well established that parents/caregivers have a substantial role in creating the eating environments of younger children who have less autonomy over their own eating (see Patrick & Nicklas, 2005, for a review), yet these key individuals remain primarily responsible for food choices, portion sizes and general mealtime environments throughout childhood and adolescence (e.g., Fulkerson, Neumark-Sztainer & Story, 2006; Savage, Fisher & Birch, 2007; Walsh & Nelson, 2010).

Parents' reports of their use of controlling feeding practices with their children in eating situations are well researched (see Scaglioni, Salvioni & Galimberti, 2008 for a review), particularly since high levels of control over young children's feeding have been shown to be counterproductive (e.g., Faith et al., 2004; Farrow & Blissett, 2008). Excessive parental control in the feeding domain has been shown to be associated with children's inability to respond appropriately to internal hunger and satiety signals as children learn to associate the process of eating with external, parental cues (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000). One example of a commonly used controlling feeding practice is restriction of food, whereby parents overtly or covertly restrict, or limit, the type of food or amount of food that their child eats (Birch et al., 2001). Parental use of restriction has been linked with

an increase in children's intake of food and general over-eating (Birch, Fisher & Davison, 2003), and is further evidenced to be related to increased child weight in pre-school aged children (Birch & Fisher, 2000), although other studies have failed to evidence this link (e.g., Matheson, Robinson, Varady & Killen, 2006). In contrast, pressuring a child to eat has been related to their reduced intake of pressured food/s, and less weight gain (e.g., Galloway, Fiorito, Francis & Birch, 2006; Wardle & Carnell, 2007). One study has suggested that the effects of pressure to eat may be longstanding, with adults reporting a continued dislike and an enduring lack of willingness to eat food/s they retrospectively recall being pressured to eat as a child (Batsell, Brown, Anfield & Paschall, 2002). In adolescents, perceptions of parents' use of greater levels of controlling feeding practices (pressure and restriction) have been linked to higher levels of eating psychopathology (Haycraft, Goodwin & Meyer, 2014).

Despite research documenting parents' use of controlling feeding practices and their relationship to young children's eating behaviours and adolescent eating behaviours, to date there remains a gap in research between these two stages, notably during preadolescence. The period of preadolescence is of particular importance since research suggests that body, weight, and dieting concerns begin around this age (Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999). Preadolescence is also a time period characterised by increasing independence and autonomy. Children begin to have more control over decisions about food choices and food environments, and parents' control over feeding may change to reflect this during preadolescence. However, parents remain the primary providers of food until a child reaches adolescence (Savage et al., 2007), yet much of the previous research in this domain focusses on parental feeding practices with *younger* children (e.g., Birch & Fisher, 2000; Rodgers et al., 2013; Scaglioni et al., 2008). Furthermore, the published literature is largely based on parents' self-reported use of controlling feeding practices with their children, which may differ from children's perceptions of such practices. In a study using adolescents, perceptions of greater controlling parental

feeding practices were linked to more unhealthy adolescent eating behaviours (Haycraft et al., 2014).

To date, only one previous study has examined preadolescents' perceptions of their parents' controlling feeding practices, finding that perceptions of greater levels of parental pressure to eat were associated with greater reports of emotional and external eating in boys (but not girls) in a Dutch, preadolescent sample (van Strien & Bazelier, 2007). However, for both boys and girls, perceptions of parental restriction were found to be negatively related to their emotional and external eating, although positively correlated with their restrained eating behaviours (van Strien & Bazelier, 2007). Given the importance of these findings in highlighting that the association between controlling parental feeding practices and child obesogenic and under-eating behaviours may continue into preadolescence, a replication of such results in a UK sample of preadolescents is warranted.

In addition to the research that links controlling parental feeding practices to over- and under-eating in children, evidence also suggests an association between controlling parenting styles and children's symptoms of mental health problems (e.g., Bögels & van Melick, 2004; Feng, Shaw, & Silk, 2008; Hudson & Rapee, 2001; LeMoyne & Buchanan, 2011). Thirlwall and Creswell (2010) reported that the children of mothers who engaged in more controlling parenting behaviours were more anxious. In their experimental study, the authors additionally found that children's levels of trait anxiety moderated the relationship between mothers' controlling parenting and children's negative predictions about their performance on a task. Specifically, they found that when mothers engaged in higher levels of controlling parenting behaviours, children with heightened levels of trait anxiety made greater negative predictions about their performance (Thirlwall & Creswell, 2010). Similarly to anxiety, evidence has suggested potential links between controlling parenting and childhood depression (e.g. Rapee, 1997), although a review of the literature by McLeod, Weisz and Wood (2007) suggested that the evidence of an association between these two

factors is limited. It is plausible that, as suggested by Hudson and Rapee (2001) and Rapee (2001), parents' excessive protection and control over their children may result in a child's perception of the world as threatening, as well as reinforcing child doubt and encouraging a reliance on their parents. This may produce a heightened susceptibility to experiencing symptoms of mental health problems (e.g., anxiety and depression) in the children of controlling parents.

