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Exploring the association between parental anti-fat attitudes and restrictive feeding practices in a British and Irish sample.

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Abstract

Parental restriction of food intake has been associated with heightened eating disorder psychopathology in some longitudinal research. Yet, relatively little is known about the determinants of restrictive feeding practices. This cross-sectional study explored the association between parents’ anti-fat attitudes and their use of restrictive feeding practices in a mixed British (41.10% England, 39.90% Scotland, 4.20% Other) and Irish (14.80%) sample. Parents and caregivers \( (N = 472; \ 94.10\% \text{ female}; \ 70.90\% \text{ university level education}) \) of children between the ages of 4-8 (48.20% female; 91.10% rated as “normal weight” by their parents) completed self-report questionnaires assessing their anti-fat attitudes (dislike, fear, and blame subscales), use of restrictive feeding practices (for weight control, health purposes, and covert restriction), and how influential their child’s body-weight and -shape is for their perception of themselves as parents. Overall, our hypothesis that parental anti-fat attitudes would be significantly associated with restrictive feeding practices was supported. Anti-fat attitudes related to disliking higher body-weight people and blaming parents for their child’s weight were significant predictors of all forms of restrictive feeding (all \( ps < .05 \)). However, anti-fat attitudes related to fearing being a higher body-weight were not significant predictors of restrictive feeding for the purposes of health nor for covert restriction (\( ps > .05 \)). Additionally, our hypothesis that the associations between anti-fat attitudes and restrictive feeding practices would be stronger for parents for whom their child’s body-weight and -shape more strongly influenced how they judged themselves as parents was not supported (the interaction term was not significant in two out of three analyses). Future research is needed to investigate these associations across time and in samples of higher body-weight children.

Keywords
anti-fat attitudes, restrictive feeding, feeding practices, parents, children, survey
1. Introduction

Parent characteristics are important determinants of children’s eating behaviours. Beyond genetics, parents are responsible for the home food environment and use strategies to control or influence what, when, and how much children eat (i.e., parental feeding practices). Additionally, as children develop they tend to model parents eating behaviours and attitudes (e.g., Brown & Ogden, 2004; Dickens & Ogden, 2014). Although recent research found that up to 47% of the variance in children’s eating behaviours is accounted for by genetics (Selzam et al., 2018), parental feeding practices are arguably the most modifiable determinant of child eating behaviour. Therefore, a significant amount of research has been devoted to investigating the effects of parental characteristics and practices on children’s eating behaviours and body-weight.

One set of feeding practices that has received significant attention are restrictive feeding practices which are defined as food parenting practices aimed at restricting the amount and types of food that children eat.

In the context of public health priorities aimed at managing children’s weight status, parental restriction of food intake has been recommended by health professionals and promoted in public health campaigns such as Public Health England’s Change for Life (NHS, 2018; Public Health England, 2016; Public Health England, 2018). Overall, the relationship between restrictive feeding, eating behaviour and weight status is inconclusive, particularly given that the majority of studies are cross-sectional in nature (Vaughn et al., 2016). Some studies have prospectively linked restrictive feeding to higher body mass index in children (e.g. Campbell et al., 2010; Rodgers et al., 2013). However, recent evidence points to a bidirectional relationship between restrictive feeding and weight status, such that a higher baseline weight or eating behaviours that
are considered problematic, may prompt parents to adopt more controlling feeding practices (e.g. Afonso et al., 2016; Jansen et al., 2014; Jansen et al., 2018). This relationship is further complicated by evidence that parental concerns about a child’s future weight gain may explain their decision to restrict food intake, independently of a child’s actual weight (Ek et al., 2016; Gregory, Paxton & Brozovic, 2010; May et al., 2007; Webber et al., 2010). Although parents may adopt restrictive feeding practices in response to, or in the hope of preventing, weight gain, children whose food is restricted by their parents may be more likely to eat in the absence of hunger (Birch et al., 2003; Fisher & Birch, 1999, 2000, 2002; Haines et al., 2019; Lansigan et al., 2015; Yee et al., 2017) and develop eating disorder symptomatology (e.g., Allen et al., 2009; Reba-Harrelson et al., 2010). Moreover, researchers have found that restrictive feeding practices do not lead to weight loss, and can even lead to weight gain in children (Campbell et al., 2010; Couch et al., 2014; Faith, 2004; Farrow et al., 2018; Rodgers et al., 2013; Webber et al., 2010). Collectively these findings suggest that targetting childhood “obesity”\(^1\) by encouraging parental food restriction practices could be ineffective, counterproductive (increase eating in the absence of hunger), or harmful (increase eating disorder psychopathology). However, it is also important to note that some research points to differential impacts of the various forms of restrictive feeding. Specifically some researchers have suggested that overt forms of control, which can be detected by the child, may be more harmful than covert control, which may help to structure the food environment and go unnoticed by the child (e.g., Ogden, Reynolds & Smith, 2006; Rodenburg et al., 2014).

