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

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23 **Abstract**

24 Parental restriction of food intake has been associated with heightened eating disorder  
25 psychopathology in some longitudinal research. Yet, relatively little is known about the  
26 determinants of restrictive feeding practices. This cross-sectional study explored the association  
27 between parents' anti-fat attitudes and their use of restrictive feeding practices in a mixed British  
28 (41.10% England, 39.90% Scotland, 4.20% Other) and Irish (14.80%) sample. Parents and  
29 caregivers ( $N = 472$ ; 94.10% female; 70.90% university level education) of children between the  
30 ages of 4-8 (48.20% female; 91.10% rated as "normal weight" by their parents) completed self-  
31 report questionnaires assessing their anti-fat attitudes (*dislike*, *fear*, and *blame* subscales), use of  
32 restrictive feeding practices (for weight control, health purposes, and covert restriction), and how  
33 influential their child's body-weight and -shape is for their perception of themselves as parents.  
34 Overall, our hypothesis that parental anti-fat attitudes would be significantly associated with  
35 restrictive feeding practices was supported. Anti-fat attitudes related to *disliking* higher body-  
36 weight people and *blaming* parents for their child's weight were significant predictors of all  
37 forms of restrictive feeding (all  $ps < .05$ ). However, anti-fat attitudes related to *fearing* being a  
38 higher body-weight were not significant predictors of restrictive feeding for the purposes of  
39 health nor for covert restriction ( $ps > .05$ ). Additionally, our hypothesis that the associations  
40 between anti-fat attitudes and restrictive feeding practices would be stronger for parents for  
41 whom their child's body-weight and -shape more strongly influenced how they judged  
42 themselves as parents was not supported (the interaction term was not significant in two out of  
43 three analyses). Future research is needed to investigate these associations across time and in  
44 samples of higher body-weight children.

45 **Keywords**

46 anti-fat attitudes, restrictive feeding, feeding practices, parents, children, survey

## 47 **1. Introduction**

48 Parent characteristics are important determinants of children’s eating behaviours. Beyond  
49 genetics, parents are responsible for the home food environment and use strategies to control or  
50 influence what, when, and how much children eat (i.e., parental feeding practices). Additionally,  
51 as children develop they tend to model parents eating behaviours and attitudes (e.g., Brown &  
52 Ogden, 2004; Dickens & Ogden, 2014). Although recent research found that up to 47% of the  
53 variance in children’s eating behaviours is accounted for by genetics (Selzam et al., 2018),  
54 parental feeding practices are arguably the most modifiable determinant of child eating  
55 behaviour. Therefore, a significant amount of research has been devoted to investigating the  
56 effects of parental characteristics and practices on children’s eating behaviours and body-weight.  
57 One set of feeding practices that has received significant attention are restrictive feeding  
58 practices which are defined as food parenting practices aimed at restricting the amount and types  
59 of food that children eat.

60

61 In the context of public health priorities aimed at managing children’s weight status, parental  
62 restriction of food intake has been recommended by health professionals and promoted in public  
63 health campaigns such as Public Health England’s *Change for Life* (NHS, 2018; Public Health  
64 England, 2016; Public Health England, 2018). Overall, the relationship between restrictive  
65 feeding, eating behaviour and weight status is inconclusive, particularly given that the majority  
66 of studies are cross-sectional in nature (Vaughn et al., 2016). Some studies have prospectively  
67 linked restrictive feeding to higher body mass index in children (e.g. Campbell et al., 2010;  
68 Rodgers et al., 2013). However, recent evidence points to a bidirectional relationship between  
69 restrictive feeding and weight status, such that a higher baseline weight or eating behaviours that