The associations between symptoms of anxiety, depression and disordered eating behaviours have been well-documented, as clinically the symptomology of these disorders often co-occur in both adults (e.g., Mischoulon et al., 2011; Pallister & Waller, 2008; Swinbourne & Touyz, 2007) and adolescents/children (e.g., Stice, Burton & Shaw, 2004; Touchette et al., 2007). Given the discussed relationships between controlling parental feeding practices and children's over- and under-eating behaviours, and the relationships between controlling parenting and children's anxiety and depression symptomology, it is plausible that anxiety and depression may mediate the relationship between parental controlling feeding practices and children's eating behaviours. If evidenced, an understanding of this relationship would be beneficial to inform future feeding and eating interventions aimed at parents and children, by highlighting the importance of considering children's levels of anxiety and/or depression when designing such interventions.

The current study aimed to replicate van Strien and Bazelier's (2007) Dutch study by using a UK sample of preadolescent children to examine the relationships between perceptions of parental controlling feeding practices and preadolescents' reports of their own over- and under-eating behaviours. It was hypothesised that greater perceptions of parental controlling feeding practices would be associated with higher levels of children's self-reported dietary restraint, emotional eating and external eating behaviours. The present study also aimed to examine the relationship between preadolescents' reports of eating behaviours and their reported levels of anxiety and depression symptomology, with a

positive association between the two hypothesised. To expand on previous research in the parenting domain (which has focused largely on parental reports) the current study further aimed to examine the potential relationship between preadolescents' perceptions of controlling parental feeding practices and their reports of anxiety and depression symptomology. It was anticipated that greater perceptions of parental controlling feeding practices would be associated with higher levels of self-reported anxiety and depression symptoms. The final aim was to draw together the results by exploring preadolescents' reports of anxiety and depression as potential mediators of the association between preadolescents' perceptions of parental feeding practices and their reported eating behaviours.

Method

Participants

Three-hundred and fifty six children participated in the study, with a roughly equal spread of boys and girls (boys $n = 184$, girls $n = 172$). The age of the children ranged from 7.25 to 10.25 years ($M = 8.75$, $SD = 0.57$). The age range of children taking part varied as some schools contained mixed age group classes. Excluding older and younger children from the study did not alter the results, so the final sample maintained all of the children recruited. The majority (93%) of children described themselves as White British. Children were recruited from primary schools from the Midlands counties of Staffordshire, Derbyshire, Nottinghamshire and Leicestershire.

Procedure

Schools ($N = 8$) agreed to participate in a study exploring the factors associated with preadolescent children's eating behaviours. Parents of children in the classes which covered the target preadolescent age range (approximately 8-9 years) were sent a letter

detailing the nature of the study and giving them the option to opt-out their child from participating.

All children participating in the research completed a series of questionnaires that included measures of their eating attitudes and behaviours, the feeding practices that they perceived their parents used with them, their levels of anxiety and depression, and demographic information (age, gender). Questionnaire measures are detailed below.

Measures

Eating Pattern Inventory for Children (EPI-C; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

To assess self-reported eating behaviours, children completed three subscales of the EPI-C (totalling 20 items). These subscales are: dietary restraint (e.g., “To keep my weight, I often eat less than I would actually like to”); external eating (e.g., “When I see someone eat, I also get hungry”); and emotional eating (e.g., “When I am lonely I comfort myself with food”).

Participants responded on a four point scale ranging from ‘not at all’ to ‘totally’. Higher scores on each subscale were indicative of higher levels of maladaptive eating behaviours. The EPI-C is designed for use in both clinical and non-clinical preadolescent children (8-11 years of age) and has been shown to have adequate factor structure (Schact et al., 2006) and good validity with preadolescents (Farrow, Haycraft & Meyer, 2011; Schact et al., 2006). In the present sample, the internal reliability coefficients (Cronbach’s α) scores for dietary restraint (0.85), external eating (0.78) and emotional eating (0.75) demonstrated good levels of internal consistency.

Kids’ Child Feeding Questionnaire (KCFQ; Carper, Fisher & Birch, 2000).