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\(^1\) In line with previous work, we have used the term body-weight (i.e., higher body-weight, lower body-weight) throughout this paper to describe the “relative fatness or leanness” of people (Blodorn et al., 2016; Logel et al., 2015, pp.4). Alternative terms such as “overweight” and “obese” will be presented within quotation marks because they are stigmatizing and represent arbitrarily defined classification categories (Blodorn et al., 2016; Logel et al., 2015).
While it is important to understand the outcomes of specific parenting practices on children’s eating behaviours, it is also pertinent to investigate the determinants of parental feeding practices. A generally overlooked predictive factor of restrictive feeding practices are parental anti-fat attitudes (negative attitudes and beliefs about higher body-weight people; Allison et al., 1991).

It has been suggested that “anti-obesity” initiatives may unintentionally promulgate weight stigma (i.e., the social devaluation of higher body-weight people) which is associated with negative physical and mental health outcomes independent of actual body size (e.g., higher mortality rates, morbidity rates for chronic diseases, body dissatisfaction, depression, and eating disorder symptomatology; Puhl & Suh, 2015; Tomiyama et al., 2018; Vartanian & Porter, 2016). Anti-fat attitudes are prevalent in Western cultures, including the United Kingdom (UK; Flint et al., 2015). People associate more negative attributes to fatness (e.g., lazy, unhappy, unloved, lacking self-control, unhealthy, unintelligent, dirty, smelly) and more positive attributes to thinness (e.g., health, morality, success, happiness, attractiveness, intelligence; e.g., Cash, 1990; Tiggemann & Rothblum, 1988). Moreover, weight-based prejudice and discrimination is frequently experienced in a number of domains including education, employment, healthcare, and interpersonal relationships (Puhl & King, 2013).

Unfortunately, parents are not immune to anti-fat attitudes about their own children (Crandall, 1995; Eisenberg et al., 2003; Keery et al., 2004; Lydecker et al., 2018; Puhl & Brownell, 2006), and preliminary research suggests parents with stronger anti-fat attitudes are more likely to
restrict their children’s food intake in an attempt to make them lose weight or to prevent weight gain (Gold & Vander Weg, 2020; Musher-Eizenman et al., 2007). Two studies, conducted in the United States of America (USA), have examined the association between parents’ anti-fat attitudes or weight stigma and restrictive feeding practices. Musher-Eizenman and colleagues (2007) were the first to explore this association and found a positive correlation between anti-fat attitudes and restrictive feeding practices in a sample of American parents. Similarly, Gold and Vander Weg (2020) found that internalized weight stigma predicted restrictive feeding practices in a sample of American parents who perceived themselves to be “overweight” or “obese”. Additionally, exploratory analyses revealed that parental concerns about their child’s weight mediated the effects of weight stigma on restrictive feeding practices (Gold & Vander Weg, 2020).

Given the nascent state of research in this area, further work is needed to strengthen confidence in existing findings and explore potential individual differences in the associations between parental anti-fat attitudes and restrictive feeding practices. For instance, these associations might be stronger for people whose evaluations of themselves as parents is more heavily dependent on their child’s body-weight or -shape. That is, it is possible that people with higher anti-fat attitudes, whose perception of themselves as parents is more influenced by their child’s body-weight and -shape, are more likely to restrict their child’s food intake in an attempt to enhance their perception of themselves as parents. Discovering individual differences could have important implications for intervention efforts as they could reveal potential treatment targets and higher-risk populations suitable for prevention efforts.
The purpose of this study is to examine the associations between three types of parental anti-fat attitudes and three restrictive food practices, and to assess whether these associations are moderated by parental self-evaluations related to their child’s weight and shape. The current study will extend previous research by examining the association between anti-fat attitudes and restrictive feeding within a British and Irish sample of parents, and by exploring whether parent self-evaluations based on their children’s weight and shape moderate these associations. Replicating these findings in countries outside of the USA, where the broader food culture varies (e.g., differences in public policy, etiquette, food preparation norms, and accessibility/availability of specific foods), will be important in determining the robustness of these associations. Additionally, this study will build on previous work by: (1) using an adapted measure of anti-fat attitudes that includes a subscale assessing beliefs that children’s weight is determined by parenting practices, and (2) examining the effects of anti-fat attitudes on covert restrictive feeding practices (i.e., children are unaware that their food is being restricted by their parents) which previous studies did not explore. We predicted that parents with higher anti-fat attitudes would report using more restrictive feeding practices (Hypothesis 1 [H1]), and that this relationship would be stronger for parents whose self-evaluations are more heavily influenced by their child’s weight and shape (Hypothesis 2 [H2]). We will explore these hypotheses using scales that assess three types of anti-fat attitudes and three types of restrictive feeding practices.