70 are considered problematic, may prompt parents to adopt more controlling feeding practices (e.g.  
71 Afonso et al., 2016; Jansen et al., 2014; Jansen et al., 2018). This relationship is further  
72 complicated by evidence that parental concerns about a child’s future weight gain may explain  
73 their decision to restrict food intake, independently of a child’s actual weight (Ek et al., 2016;  
74 Gregory, Paxton & Brozovic, 2010; May et al., 2007; Webber et al., 2010). Although parents  
75 may adopt restrictive feeding practices in response to, or in the hope of preventing, weight gain,  
76 children whose food is restricted by their parents may be more likely to eat in the absence of  
77 hunger (Birch et al., 2003; Fisher & Birch, 1999, 2000, 2002; Haines et al., 2019; Lansigan et al.,  
78 2015; Yee et al., 2017) and develop eating disorder symptomatology (e.g., Allen et al., 2009;  
79 Reba-Harrelson et al., 2010). Moreover, researchers have found that restrictive feeding practices  
80 do not lead to weight loss, and can even lead to weight gain in children (Campbell et al., 2010;  
81 Couch et al., 2014; Faith, 2004; Farrow et al., 2018; Rodgers et al., 2013; Webber et al., 2010).  
82 Collectively these findings suggest that targetting childhood “obesity”<sup>1</sup> by encouraging parental  
83 food restriction practices could be ineffective, counterproductive (increase eating in the absence  
84 of hunger), or harmful (increase eating disorder psychopathology). However, it is also important  
85 to note that some research points to differential impacts of the various forms of restrictive  
86 feeding. Specifically some researchers have suggested that overt forms of control, which can be  
87 detected by the child, may be more harmful than covert control, which may help to structure the  
88 food environment and go unnoticed by the child (e.g., Ogden, Reynolds & Smith, 2006;  
89 Rodenburg et al., 2014).

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<sup>1</sup> 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).

90

91 While it is important to understand the outcomes of specific parenting practices on children's  
92 eating behaviours, it is also pertinent to investigate the determinants of parental feeding  
93 practices. A generally overlooked predictive factor of restrictive feeding practices are parental  
94 anti-fat attitudes (negative attitudes and beliefs about higher body-weight people; Allison et al.,  
95 1991).

96

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

109

110 Unfortunately, parents are not immune to anti-fat attitudes about their own children (Crandall,  
111 1995; Eisenberg et al., 2003; Keery et al., 2004; Lydecker et al., 2018; Puhl & Brownell, 2006),  
112 and preliminary research suggests parents with stronger anti-fat attitudes are more likely to

113 restrict their children’s food intake in an attempt to make them lose weight or to prevent weight  
114 gain (Gold & Vander Weg, 2020; Musher-Eizenman et al., 2007). Two studies, conducted in the  
115 United States of America (USA), have examined the association between parents’ anti-fat  
116 attitudes or weight stigma and restrictive feeding practices. Musher-Eizenman and colleagues  
117 (2007) were the first to explore this association and found a positive correlation between anti-fat  
118 attitudes and restrictive feeding practices in a sample of American parents. Similarly, Gold and  
119 Vander Weg (2020) found that internalized weight stigma predicted restrictive feeding practices  
120 in a sample of American parents who perceived themselves to be “overweight” or “obese”.  
121 Additionally, exploratory analyses revealed that parental concerns about their child’s weight  
122 mediated the effects of weight stigma on restrictive feeding practices (Gold & Vander Weg,  
123 2020).

124  
125 Given the nascent state of research in this area, further work is needed to strengthen confidence  
126 in existing findings and explore potential individual differences in the associations between  
127 parental anti-fat attitudes and restrictive feeding practices. For instance, these associations might  
128 be stronger for people whose evaluations of themselves as parents is more heavily dependent on  
129 their child’s body-weight or -shape. That is, it is possible that people with higher anti-fat  
130 attitudes, whose perception of themselves as parents is more influenced by their child’s body-  
131 weight and -shape, are more likely to restrict their child’s food intake in an attempt to enhance  
132 their perception of themselves as parents. Discovering individual differences could have  
133 important implications for intervention efforts as they could reveal potential treatment targets  
134 and higher-risk populations suitable for prevention efforts.