To measure children's perceptions of the feeding practices used by their parents when feeding them, the KCFQ subscales pressure to eat (e.g., "When you say "I'm not hungry" at dinnertime, do your parents say "You need to eat anyway"?") and restriction (e.g., "Do your parents ever say things like "You've had enough to eat now, you need to stop"?") were used. The KCFQ is an age-appropriately worded child version of the Child Feeding Questionnaire (CFQ; Birch et al., 2001). The CFQ is frequently used in research with parents and the KCFQ measures similar constructs to the CFQ. The authors of the KCFQ suggest that questions be administered twice, measuring each parent's behaviours separately (e.g., "Does your mommy ever let you have snacks?" and "Does your daddy ever let you have snacks?"). In the present study, however, these were combined and questions were asked once by replacing "mommy/daddy" with "parents" in order to minimise child fatigue in the young age sample, and to replicate the use of the measure by van Strien and Bazelier (2007) with a similar preadolescent sample. To allow comparisons to be made with van Strien and Bazelier's (2007) findings, the factor structure of the KCFQ adopted by these authors was likewise used in the current study ('pressure' consisted of the items 1, 2, 3, 5, 6, 7, 8 and 15; restriction consisted of the items 10, 11, 12, 14 and 16. Items 8, 10, 11, 12, 14 and 16 were reverse coded). The KCFQ has a three point response scale; 'no', 'sometimes' and 'yes' and higher scores suggest greater levels of parental controlling feeding practices, as perceived by the child. In the present sample Cronbach's alphas were 0.68 (pressure to eat) and 0.60 (restriction), suggesting moderate levels of internal reliability, although comparable to those reported by van Strien & Bazelier (2007) (pressure average 0.76; restriction average 0.60).

Spence Children's Anxiety Scale (SCAS; Spence, 1997, 1998).

The SCAS is a self-report measure of children's anxiety symptoms. Of the original six subscales, two were used in the present study: social phobia (e.g., "I feel scared when I have to take a test") and generalised anxiety disorder/overanxious disorder (e.g., "I worry about things"), totalling 12 items. The subscales social phobia and generalised anxiety were

chosen as both are well-documented as being co-morbid with symptoms of eating disorders (e.g., Levinson & Rodebaugh, 2012; Swinbourne, Hunt, Abbott, Russell, St Clare & Touyz, 2012). The SCAS is rated on a four point scale, from 'never' to 'always', with scores summed to provide subscale totals. Higher scores signify greater levels of self-reported anxiety. The SCAS has been evidenced to be a valid and reliable measure of child anxiety (Spence, 1998) and has been used with children aged 7-17 years, with good levels of internal consistency (Muris, Schmidt & Merckelbach, 2000). Alpha levels for the present sample were 0.71 for social phobia and 0.77 for generalised anxiety, suggesting sound levels of internal consistency.

Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The CDI:S is a 10-item measure of self-reported symptoms of depression in children aged 7-17 years. In the present study, only the negative mood scale (three items, e.g., "I am sad once in a while") was used. For each item, the child must select one response from three statements that best describes their mood over the previous two weeks (e.g., "I am sad once in a while" / "I am sad many times" / "I am sad all the time"). Responses are summed, with higher scores indicating greater depressive symptoms. The CDI:S has previously been shown to have sound levels of internal consistency (Kovacs, 2003), however, in the current study, internal reliability was 0.52 and so results using this measure were interpreted with caution.

Statistical Analyses

Kolmogorov-Smirnov tests showed that almost all subscales were non-normally distributed and consequently non-parametric tests were used where possible. Mann-Whitney U tests identified gender differences for boys' and girls' self-reported levels of external and emotional eating, as well as their reports of general and social anxiety (see Table 1). Similar to the findings of van Strien and Bazelier (2007; who found that perceptions of pressure to eat was negatively correlated with child age for 7-9 year old boys), child age was negatively

associated with perceptions of pressure to eat ($r = -.091, p < 0.05$). However, unlike van Strien and Bazelier (2007; who found that perceptions of restriction were negatively correlated with child age for 7-9 year old girls) child age was not correlated with perceptions of restriction. Further preliminary Spearman's Rho correlations indicated that child age was negatively associated with reports of eating behaviours, specifically: external eating ($r = -.169, p < 0.01$) and emotional eating ($r = -.172, p < 0.01$). Therefore, subsequent analyses controlled for gender and age.

To replicate van Strien and Bazelier's (2007) findings in a UK sample and identify the relationships between preadolescents' perceptions of parental controlling feeding practices (pressure and restriction) and reports of eating behaviours (dietary restraint, emotional eating and external eating), one-tailed partial correlations (controlling for gender and age) were conducted. Further one-tailed partial correlations (controlling for gender and age) were used to examine the associations between preadolescents' reports of under- and over-eating behaviours and their reports of anxiety (general and social) and depression (negative mood). Finally, one-tailed partial correlations (controlling for gender and age) between perceptions of controlling parental feeding practices and preadolescents' reports of anxiety and depression were calculated.