2. Methods

2.1 Procedure

Parents and caregivers living in the UK or Republic of Ireland with children between the ages of 4-8 years were recruited in May of 2019. This age range was selected because by the age of 4
years most children have completed weaning and the normal developmental phase of fussy eating and parents have had time to establish consistent family feeding practices, while after the age of 8-years-old children begin to make more independent food choices (Musher-Eizenman et al., 2018). If parents stated that they had more than one child in this age range, they were directed to answer questions in relation to their youngest child. Participants were excluded if they could not read and respond in English.

An invitation to participate in the study was shared via email and social media through school parent councils, activity clubs, parenting support organizations, and the researcher’s personal social media accounts. Parents were informed that the study was focused on factors that may be associated with parental feeding practices and aimed to examine the interaction between attitudes towards weight, thoughts about food, and parental feeding styles. Following an initially low response rate from male caregivers, additional attempts were made to encourage male participation. Specifically, researchers contacted organisations that work with fathers and asked them to circulate the study invitation and social media posts were shared targeting male caregivers. Data were collected anonymously through an online questionnaire hosted on the Online Surveys platform. Before beginning the questionnaires, participants were asked to confirm that they met the inclusion criteria of the study and informed consent was obtained. Participants completed questionnaires on demographic information, perception of their child’s weight status, parental anti-fat attitudes, evaluations of themselves as parents based on their child’s weight and shape, and parental feeding practices. The questionnaires took approximately ten minutes to complete. Upon completion, participants read an online debrief form and were directed to applicable child feeding resources. Participants did not receive any form of
2.2 Participants

A total of 511 parents and caregivers (94.10% female, 5.90% male; $M_{\text{age}} = 36.74$, $SD_{\text{age}} = 4.92$) took part in the study. Just under half of the children were female (48.20%, $n = 244$) and the average age of children was 5.29 years ($SD = 1.31$). Most of the sample (58.00%) had two children in their household. A majority of participants resided in England (41.10%) or Scotland (39.90%), with smaller proportions residing in the Republic of Ireland (14.80%), Wales (2.20%), Northern Ireland (1.60%), or an unspecified part of the UK (0.40%). Most of the participants reported having a University degree or higher qualification (70.90%) as compared to 42.00% in the general population in the UK and Ireland (Central Statistics Office, 2016; Office for National Statistics, 2019). Over a third (36.80%) of participants were in the highest income quintile (based on statistics from the UK’s Office for National Statistics) and had gross annual household incomes above £64,000; whereas, 6.30% of participants were in the lowest quintile having a gross annual household income below £18,999.

2.3 Measures

2.3.1 Perceived Child Weight Status

Participants answered a single item from the perceived weight status subscale of the Child Feeding Questionnaire (CFQ; Birch et al., 2001; “How would you describe this child’s weight?”). Response options included: Markedly Underweight, Underweight, Normal,
Overweight, or Markedly Overweight. Perceived weight status was utilized because in the context of attitudes towards weight and feeding behaviours, a parent’s perception of their child’s weight is likely to moderate disordered eating more than their measured weight category (Robinson & Sutin, 2017). Thus, a self-report measure of perceived child weight status was considered most appropriate for this study.

2.3.2 Anti-Fat Attitudes

Participants completed a modified 9-item version of Crandall’s (1994) Anti-fat Attitudes Questionnaire (AFA). Three items were taken from the AFA dislike subscale (e.g., “I really don’t like fat people much.”) and used to assess how much individuals’ dislike higher body-weight people. Three items from the AFA fear subscale (e.g., “I feel disgusted with myself when I gain weight”) were used to assess personal distress about weight or weight gain. Finally, three items from an adapted version of the AFA (Holub, Tan, & Patel, 2011) were used to create a blame subscale that assessed whether people believe parents are to blame for their children’s weight (e.g., “If children are overweight, it is pretty much their parents’ fault”). Participants responded to all items using a 7-point scale (0 – Very Strongly Disagree, 6 – Very Strongly Agree). The items of each subscale were averaged to create reliable anti-fat attitudes dislike ($\alpha = .72$), fear ($\alpha = .85$), and blame ($\alpha = .85$) subscale scores. Higher scores reflect more negative attitudes towards higher body-weight.