135



136 The purpose of this study is to examine the associations between three types of parental anti-fat  
137 attitudes and three restrictive food practices, and to assess whether these associations are  
138 moderated by parental self-evaluations related to their child's weight and shape. The current  
139 study will extend previous research by examining the association between anti-fat attitudes and  
140 restrictive feeding within a British and Irish sample of parents, and by exploring whether parent  
141 self-evaluations based on their children's weight and shape moderate these associations.  
142 Replicating these findings in countries outside of the USA, where the broader food culture varies  
143 (e.g., differences in public policy, etiquette, food preparation norms, and accessibility/availability  
144 of specific foods), will be important in determining the robustness of these associations.  
145 Additionally, this study will build on previous work by: (1) using an adapted measure of anti-fat  
146 attitudes that includes a subscale assessing beliefs that children's weight is determined by  
147 parenting practices, and (2) examining the effects of anti-fat attitudes on covert restrictive  
148 feeding practices (i.e., children are unaware that their food is being restricted by their parents)  
149 which previous studies did not explore. We predicted that parents with higher anti-fat attitudes  
150 would report using more restrictive feeding practices (Hypothesis 1 [H1]), and that this  
151 relationship would be stronger for parents whose self-evaluations are more heavily influenced by  
152 their child's weight and shape (Hypothesis 2 [H2]). We will explore these hypotheses using  
153 scales that assess three types of anti-fat attitudes and three types of restrictive feeding practices.

154

## 155 **2. Methods**

### 156 **2.1 Procedure**

157 Parents and caregivers living in the UK or Republic of Ireland with children between the ages of  
158 4-8 years were recruited in May of 2019. This age range was selected because by the age of 4

159 years most children have completed weaning and the normal developmental phase of fussy  
160 eating and parents have had time to establish consistent family feeding practices, while after the  
161 age of 8-years-old children begin to make more independent food choices (Musher-Eizenman et  
162 al., 2018). If parents stated that they had more than one child in this age range, they were  
163 directed to answer questions in relation to their youngest child. Participants were excluded if  
164 they could not read and respond in English.

165

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

182 compensation for completing the study. Ethical approval for this study was granted by the  
183 University of Edinburgh's School of Health in Social Science ethics committee. Data were  
184 collected and stored in line with General Data Protection Regulations.

185

## 186 **2.2 Participants**

187 A total of 511 parents and caregivers (94.10% female, 5.90% male;  $M_{age} = 36.74$ ,  $SD_{age} = 4.92$ )  
188 took part in the study. Just under half of the children were female (48.20%,  $n = 244$ ) and the  
189 average age of children was 5.29 years ( $SD = 1.31$ ). Most of the sample (58.00%) had two  
190 children in their household. A majority of participants resided in England (41.10%) or Scotland  
191 (39.90%), with smaller proportions residing in the Republic of Ireland (14.80%), Wales (2.20%),  
192 Northern Ireland (1.60%), or an unspecified part of the UK (0.40%). Most of the participants  
193 reported having a University degree or higher qualification (70.90%) as compared to 42.00% in  
194 the general population in the UK and Ireland (Central Statistics Office, 2016; Office for National  
195 Statistics, 2019). Over a third (36.80%) of participants were in the highest income quintile (based  
196 on statistics from the UK's Office for National Statistics) and had gross annual household  
197 incomes above £64,000; whereas, 6.30% of participants were in the lowest quintile having a  
198 gross annual household income below £18,999.

199

## 200 **2.3 Measures**

### 201 **2.3.1 Perceived Child Weight Status**

202 Participants answered a single item from the perceived weight status subscale of the  
203 Child Feeding Questionnaire (CFQ; Birch et al., 2001; "How would you describe this child's  
204 weight?"). Response options included: *Markedly Underweight*, *Underweight*, *Normal*,

205 *Overweight, or Markedly Overweight*. Perceived weight status was utilized because in the  
206 context of attitudes towards weight and feeding behaviours, a parent’s perception of their child’s  
207 weight is likely to moderate disordered eating more than their measured weight category  
208 (Robinson & Sutin, 2017). Thus, a self-report measure of perceived child weight status was  
209 considered most appropriate for this study.