To explore anxiety and depression as potential mediators of the relationships between perceptions of parental feeding practices and reports of eating behaviours, mediation analysis (Baron & Kenny, 1986) was used. When perceived parental feeding practices, anxiety and depression, and eating behaviours were significantly related in the initial correlations, these variables were subsequently investigated by mediation analyses using a series of linear regressions. The four stages for testing mediation are: 1) the independent variable must significantly predict the dependent variable; 2) the independent variable must predict the mediator; 3) the mediator must predict the dependent variable when controlling for the independent variable. If these steps are met, the fourth step then examines whether

the effect of the independent variable on the dependent variable is less after controlling for the mediator. If the independent variable no longer affects the dependent variable after controlling for the mediator, complete mediation has occurred (Baron & Kenny, 1986). If the effect of the independent variable on the dependent variable *reduces in size* after controlling for the mediator, partial mediation may have occurred, and calculations using a Sobel test can confirm this (Preacher & Leonardelli, 2013).

Although the data were non-normally distributed, since there is no non-parametric equivalent to partial correlations or regression, the use of these analyses in this instance was deemed acceptable. Statistical analyses were performed using PASW Statistics 20 with an alpha level of $p < .05$.

Results

Descriptive Statistics

Table 1 displays the means, standard deviations, medians and range scores for children's self-reported eating behaviours, perceived parental feeding practices and levels of anxiety and depression.

TABLE 1 ABOUT HERE

Preadolescents' mean eating behaviour scores were generally similar to published studies using the EPIC with a similar age range of children (Farrow et al., 2011; Schact et al., 2006). Average scores on the KCFQ were comparable to the results found with the original KCFQ (Carper, Fisher & Birch, 2000). Mean levels of self-reported anxiety (SCAS) were slightly higher than previous studies using this measure (Farrow et al., 2011; Spence, 1998), possibly due to the lower mean age of the children in the present study. Mean scores for

children's levels of depression (negative mood) were broadly comparable to normative mean CDI:S scores reported by Kovacs (2003) for children of a similar age.

Mann-Whitney U tests of difference (Table 1) showed significant gender differences for two of the eating behaviours and for preadolescents' reports of anxiety; specifically, boys reported significantly greater levels of external and emotional eating compared to girls. No gender differences were evident for reports of dietary restraint behaviours. Girls reported higher symptoms of general and social anxiety compared to boys. No significant gender differences were found for perceptions of parental feeding practices.

Correlation analyses

To examine the hypothesised relationships between preadolescents' reports of their own eating behaviours with their perceptions of parental controlling feeding practices and with their reported levels of anxiety or depression symptomology, a series of one-tailed partial correlations were calculated, controlling for gender and age (Table 2).

TABLE 2 ABOUT HERE

Correlates of dietary restraint

Preadolescents' reports of dietary restraint were associated with their perceptions of parental pressure to eat, as well as their levels of general and social anxiety and depression.

Correlates of external eating

Reports of external eating were associated with preadolescents' perceptions of pressure to eat, as well as their levels of general anxiety, social anxiety and depression. External eating was negatively associated with perceptions of parental restriction.

Correlates of emotional eating

Emotional eating was associated with perceptions of parental pressure, and reports of general and social anxiety, and depression. Emotional eating was negatively associated with preadolescents' perceptions of parental restriction.

To examine the hypothesised relationships between preadolescents' perceptions of parental controlling feeding practices and their reports of anxiety and depression, further one-tailed partial correlations were calculated, controlling for gender and age (Table 3).

TABLE 3 ABOUT HERE

Preadolescents' perceptions of greater parental pressure to eat were significantly associated with higher levels of general and social anxiety, and negative mood. Perceptions of parental restriction were not found to correlate with preadolescents' reports of anxiety and depression.

Mediation analyses

To satisfy the final aim of the study and draw together the results of the correlations, mediation analyses (Baron & Kenny, 1986) were used to examine whether preadolescents' reports of anxiety and depression mediated the relationship between perceptions of parental feeding practices and reported eating behaviours. The partial correlations indicated that only perceived parental pressure to eat was significantly associated with preadolescents' reported mental health symptoms (social and general anxiety). Thus, mediation analyses were used to test whether preadolescents' reports of anxiety (social and general) mediated the relationship between perceptions of pressure from parents and self-reported eating behaviours (dietary restraint, emotional eating and external eating). Depression was not considered as a potential mediator, based on the non-significant correlation results (see Table 3).