2.3.3 Parental Self-Evaluation of Child’s Weight and Shape

Participants answered two items from the Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 1994) adapted to measure parental self-evaluation in relation to their
child’s weight and shape (Lydecker & Grilo, 2017; (1)“Over the past 28 days, has your child’s weight influenced how you think about yourself as a parent?”, (2) “Over the past 28 days, has your child’s shape influenced how you think about yourself as a parent?”). Participants responded to the items using a 7-point scale (0 – Not at all, 6 – Markedly). Items were averaged to create a reliable rating of parental self-evaluation based on child’s body-weight and shape (α = .89). Higher scores indicate a stronger influence of child’s weight and shape on participant’s evaluations of themselves as parents. This measure differs from the AFA blame subscale in that it asks about self-evaluations rather than beliefs about parents in general. Although it is possible that parents might consider themselves when answering the AFA items, nonsignificant correlations suggest that these are separate constructs (see Table 1).

2.3.4 Restrictive Feeding Practices

Participants completed three subscales from the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007, as described and updated by Musher-Eizenman et al., 2018) that assess three types of restriction as a parental feeding practice, all of which grouped together under the overarching construct of coercive control in Musher-Eizenmann et al.’s research: (1) restriction for weight control (7 items; e.g., “I don’t allow my child to eat between meals because I don’t want them to get fat”), (2) restriction for health (5 items; e.g., “I guide or regulate my child’s eating so that they do not eat too many junk foods”), and (3) covert restriction (4 items; e.g., “I keep unhealthy foods hidden so my child won’t eat them”). Participants answered questions using a 5-point scale (1 – Disagree, 5 – Agree). Subscale items were averaged to create reliable restriction for weight control (α = .73),
restriction for health ($\alpha = .79$), and covert restriction ($\alpha = .79$) scores. Higher scores reflect greater use of restriction as a parental feeding practice.

2.4 Statistical Analyses

2.4.1 Preliminary Analyses

Data were analysed using the Statistical Package for Social Sciences (SPSS, version 24; IBM Corp, 2016). Prior to hypothesis testing, descriptive statistics of the sample were examined and assumptions were checked. Categorical variables were dummy coded for analyses. Because no parent perceived their child as “very underweight”, and only two parents perceived their child as “very overweight”, parent ratings were recoded into three categories of perceived child weight (“underweight” 5.90%, $n = 30$; “normal weight” 91.10%, $n = 461$; and “overweight” 3.00%, $n = 15$). Given the small number of participants who lived in Wales ($n = 11$) and Northern Ireland ($n = 8$), country of residence was grouped into four categories: England, Scotland, Republic of Ireland and “Other UK” (incorporating Wales, Northern Ireland, and unidentified location in the UK; $n = 21$). Since most of the sample was university educated, education was coded as either “university educated” or “not university educated” for the purpose of the analyses. Cases with no child aged 4-8 in the household or with no information on the country of residence were excluded from analyses because of the likelihood that these cases did not meet the eligibility criteria ($n = 5$). Thirty-four participants were missing demographic information regarding: age ($n = 7$), income ($n = 25$), and education ($n = 2$). Inspection of missing values graphs and results from Little’s MCAR test ($\chi^2(22) = 22.82, p = .41$) indicated that data was missing at random. Thus, listwise deletion was used in our main analyses resulting in a final sample size of 472.
2.4.2 Main Analyses

A series of three hierarchical regressions were conducted to test the hypothesis that parental anti-fat attitudes would predict restrictive food practices. All analyses controlled for parent gender, child gender, parent age, child age, household income (quintile), parent level of education, country of residence, and perceived child weight status. Each restrictive feeding subscale was individually regressed onto: Step 1) control variables; Step 2) AFA subscales. Hayes’ (2018) PROCESS macro was used to test the hypothesis that parental self-evaluations based on their child’s weight or shape would moderate the relationship between parental anti-fat attitudes and restrictive feeding practices. Five cases were detected as multivariate outliers; however, a sensitivity analysis revealed that their inclusion did not alter any findings. Therefore, results will be presented with these outliers included ($N = 472$).