210

### 211 **2.3.2 Anti-Fat Attitudes**

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

224

### 225 **2.3.3 Parental Self-Evaluation of Child’s Weight and Shape**

226 Participants answered two items from the Eating Disorder Examination Questionnaire  
227 (EDEQ; Fairburn & Beglin, 1994) adapted to measure parental self-evaluation in relation to their

228 child's weight and shape (Lydecker & Grilo, 2017; (1)“Over the past 28 days, has your child's  
229 weight influenced how you think about yourself as a parent?”, (2) “Over the past 28 days, has  
230 your child's shape influenced how you think about yourself as a parent?”). Participants  
231 responded to the items using a 7-point scale (0 – *Not at all*, 6 – *Markedly*). Items were averaged  
232 to create a reliable rating of parental self-evaluation based on child's body-weight and -shape ( $\alpha$   
233 = .89). Higher scores indicate a stronger influence of child's weight and shape on participant's  
234 evaluations of themselves as parents. This measure differs from the AFA blame subscale in that  
235 it asks about self-evaluations rather than beliefs about parents in general. Although it is possible  
236 that parents might consider themselves when answering the AFA items, nonsignificant  
237 correlations suggest that these are separate constructs (see Table 1).

238

### 239 **2.3.4 Restrictive Feeding Practices**

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

250 restriction for health ( $\alpha = .79$ ), and covert restriction ( $\alpha = .79$ ) scores. Higher scores reflect  
251 greater use of restriction as a parental feeding practice.

252

## 253 **2.4 Statistical Analyses**

### 254 **2.4.1 Preliminary Analyses**

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

272

## 273           **2.4.2 Main Analyses**

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

284

## 285           **3. Results**

### 286           **3.1 Descriptive Statistics**

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

296 positively correlated with restriction for weight control and covert restriction, but not restriction  
297 for health.

298

## 299 **3.2 Main Analyses**

### 300 **3.2.1 Do Anti-Fat Attitudes Predict Parental Food Restriction for Weight Control?**

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

313

### 314 **3.2.2 Do Anti-Fat Attitudes Predict Parental Food Restriction for Health?**

315 The second hierarchical regression with restrictive feeding for health purposes as the  
316 outcome variable also supported H1 (see Table 3). The final step of the model was significant  
317 and explained 14.00% of the total variance in parental food restriction for the purposes of health,  
318  $F(17,454) = 4.36, p < .001$ . Household income quintile, country of residence, and AFA dislike



319 and blame scores were significant predictors of restrictive feeding practices for health (see Table  
320 3). As expected, and holding constant the effect of all control variables, participants who  
321 reported a stronger dislike of higher body-weight people and assigned more blame to parents for  
322 their children's weight, reported more food restriction practices for the purposes of health.  
323 However, in opposition to our hypothesis, participants who reported a stronger fear of being a  
324 higher body-weight did not report using more restrictive feeding practices for the purposes of  
325 health. Participants in the lowest household income quintile (1) and those living in Ireland and  
326 Scotland also engaged in more restrictive feeding for health compared to participants in the  
327 highest income quintile (5) and those living in England, respectively.

328

### 329 **3.2.3 Do Anti-Fat Attitudes Predict Parental Covert Food Restriction?**

330 Results of the third hierarchical regression analysis with covert restriction as the outcome  
331 variable also supported H1 (see Table 4). The final step of the model was significant and  
332 explained 12.40% of the total variance in covert restriction feeding practices,  $F(17,454) =$   
333  $3.78, p < .001$ . Child's age, country of residence, and parental AFA dislike and blame scores  
334 were all significant predictors of covert restrictive feeding practices. In support of our  
335 hypothesis, and holding constant the effect of all control variables, participants who reported a  
336 stronger dislike of higher body-weight people and assigned more blame to parents for their  
337 children's weight, reported more covert food restriction practices. However, contrary to our  
338 hypothesis, parental fear of being a higher body-weight was not a significant predictor of covert  
339 food restriction. Participants reporting on younger children and those living in Ireland and

340 Scotland<sup>2</sup> also used more covert food restriction compared to participants reporting on older  
341 children and those from England, respectively.