Anxiety as a mediator of the relationship between perceptions of pressure and reports of dietary restraint

Preadolescents' reports of general and social anxiety fully mediated the relationship between perceived parental pressure to eat and children's reports of dietary restraint. This was tested via the following stages. First, preadolescents' perceptions of parental pressure (IV) significantly predicted their reports of dietary restraint (DV) ($\beta = .25, p = .009$). Next, perceptions of pressure significantly predicted preadolescents' reports of general anxiety ($\beta = 1.79, p < .001$) and social anxiety ($\beta = 1.96, p < .001$) (mediators). General anxiety significantly predicted dietary restraint ($\beta = .06, p < .001$), and social anxiety also significantly predicted dietary restraint ($\beta = .07, p < .001$). In the final stage of the mediation model, perceptions of pressure failed to continue to be a significant predictor of dietary restraint when general anxiety was added to the regression ($\beta = .16, p > .05$), and separately, when social anxiety was added to the regression ($\beta = .14, p > .05$) (Figures 1 & 2).

FIGURES 1 & 2 ABOUT HERE

Anxiety as a partial mediator of the relationship between perceptions of pressure and reports of external eating

Preadolescents' reports of general and social anxiety partially mediated the relationship between perceived parental pressure to eat and children's reports of external eating. Perceptions of parental pressure (IV) significantly predicted preadolescents' reports of external eating (DV) ($\beta = .26, p = .01$). Next, perceptions of pressure significantly predicted preadolescents' reports of general anxiety ($\beta = 1.79, p < .001$) and social anxiety ($\beta = 1.96, p < .001$) (mediators). General anxiety predicted external eating ($\beta = .03, p = .001$), and social anxiety also predicted external eating ($\beta = .02, p = .02$). Finally, perceptions of pressure continued to be a significant predictor of external eating when general anxiety ($\beta = .03, p$

=.003) was added to the regression, and separately, when social anxiety was added to the regression ($\beta = .02, p = .05$), indicating that full mediation had not occurred, but suggesting a potential partial mediation. Sobel test (Preacher & Leonardelli, 2013; Sobel, 1982) confirmed that general anxiety (Sobel test: $p < .001$) and social anxiety (Sobel test: $p < .001$) significantly partially mediated the relationship between parental pressure and external eating (Figures 3 & 4).

FIGURES 3 & 4 ABOUT HERE

Anxiety as a mediator of the relationship between perceptions of pressure and reports of emotional eating

Preadolescents' reports of general and social anxiety fully mediated the relationship between perceived parental pressure to eat and children's reports of emotional eating. Perceptions of parental pressure (IV) significantly predicted preadolescents' reports of emotional eating (DV) ($\beta = .17, p = 0.04$). Next, preadolescents' perceptions of pressure significantly predicted their reports of general anxiety ($\beta = 1.79, p < .001$) and social anxiety ($\beta = 1.96, p < .001$) (mediators). General anxiety predicted emotional eating ($\beta = .05, p < .001$), and social anxiety predicted emotional eating ($\beta = .03, p = .001$). Finally, perceptions of pressure failed to continue to be a significant predictor of emotional eating when general anxiety was added to the regression ($\beta = .08, p > .05$), and separately, when social anxiety was added to the regression ($\beta = .10, p > .05$) (Figures 5 & 6).

FIGURES 5 & 6 ABOUT HERE

Discussion

The primary aim of the current study was to replicate the findings of van Strien and Bazelier's (2007) study with a UK sample of preadolescent children. In support of the hypothesised relationships, greater perceptions of parental pressure to eat were associated with higher reports of dietary restraint, external eating and emotional eating, in preadolescents. However, preadolescents' reports of higher levels of external and emotional eating were associated with lower perceptions of parental restriction over their eating. The second aim of the study was to examine the relationship between preadolescents' reports of under- and over- eating behaviours and their reported levels of anxiety and depression symptomology. All three eating behaviours (dietary restraint, emotional eating and external eating) were associated with preadolescents' levels of general and social anxiety, and depression symptomology, fully supporting the hypotheses. The hypothesised relationships between preadolescents' perceptions of controlling parental feeding practices and their reports of anxiety and depression symptomology were partially supported as perceptions of pressure to eat were related to preadolescents' reports of general and social anxiety and negative mood. Finally, the exploratory hypothesis, that preadolescents' reports of anxiety and depression would mediate the relationship between preadolescents' perceptions of parental feeding practices and their reported eating behaviours, was partially supported as preadolescent anxiety (general and social) was found to fully mediate the relationships between perceptions of parental pressure to eat and reports of dietary restraint and emotional eating behaviours. Preadolescents' general and social anxiety partially mediated the relationship between perceptions of parental pressure and reports of external eating behaviours.

Boys in our sample reported significantly greater levels of external and emotional eating compared to girls, similar to previous findings using children of a comparable age (van Strien & Bazelier, 2007). No gender differences were evident for reports of dietary restraint behaviours. No significant gender differences were found for perceptions of parental feeding practices, in line with van Strien and Bazelier's (2007) results with Dutch preadolescents.