3. Results

3.1 Descriptive Statistics

Means, standard deviations, and zero-order correlations of continuous variables are presented in Table 1. On average, participants reported more anti-fat attitudes related to blaming parents for their children’s weight, than disliking higher body-weight people or fearing being a higher body-weight. Participants also reported more restrictive feeding for health rather than weight control or covert restriction. Sixty-nine percent of the sample ($n = 347$) reported that their child’s weight and shape did “not at all” influence how they viewed themselves as parents. As expected, most anti-fat attitudes were positively correlated with restrictive feeding practices (the only association that was not significant was between the AFA fear and restriction for health subscales). Additionally, parental self-evaluation based on their child’s weight and shape were
positively correlated with restriction for weight control and covert restriction, but not restriction for health.

3.2 Main Analyses

3.2.1 Do Anti-Fat Attitudes Predict Parental Food Restriction for Weight Control?

Results from the regression analysis predicting restrictive feeding practices used for weight control supported H1 and are presented in Table 2. The final step of the model was significant and explained 18.20% of the variance in parental food restriction practices for weight control, \( F(17,454) = 5.96, p < .001 \). Parent sex, country of residence, perception of child’s weight, and all AFA subscale scores were significant predictors of restrictive feeding practices for weight control in the final model. As predicted, and holding constant the effect of all control variables, participants who reported a stronger dislike of higher body-weight people, a stronger fear of being a higher body-weight, and assigned more blame to parents for their children’s weight, reported more food restriction practices for the purposes of weight control. Participants who were male, living in Ireland, and perceived their child as “overweight” also reported higher food restriction for weight control compared to participants who were female, living in England, and perceived their child as “normal weight”, respectively.

3.2.2 Do Anti-Fat Attitudes Predict Parental Food Restriction for Health?

The second hierarchical regression with restrictive feeding for health purposes as the outcome variable also supported H1 (see Table 3). The final step of the model was significant and explained 14.00% of the total variance in parental food restriction for the purposes of health, \( F(17,454) = 4.36, p < .001 \). Household income quintile, country of residence, and AFA dislike
and blame scores were significant predictors of restrictive feeding practices for health (see Table 3). As expected, and holding constant the effect of all control variables, participants who reported a stronger dislike of higher body-weight people and assigned more blame to parents for their children’s weight, reported more food restriction practices for the purposes of health. However, in opposition to our hypothesis, participants who reported a stronger fear of being a higher body-weight did not report using more restrictive feeding practices for the purposes of health. Participants in the lowest household income quintile (1) and those living in Ireland and Scotland also engaged in more restrictive feeding for health compared to participants in the highest income quintile (5) and those living in England, respectively.

3.2.3 Do Anti-Fat Attitudes Predict Parental Covert Food Restriction?

Results of the third hierarchical regression analysis with covert restriction as the outcome variable also supported H1 (see Table 4). The final step of the model was significant and explained 12.40% of the total variance in covert restriction feeding practices, $F(17,454) = 3.78, p < .001$. Child’s age, country of residence, and parental AFA dislike and blame scores were all significant predictors of covert restrictive feeding practices. In support of our hypothesis, and holding constant the effect of all control variables, participants who reported a stronger dislike of higher body-weight people and assigned more blame to parents for their children’s weight, reported more covert food restriction practices. However, contrary to our hypothesis, parental fear of being a higher body-weight was not a significant predictor of covert food restriction. Participants reporting on younger children and those living in Ireland and
Scotland\(^2\) also used more covert food restriction compared to participants reporting on older children and those from England, respectively.

3.2.4 Do Parent Self-Evaluations Based on Child Weight and Shape Moderate these Associations?

We used Hayes’ (2018) PROCESS macro from SPSS (Model 1) using 10,000 bootstrap samples to test whether parent’s self-evaluation based on their child’s weight and shape moderated the relationship between anti-fat attitudes and parental food restriction practices. All models and predictors from previous analyses remained significant. Additionally, parental self-evaluations based on child’s weight and shape was a significant predictor of restrictive feeding for weight control \((b = 0.09, t(452) = 3.85, p < .001)\) and covert restriction \((b = 0.10, t(452) = 2.81, p = .03)\). Self-evaluation based on child’s weight and shape only moderated the association between AFA dislike scores and restrictive feeding for health scores, \(b = -0.07, t(452) = -2.15, p = .03\). Specifically, the relationship between AFA dislike scores and restrictive feeding for health was significant at low \((b = 0.13, t(452) = 2.91, p = .004)\) and average levels \((b = 0.09, t(452) = 2.24, p = .03)\), but not high levels \((b = 0.02, t(452) = 0.33, p = .75)\), of self-evaluations based on child’s weight and shape (See Figure 1). That is, participants whose self-evaluations were influenced more strongly by their child’s weight and shape, reported higher restrictive feeding for health purposes regardless of their level of dislike towards higher body-weight people. Whereas, for participants whose self-evaluations were less influenced by their child’s weight and shape, the stronger their dislike for higher body-weight people, the more they