342

### 343 **3.2.4 Do Parent Self-Evaluations Based on Child Weight and Shape Moderate these** 344 **Associations?**

345 We used Hayes' (2018) PROCESS macro from SPSS (Model 1) using 10,000 bootstrap  
346 samples to test whether parent's self-evaluation based on their child's weight and shape moderated  
347 the relationship between anti-fat attitudes and parental food restriction practices. All models and  
348 predictors from previous analyses remained significant. Additionally, parental self-evaluations based  
349 on child's weight and shape was a significant predictor of restrictive feeding for weight control ( $b =$   
350  $0.09, t(452) = 3.85, p < .001$ ) and covert restriction ( $b = 0.10, t(452) = 2.81, p = .03$ ). Self-evaluation  
351 based on child's weight and shape only moderated the association between AFA dislike scores and  
352 restrictive feeding for health scores,  $b = -0.07, t(452) = -2.15, p = .03$ . Specifically, the relationship  
353 between AFA dislike scores and restrictive feeding for health was significant at low ( $b = 0.13, t(452)$   
354  $= 2.91, p = .004$ ) and average levels ( $b = 0.09, t(452) = 2.24, p = .03$ ), but not high levels ( $b = 0.02,$   
355  $t(452) = 0.33, p = .75$ ), of self-evaluations based on child's weight and shape (See Figure 1). That is,  
356 participants whose self-evaluations were influenced more strongly by their child's weight and shape,  
357 reported higher restrictive feeding for health purposes regardless of their level of dislike towards  
358 higher body-weight people. Whereas, for participants whose self-evaluations were less influenced by  
359 their child's weight and shape, the stronger their dislike for higher body-weight people, the more they

---

<sup>2</sup> 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.

360 used restrictive feeding practices for health purposes. Overall, because parental self-evaluations based  
361 on their child's weight and shape did not moderate any other associations between anti-fat attitudes  
362 and restrictive feeding practices (i.e., all other interaction terms  $ps > .05$ ), we conclude that our  
363 hypothesis was not supported.

364

#### 365 **4. Discussion**

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

370

371 Overall, our hypothesis that parents who have higher levels of anti-fat attitudes will report more  
372 restrictive feeding practices was supported. A stronger dislike for higher body-weight people and  
373 assigning more blame to parents for their children's weight were consistent predictors of restrictive  
374 feeding practices. Whereas, parents with a stronger fear of being a higher body-weight reported  
375 restricting their child's food intake for the purposes of weight control (but not for health or using  
376 covert restriction). A possible interpretation of this pattern of results is that parental fear of being a  
377 higher body-weight predicts restriction for weight control, but not health purposes or covert  
378 restriction, because it is more motivated by a concern with their child's appearance rather than their  
379 child's health. This could reflect a well-intentioned desire to prevent their children from facing any  
380 negative consequences as a result of their weight such as stigmatization, bullying, or discrimination.  
381 Musher et al. (2007) also found that fathers' fear of being a higher body-weight predicted restriction  
382 for weight control but not for health. However, they did not find that fear of being a higher body-

383 weight was predictive of mother's restrictive feeding for the purposes of weight control or health.  
384 Thus, future research is needed to clarify the specific associations between different types of anti-fat  
385 attitudes and restrictive feeding practices, and to further evaluate parental gender differences in these  
386 associations.