Girls reported higher symptoms of general and social anxiety compared to boys, which is again comparable to previous findings within this age group (e.g., Bender, Reinholdt-Dunne, Esbjørn & Pons, 2012; Orgilés et al., 2012).

The finding that greater perceptions of parental pressure to eat were associated with higher reports of dietary restraint, emotional eating and external eating in preadolescent children confirms the findings of van Strein and Bazelier (2007). The links between dietary restraint and perceptions of pressure to eat support previous research with younger children which has found greater parental pressure to eat is associated with children's reduced intake of food (e.g., Galloway et al., 2006; Wardle & Carnell, 2007). Pressure to eat is thought to disrupt children's ability to respond to internal cues of hunger and satiety (Carper, Fisher & Birch, 2000) and can have long-lasting implications on food intake (Batsell et al., 2002).

Similarly to van Strein and Bazelier (2007), the present study found that lower perceptions of parental restriction were associated with *higher* reports of emotional and external eating in preadolescents. This implies that children who perceive lower levels of restriction over their eating engage in more obesogenic eating behaviours, which is contrary to findings with younger children (e.g., Birch et al., 2003; Fisher & Birch, 1999), but supports the findings of van Strien and colleagues (2009) in a preadolescent population. This suggests that a moderate perceived level of parental restriction may facilitate the prevention of over-eating in this age group. Importantly, parental restriction over children's eating may be a covert behaviour that is not always detectable by the child. For example, parents may restrict their child's intake of specific foods by avoiding bringing them into the house, or avoiding taking their child to specific restaurants; behaviours not necessarily perceivable by their child (Ogden, Reynolds & Smith, 2006). Parental pressure to eat, on the other hand, is a more overt behaviour, which is likely to be better perceived and detected by a child, for example, verbally instructing a child to eat more of a food (Ogden et al., 2006). It is possible that children's perceptions of restriction, therefore, may not be entirely accurate, since the use of

this feeding practice may be less obvious to the child, and future research is required to explore children's perceptions of controlling parental feeding practices in more detail.

The links between disordered eating behaviours with anxiety and depression are well-established in the clinical literature (e.g., Blinder, Cumella & Sanathara, 2006; Pallister & Waller, 2008; Santos, Richards & Bleckley, 2006), and the results of the present study provide support for these associations in a community sample of preadolescents. Higher self-reported eating behaviours (dietary restraint, emotional eating and external eating) were related with higher reported symptoms of anxiety (general and social) and depression (negative mood). In particular, the results highlighted a medium to large relationship between dietary restraint behaviours and anxiety symptomology. Clinically, anxiety symptoms have been shown to pre-date eating disorder symptoms (e.g., Bulik, Sullivan, Carter & Joyce, 1996; Godart, Flament, Lecrubier & Jeammet, 2000). This is noteworthy given that the results of the current study found greater perceptions of parental pressure to eat were related to higher reports of general and social anxiety, and negative mood; however, no significant relationships were found between perceptions of restriction and reports of mental health symptomology.

Building on the findings of Thirlwall and Cresswell (2010), who found that the children of controlling mothers exhibited more anxiety symptomology, it is plausible that parents who pressure their child to eat may (unintentionally) ignite anxiety in their children as the child comes to rely on external cues regarding what and when to eat. Thirlwall and Cresswell (2010) further found that when mothers engaged in higher levels of controlling parenting, children with heightened levels of anxiety made greater negative predictions about their performance on a task. In relation to the current findings, this may suggest that parents who exert higher levels of pressure to eat on children with heightened anxiety levels may in turn nurture dieting behaviours in their children. Since early reports of dietary restraint behaviours have been identified as prospective risk factors for the development and

maintenance of binge eating and bulimia nervosa (e.g., Neumark-Sztainer, Wall, Haines, Story & Eisenberg, 2007; Stice & Agras, 1998), further research is recommended to build on these findings.

The current study is the first to explore anxiety and depression as potential mediators of the relationship between perceptions of parental feeding practices and self-reported eating behaviours in preadolescents. The results extend previous findings (e.g., van Strein & Bazelier, 2007) by highlighting that preadolescent anxiety (general and social) fully mediated the relationship between perceptions of parental pressure to eat and reports of dietary restraint and emotional eating behaviours, and anxiety (general and social) partially mediated the relationship between perceptions of pressure to eat and reports of external eating. Such results suggest that greater levels of anxiety in preadolescents whose perceive their parents to apply greater levels of pressure to eat may contribute to greater reports of over- and under- eating behaviours in these individuals. This supports the literature that reports links between controlling parenting practices and children's mental health symptomology (e.g., Bögels & van Melick, 2004; Feng et al., 2008; Hudson & Rapee, 2001; LeMoyne & Buchanan, 2011) and the theory that excessive parental control can heighten a child's reliance on their parents, resulting in a greater vulnerability to experiencing mental health problems (Hudson & Rapee, 2001; Rapee, 2001). Preadolescents exposed to greater parental pressure may have a heightened susceptibility to anxiety since repeated exposure to pressure to eat may encourage children's reliance on parents for hunger and satiety cues. This in turn could manifest in maladaptive eating behaviours, such as emotional eating, dietary restraint and external eating, potentially as the child attempts to take back control of their eating.