\(^2\) Participants living in other UK locations were also found to report more covert restriction compared to participants living in England in the final model of this regression \((b = 0.43, t(453) = 1.99, p = .047)\). However, this was not significant in step 1, nor when parents self-evaluations based on their child’s weight and shape was added into the model in subsequent analyses \((b = 0.41, t(452) = 1.90, p = .059)\). Thus, this finding was found to be unstable.
used restrictive feeding practices for health purposes. Overall, because parental self-evaluations based
on their child’s weight and shape did not moderate any other associations between anti-fat attitudes
and restrictive feeding practices (i.e., all other interaction terms ps > .05), we conclude that our
hypothesis was not supported.

4. Discussion

Relatively little is known about the psychosocial determinants of restrictive feeding practices. The
goal of this study was to investigate the association between anti-fat attitudes and restrictive feeding
practices in a predominantly English, Scottish, and Irish sample and explore whether parental self-
evaluations based on their child’s weight and shape moderate these associations.

Overall, our hypothesis that parents who have higher levels of anti-fat attitudes will report more
restrictive feeding practices was supported. A stronger dislike for higher body-weight people and
assigning more blame to parents for their children’s weight were consistent predictors of restrictive
feeding practices. Whereas, parents with a stronger fear of being a higher body-weight reported
restricting their child’s food intake for the purposes of weight control (but not for health or using
cover restriction). A possible interpretation of this pattern of results is that parental fear of being a
higher body-weight predicts restriction for weight control, but not health purposes or covert
restriction, because it is more motivated by a concern with their child’s appearance rather than their
child’s health. This could reflect a well-intentioned desire to prevent their children from facing any
negative consequences as a result of their weight such as stigmatization, bullying, or discrimination.
Musher et al. (2007) also found that fathers’ fear of being a higher body-weight predicted restriction
for weight control but not for health. However, they did not find that fear of being a higher body-
weight was predictive of mother’s restrictive feeding for the purposes of weight control or health. Thus, future research is needed to clarify the specific associations between different types of anti-fat attitudes and restrictive feeding practices, and to further evaluate parental gender differences in these associations.

Anti-fat attitudes explained between 5-10% of the variance in restrictive feeding practices, suggesting that anti-fat attitudes did not fully explain why parents restrict their children’s food intake. It is possible that this finding was due to controlling for several other variables which reduced the statistical power of the test. It is also possible that in a more diverse sample these associations would be stronger. Due to the low levels of children identified as “overweight” in the sample (n =15), some parents with anti-fat attitudes may not restrict food because they do not perceive their child’s food intake as needing to be regulated. This might also help explain why parental fear of being a higher body-weight did not predict restricting children’s food intake for health purposes or covert food restriction. Parents who fear being a higher body-weight and perceive their children to be “normal” weight may not see a need to restrict their children’s eating for health purposes or covertly. Whereas, parents who perceive their child to be “overweight” might be more likely to try and restrict their child’s intake in an effort to improve health, particularly if parents are afraid of being a higher body-weight themselves. Indeed, the current study found that parents who perceived their child as “overweight” reported higher food restriction for weight control purposes compared to parents who perceived their child as “normal” weight. This aligns with current understanding of the bidirectional nature of restrictive feeding practices and child weight status, including previous research that has found that parents are more likely to restrict the food intake of higher body-weight children (Gold & Vander Weg, 2020; Musher-Eizenmann et al., 2007).
Our second hypothesis, that the relationship between anti-fat attitudes and restrictive feeding would be moderated by parental self-evaluation based on the child’s weight or shape, was not supported. The moderation pathway between parental anti-fat attitudes related to disliking higher body-weight people and restrictive feeding practices for health was significant, but not in the anticipated direction. It is possible that the lack of moderation found in the other pathways is due to the low proportion of parents describing their child as “overweight” and very few parents stating that their child’s weight or shape influenced how they thought about themselves as parents. The significant moderation we did find in our sample could reflect a desire of parents who judge themselves more strongly based on their child’s weight and shape to prevent their “normal” weight child from becoming “overweight” or experiencing ill health. That is, it is possible that these parents might view restriction as a means of preventing weight gain or poor health outcomes (e.g., limiting sugary drinks) and restrict food consumption for these purposes despite viewing their child as a “normal” weight because their own self-perceptions are dependent on their child having a lower body-weight. This aligns with the findings from previous research where concern about their child becoming “overweight” predicted restrictive feeding (May et al., 2007; Ek et al., 2016; Gregory, Paxton & Brozovic, 2010; May et al., 2007; Webber et al., 2010). Thus, future research should work to replicate our findings in a more diverse sample and should also examine how parental concern about their child becoming higher body-weight interacts with anti-fat attitudes and restrictive feeding practices.