387  
388 Anti-fat attitudes explained between 5-10% of the variance in restrictive feeding practices, suggesting  
389 that anti-fat attitudes did not fully explain why parents restrict their children's food intake. It is  
390 possible that this finding was due to controlling for several other variables which reduced the  
391 statistical power of the test. It is also possible that in a more diverse sample these associations would  
392 be stronger. Due to the low levels of children identified as "overweight" in the sample ( $n=15$ ), some  
393 parents with anti-fat attitudes may not restrict food because they do not perceive their child's food  
394 intake as needing to be regulated. This might also help explain why parental fear of being a higher  
395 body-weight did not predict restricting children's food intake for health purposes or covert food  
396 restriction. Parents who fear being a higher body-weight and perceive their children to be "normal"  
397 weight may not see a need to restrict their children's eating for health purposes or covertly. Whereas,  
398 parents who perceive their child to be "overweight" might be more likely to try and restrict their  
399 child's intake in an effort to improve health, particularly if parents are afraid of being a higher body-  
400 weight themselves. Indeed, the current study found that parents who perceived their child as  
401 "overweight" reported higher food restriction for weight control purposes compared to parents who  
402 perceived their child as "normal" weight. This aligns with current understanding of the bidirectional  
403 nature of restrictive feeding practices and child weight status, including previous research that has  
404 found that parents are more likely to restrict the food intake of higher body-weight children (Gold &  
405 Vander Weg, 2020; Musher-Eizenmann et al., 2007).

406  
407 Our second hypothesis, that the relationship between anti-fat attitudes and restrictive feeding would  
408 be moderated by parental self-evaluation based on the child's weight or shape, was not supported.  
409 The moderation pathway between parental anti-fat attitudes related to disliking higher body-weight  
410 people and restrictive feeding practices for health was significant, but not in the anticipated direction.  
411 It is possible that the lack of moderation found in the other pathways is due to the low proportion of  
412 parents describing their child as "overweight" and very few parents stating that their child's weight or  
413 shape influenced how they thought about themselves as parents. The significant moderation we did  
414 find in our sample could reflect a desire of parents who judge themselves more strongly based on  
415 their child's weight and shape to prevent their "normal" weight child from becoming "overweight" or  
416 experiencing ill health. That is, it is possible that these parents might view restriction as a means of  
417 preventing weight gain or poor health outcomes (e.g., limiting sugary drinks) and restrict food  
418 consumption for these purposes despite viewing their child as a "normal" weight because their own  
419 self-perceptions are dependent on their child having a lower body-weight. This aligns with the  
420 findings from previous research where concern about their child *becoming* "overweight" predicted  
421 restrictive feeding (May et al., 2007; Ek et al., 2016; Gregory, Paxton & Brozovic, 2010; May et al.,  
422 2007; Webber et al., 2010). Thus, future research should work to replicate our findings in a more  
423 diverse sample and should also examine how parental concern about their child becoming higher  
424 body-weight interacts with anti-fat attitudes and restrictive feeding practices.

425  
426 There were also several unanticipated findings that should be investigated further in future work.  
427 Although not directly related to our hypotheses, we found that parents living in Ireland and Scotland  
428 reported more restrictive feeding practices compared to parents living in England. We are unaware of

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

442

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

451 and which are useful strategies to help structure the food environment and support the development  
452 of children's eating behaviours.

453

#### 454 **4.1 Implications and Future Directions**

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

459

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

465

466 Results from this study suggest the need to explore the role of parental anti-fat attitudes in the  
467 development of maladaptive eating in children. Given that parental anti-fat attitudes are important  
468 predictors of the use of restrictive feeding practices, and restrictive feeding has been linked to the  
469 development of eating disorder psychopathology (e.g., Allen et al., 2009), it is possible that parental  
470 anti-fat attitudes increase the risk of children developing an eating disorder via this mediational  
471 pathway (i.e., parent anti-fat attitudes → restrictive feeding → increased eating disorder  
472 psychopathology in children). It is also possible that children could internalize their parents' anti-fat  
473 attitudes which could also contribute to the development of eating disorder psychopathology.