The finding that social anxiety mediated the relationship between perceptions of parental pressure to eat and the over-eating behaviours, emotional eating and external eating, is of interest. Children with higher levels of social anxiety may have a tendency to

overemphasise worries related to the social environment and, as such, may be more susceptible to social and non-dietary cues for eating, including emotional and environmental cues. For those children who exhibit higher levels of anxiety in social situations, their experience of pressure to eat at home may make them more likely to respond to external cues for eating in social situations by over-eating. For example, if a child, who is pressured to eat at home and also experiences social anxiety, is feeling bored, they may over-eat in social situations as a response to their emotions (emotional eating). Although these results are exploratory and other explanations are plausible, these mediational results are of great importance and highlight the possible detrimental influence of parental pressure in relation to children's anxiety and eating behaviours in this age group.

It would be of interest for future research to ascertain how children's levels of anxiety link to their parents' general style of parenting. It would further be beneficial to examine parents' own levels of anxiety in this relationship. Parents who are more anxious themselves have been found to be more likely to exhibit controlling feeding practices with their children (e.g., Farrow & Blissett, 2005; Haycraft & Blissett, 2008, 2012), especially if they have anxieties relating to eating and/or mealtimes. As anxiety, like eating behaviours, can be modelled by parents (Fisak & Grills-Taquechel, 2007), children may be more anxious as a consequence of their parents' anxiety, and this is something future research should consider.

Contrary to our hypotheses, depression symptomology was not found to be significantly related to perceptions of parents' feeding practices or to mediate the relationship between perceptions of parental feeding practices and self-reported eating behaviours, which supports a review which suggested only weak links between controlling parenting and childhood depression (McLeod et al., 2007). However, the reliability level of the measure used for depression was low with the current sample, and despite the measure being suitable for children aged 7-17 years, the low reliability may suggest that this measure may have been too complex for some of the younger children. Use of a depression measure that

is more sensitive and specific to younger children may have produced different results and it would be advantageous for future research to consider this, although to our knowledge there are no alternative, succinct measures of depression suitable for this age group.

A further noteworthy limitation was that schools that took part in the research were self-selecting. It is plausible that the Head Teachers/schools that agreed to participate in the current study had a greater interest in healthy eating/childhood wellbeing than the general UK school population and as such children within these schools may have been exposed to more healthy eating projects or initiatives. Furthermore, despite the large sample size, the cross-sectional design and use of statistical mediation based on the selected theoretical model means that causation cannot be concluded as other causal pathways may be possible. The cross-sectional nature of the research also limits the ability to observe whether the findings persist over time. Longitudinal research would be beneficial to replicate whether these findings remain stable, particularly the mediational results, to establish the longer term contribution of parental feeding practices and preadolescents' mental health to children's eating behaviours.

Future research would benefit from collecting parental data regarding their use of controlling feeding practices with their children as well as data relating to their general parenting style, and their own eating behaviours. Since the current study analysed *child perceptions* of parental controlling feeding practices, which may not be wholly accurate as some behaviours may not be detectable by the child (e.g., covert control), it would be of interest to match these to parental reports of such behaviours and to examine the degree of correspondence between child and parent reports. It is plausible that children who report higher levels of anxiety or depression may perceive their parents as more controlling over their eating behaviours, as well as more controlling in their general parenting style. Further, it is possible that there may be links found between preadolescents' reports of dietary restraint, emotional eating and external eating behaviours and their parents' reports of these eating behaviours,

as parents model eating behaviours to their children (e.g., Palfreyman, Haycraft & Meyer, 2012; Scaglioni et al., 2008). Parents' own eating behaviours and levels of anxiety are likely to influence the way they control their children's eating experiences. The direction in which these processes occur is important for future research to examine. Parents may pressure their child to eat as a response to perceptions that their child is exhibiting dietary restraint behaviours, or restrict a child they believe them to be emotionally or externally eating. Given the current focus in the Western world on both under- and over- eating in childhood, parents' anxieties over their child's diet and weight may be the precursor to their use of controlling feeding practices. More research is needed to dissect these relationships.