There were also several unanticipated findings that should be investigated further in future work. Although not directly related to our hypotheses, we found that parents living in Ireland and Scotland reported more restrictive feeding practices compared to parents living in England. We are unaware of
any factors differentiating England from Ireland or Scotland that would adequately explain these findings. Future work should work to replicate these findings to ensure that they are not due to sampling bias or an unidentified confounding variable. Likewise future work should seek to replicate findings that parents in the lowest income quintile restrict intake for health purposes more than those in the highest income quintile, and possible explanations for why that might be the case. If these findings are supported by subsequent research, it could help identify populations that would benefit most from receiving interventions aimed at decreasing restrictive feeding practices. Males also reported restricting their child’s food intake for weight control more than females. This is in line with findings from Musher-Eizenman et al. (2007) who found that fathers reported significantly more restriction for weight control purposes compared to mothers. More evidence is required before we can say with any degree of certainty that male caregivers are more likely to restrict their children’s eating in an attempt to control their child’s weight, but this points to an important area for future work to consider.

Finally, parents of younger children engaged in more covert food restriction compared to parents of older children. One possible explanation for this finding is that younger children are less independent and therefore it is more feasible to conceal food restriction from younger children. Although Musher-Eizenmann et al. (2018) found that covert restriction aligned with controlling feeding practices, other researchers (e.g., Vaughn et al, 2016) have argued for covert restriction to be included in measures of structure rather than restriction. In the longer term, it may be that only overt restriction is associated with maladaptive eating (e.g., Roberts et al, 2020). Future work should explore this finding in more depth, in the context of ongoing work to establish which feeding practices have negative outcomes.
and which are useful strategies to help structure the food environment and support the development of children’s eating behaviours.

4.1 Implications and Future Directions

This study contributes to the body of literature showing that anti-fat attitudes are a unique predictor of restrictive feeding practices, over and above children’s perceived current weight. While the determinants of eating behaviours are complex, these significant associations enable the discussion of the implications of these findings and areas where further study is warranted.

Future work should explore the mediational pathway found by Gold and Vander Weg (2020). Since their findings were published after our study was completed, we were unable to consider their findings when designing our study. As a result, we did not assess parental concern about their child’s weight and were unable to test the mediational pathway discovered by Gold and Vander Weg (2020). Future work is necessary to replicate this finding in an independent sample.

Results from this study suggest the need to explore the role of parental anti-fat attitudes in the development of maladaptive eating in children. Given that parental anti-fat attitudes are important predictors of the use of restrictive feeding practices, and restrictive feeding has been linked to the development of eating disorder psychopathology (e.g., Allen et al., 2009), it is possible that parental anti-fat attitudes increase the risk of children developing an eating disorder via this mediational pathway (i.e., parent anti-fat attitudes $\rightarrow$ restrictive feeding $\rightarrow$ increased eating disorder psychopathology in children). It is also possible that children could internalize their parents’ anti-fat attitudes which could also contribute to the development of eating disorder psychopathology.
Because children may internalize their parents’ eating behaviours and attitudes (e.g., Brown & Ogden, 2004; Dickens & Ogden, 2014), and stronger anti-fat attitudes are associated with more eating disorder psychopathology (Pepper & Ruiz, 2007), parents’ anti-fat attitudes might indirectly contribute to the development of maladaptive eating in their children. Additionally, stronger anti-fat attitudes in parents may predict more instances of weight-based criticism, comments, or discussions directed at their children which could subsequently increase maladaptive eating in children (e.g., Carper et al., 2000; Berge et al., 2018; Damiano et al., 2015; Keery et al., 2004). Thus, multiple pathways may exist from parental anti-fat attitudes and maladaptive eating in children. Future research should explore the role of parental anti-fat attitudes in the development of disordered eating.

These results also suggest that parental anti-fat attitudes could be a viable target of interventions or used as a way to identify families who might benefit most from intervention efforts. It is important to note that even in our sample where children were predominantly perceived as “normal” weight, parents with stronger anti-fat attitudes were more likely to restrict their children’s eating. This research supports the potential value of programs that aim to improve body image and decrease maladaptive eating practices in children, particularly for families with parents who hold strong anti-fat attitudes. Likely this would include some component of educating parents about the specious relationship between weight and health. This in line with recommendations from the American Academy of Pediatrics (Golden et al., 2016) that parents should avoid focusing on their children’s weight because of the adverse consequences to their health. Instead, parents should focus on promoting a healthy relationship with food, eating, and one’s body independent of weight. For example, the program *Confident Body, Confident Child* has been developed for parents of young children and has showed promising initial results with sustained improvements in parents’ knowledge.
of how to promote positive body image and eating behaviours and reduced use of restriction for weight control over a 12-month period (Damiano et al., 2016; Hart et al., 2019).

4.2 Limitations

As mentioned in previous sections this sample was limited by the lack of diversity, and future studies should explore these associations in samples with higher body-weight kids, and with more male caregivers. Additionally, given the cross-sectional nature of our data we cannot make any causal claims about the direction of these associations; however, the alternative direction seems unlikely (i.e., that restricting their child’s intake increases a parent’s anti-fat attitudes). It seems more likely that parents with stronger anti-fat attitudes would engage in more restrictive feeding practices ostensibly as a result of not wanting their children to be a higher body-weight. However, researchers should explore these associations longitudinally to confirm the direction and examine how these variables are associated over time, to help inform the framing of interventions at both an individual and public health level.

4.3 Conclusion

Overall, parental anti-fat attitudes were associated with more restrictive feeding practices in a sample of predominantly female caregivers living in the UK and Republic of Ireland. However, we did not find that this relationship was stronger for parents who evaluated themselves more strongly based on their child’s weight or shape. Future work should explore these associations over time and in samples of higher body-weight children.
Acknowledgements: We are extremely grateful to the parents and caregivers who took the time to complete our survey and made this research possible.

Author Contributions: SD & LD designed the study and collected the data. SD and MR conducted data analysis and writing the manuscript. HS supervised the project and contributed to writing the manuscript. All authors have reviewed and approved of the final version of this paper.

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Declaration of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Figure Captions: Figure 1. Interaction between anti-fat attitudes dislike subscale scores and self-evaluations based on child’s weight and shape predicting restrictive feeding for health.
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https://doi.org/10.1371/journal.pgen.1007757


https://doi.org/10.1007/BF00288018


### Table 1

**Means, Standard Deviations, and Correlations of Study Variables**

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*Note.* *p < .05; **p < .01; ***p < .001. AFA = Anti-fat Attitudes. Coding for sex: Female = 0, Male = 1.
### Results of Hierarchical Regression Analyses Predicting Restrictive Feeding Practices for Weight Control

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\[
\begin{align*}
R & = .30 \\
R^2 & = .09 \\
\Delta R^2 & = .09^{**}
\end{align*}
\]

Note. Significant values are bolded. *p < .05; **p < .01; ***p < .001; AFA = Anti-fat attitudes.

Reference categories for dummy coding variables: income quintile 5, England, & child “normal weight”.

---

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Table 3

Results of Hierarchical Regression Analyses Predicting Restrictive Feeding Practices for Health

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\[
\begin{align*}
R & \quad .28 \\
R^2 & \quad .08 \\
\Delta R^2 & \quad .08^{***}
\end{align*}
\]

Note. Significant values are bolded. * p < .05; ** p < .01; *** p < .001; AFA = Anti-fat attitudes.

Reference categories for dummy coding variables: income quintile 5, England, & child “normal weight”.

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### Table 4
**Results of Hierarchical Regression Analyses Predicting Covert Restrictive Feeding Practices**

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<td>1.51</td>
<td>.132</td>
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<td>.013</td>
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<td>0.47</td>
<td>.636</td>
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<td>AFA Blame</td>
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<td>0.09</td>
<td>0.13</td>
<td>2.64</td>
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</tbody>
</table>

| $R$                        | .28  |         |      |      | .35  |         |      |      |
| $R^2$                      | .076 |         |      |      | .124 |         |      |      |
| $\Delta R^2$               | .076**|        |      |      | .048***|       |      |      |

*Note.* Significant values are bolded. *$p < .05$; **$p < .01$; ***$p < .001$; AFA = Anti-fat attitudes.

Reference categories for dummy coding variables: income quintile 5, England, & child “normal weight”.
Interaction between anti-fat attitudes dislike subscale scores and self-evaluations based on child’s weight and shape predicting restrictive feeding for health

**Note.** AFA Dislike = dislike subscale from the Anti-Fat Attitudes Questionnaire (Crandall, 1994).