Research has suggested that parental control is not usually isolated to the feeding environment, but instead typically reflects a wider style of parenting (see Collins, Duncanson & Burrows, 2014, for a review). For example, an authoritarian parenting style is characterised by high demand and control over their child, and this type of parenting style has been linked with excessive levels of pressure and restriction over their child in the feeding domain (e.g., Hughes, Power, Fisher, Mueller & Nicklas, 2005). Parenting styles have further been linked to mental health symptomology in adolescents (e.g., Wolfradt, Hempel & Miles, 2003). It is likely that pressure to eat may also be a characteristic of a more general controlling parenting style. The results of the present study may be linked more generally to parenting styles as a whole and future research should consider how general parenting styles and practices may interact with children's mental health levels (anxiety and depression) and their eating behaviours. There are clearly some fascinating avenues for future research in this area.

Despite the limitations discussed, this is the first study to examine the relationships between eating behaviours, perceptions of parental feeding practices and mental health symptoms (anxiety and depression) in a UK sample of preadolescents. Given the importance of the preadolescent period of development in relation to the onset of body, weight, and dieting

concerns (e.g., Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999), and the dearth of research with this age group, the present results make an important addition to the field. The results support and extend previous literature with a younger age group by demonstrating evidence of the links between eating behaviours and perceived parental feeding practices, and between perceived parental feeding practices and mental health symptomology, in preadolescent children. The novel findings of this study may begin to explain why the children of parents who use greater levels of pressure in feeding situations are more likely to report maladaptive eating behaviours, by suggesting that co-morbid symptoms of anxiety may help to explain these relationships. Most importantly, the results highlight the possible negative implications of preadolescents' perceptions of their parents' pressure to eat and, whether this parental feeding practice is unintentional or not, it is potentially linked to the development or maintenance of mental health problems in this age group. This study suggests that children may be using food to deal with symptoms of psychopathology, and this finding is something that needs disseminating to anyone working with children in this age group, such as health professionals and teachers, especially since parenting behaviours have the potential to be modified. However, more research is needed before causal relationships may be concluded.

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Table 1: Descriptive statistics (means, medians, standard deviations and ranges) and tests of difference scores for children's reported eating behaviours, perceived parental feeding practices, and reports of anxiety and depression

	Boys (n = 184)		Girls (n = 172)		Mann Whitney U (z)
	Mean (SD)	Median (range)	Mean (SD)	Median (range)	
Eating Pattern Inventory for Children Questionnaire (EPIC)					
Dietary restraint	2.01 (.76)	1.89 (3.00)	2.05 (.79)	2.00 (3.00)	-0.39
External eating	2.44 (.86)	2.40 (3.00)	2.17 (.72)	2.00 (3.00)	-2.91**
Emotional eating	1.92 (.82)	1.75 (3.00)	1.75 (.74)	1.50 (3.00)	-1.84*
Kids' Child Feeding Questionnaire (KCFQ)					
Restriction	0.88 (.45)	1.00 (2.00)	0.86 (.41)	1.00 (2.00)	-0.32
Pressure	1.01 (.41)	0.88 (1.88)	0.95 (.45)	0.80 (2.00)	-1.25
Spence Children's Anxiety Scale (SCAS)					
Social phobia	6.62 (4.20)	6.00 (18.00)	7.67 (4.17)	7.00 (17.00)	-2.51**
General anxiety	6.82 (4.19)	6.00 (18.00)	8.42 (4.28)	8.00 (18.00)	-3.63***
Children's Depression Inventory Short Form (CDI:S)					
Negative mood	.89 (1.22)	0.00 (6.00)	1.17 (1.45)	0.50 (6.00)	-1.58

* $p < .05$; ** $p < .01$, *** $p < .001$, one tailed

Table 2: Partial correlation coefficients (controlling for age and gender) between children's reports of eating behaviours with perceptions of parental feeding practices and with reports of anxiety and depression

	Eating Pattern Inventory for Children (EPIC)		
	Dietary Restraint	External Eating	Emotional Eating
Kids Child Feeding Questionnaire (KCFQ)			
Restriction	-.02	-.20***	-.26***
Pressure	.14*	.12*	.08*
Spence Children's Anxiety Scale (SCAS)			
General anxiety	.37***	.20***	.28***
Social anxiety	.38***	.16**	.22***
Children's Depression Inventory (CDI:S):			
Negative mood	.27***	.09*	.14*

* $p < .05$; ** $p < .01$, *** $p < .001$, one tailed

Table 3: Partial correlation coefficients (controlling for age and gender) between children's perceptions of parental feeding practices and reports of anxiety and depression

	Controlling feeding practices	
	KCFQ Restriction	KCFQ Pressure
General anxiety	-.06	.21***
Social anxiety	.02	.22***
Negative mood	-.06	.08*

* $p < .05$; ** $p < .01$, *** $p < .001$, one tailed