474 Because children may internalize their parents' eating behaviours and attitudes (e.g., Brown &  
475 Ogden, 2004; Dickens & Ogden, 2014), and stronger anti-fat attitudes are associated with more  
476 eating disorder psychopathology (Pepper & Ruiz, 2007), parents' anti-fat attitudes might indirectly  
477 contribute to the development of maladaptive eating in their children. Additionally, stronger anti-fat  
478 attitudes in parents may predict more instances of weight-based criticism, comments, or discussions  
479 directed at their children which could subsequently increase maladaptive eating in children (e.g.,  
480 Carper et al., 2000; Berge et al., 2018; Damiano et al., 2015; Keery et al., 2004). Thus, multiple  
481 pathways may exist from parental anti-fat attitudes and maladaptive eating in children. Future  
482 research should explore the role of parental anti-fat attitudes in the development of disordered eating.  
483

484 These results also suggest that parental anti-fat attitudes could be a viable target of interventions or  
485 used as a way to identify families who might benefit most from intervention efforts. It is important to  
486 note that even in our sample where children were predominantly perceived as "normal" weight,  
487 parents with stronger anti-fat attitudes were more likely to restrict their children's eating. This  
488 research supports the potential value of programs that aim to improve body image and decrease  
489 maladaptive eating practices in children, particularly for families with parents who hold strong anti-  
490 fat attitudes. Likely this would include some component of educating parents about the specious  
491 relationship between weight and health. This in line with recommendations from the American  
492 Academy of Pediatrics (Golden et al., 2016) that parents should avoid focusing on their children's  
493 weight because of the adverse consequences to their health. Instead, parents should focus on  
494 promoting a healthy relationship with food, eating, and one's body independent of weight. For  
495 example, the program *Confident Body, Confident Child* has been developed for parents of young  
496 children and has showed promising initial results with sustained improvements in parents' knowledge



497 of how to promote positive body image and eating behaviours and reduced use of restriction for  
498 weight control over a 12-month period (Damiano et al., 2016; Hart et al., 2019).

499

## 500 **4.2 Limitations**

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

511

## 512 **4.3 Conclusion**

513 Overall, parental anti-fat attitudes were associated with more restrictive feeding practices in a  
514 sample of predominantly female caregivers living in the UK and Republic of Ireland. However,  
515 we did not find that this relationship was stronger for parents who evaluated themselves more  
516 strongly based on their child's weight or shape. Future work should explore these associations  
517 over time and in samples of higher body-weight children.

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530  
531 **Figure Captions:** Figure 1. Interaction between anti-fat attitudes dislike subscale scores and self-  
532 evaluations based on child's weight and shape predicting restrictive feeding for health.

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760 Table 1  
 761 *Means, Standard Deviations, and Correlations of Study Variables*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Parent Age	36.74	4.96	1	.17**	.27**	.01	.15**	-.05	.05	-.01	.07	.11*	.01
2. Parent Sex	-	-		1	.07	-.01	.07	.00	.06	.10*	.15**	.00	-.05
3. Child Age	5.30	1.31			1	-.01	.11*	-.02	.03	.05	.06	-.04	-.13**
4. Child Sex	-	-				1	.03	.07	-.05	-.06	-.04	-.00	.04
5. AFA Dislike	1.17	1.03					1	.32**	.35**	.04	.25**	.18**	.18**
6. AFA Fear	2.83	1.61						1	.38**	.08	.22**	.08	.11*
7. AFA Blame	3.55	1.35							1	.02	.23**	.25**	.19**
8. Self-Evaluation Based on Child's Weight/Shape	0.57	1.05								1	.20**	.07	.09*
9. Restriction Weight Control	1.41	0.54									1	.30**	.34**
10. Restriction Health	3.33	0.82										1	.52**
11. Covert Restriction	2.56	0.94											1

762 *Note.* \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . AFA = Anti-fat Attitudes. Coding for sex: Female = 0, Male = 1.

763 Table 2  
 764 *Results of Hierarchical Regression Analyses Predicting Restrictive Feeding Practices for Weight*  
 765 *Control*

Restriction for Weight Control								
Predictor	Step 1 ( <i>df</i> = 457)				Step 2 ( <i>df</i> = 454)			
	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>
Parent Age	0.03	0.05	0.62	.535	0.00	0.02	0.48	.630
Parent Sex	0.29	0.13	2.88	<b>.004</b>	0.28	0.13	2.87	<b>.004</b>
Child Age	0.00	0.00	0.05	.963	-0.00	-0.00	-0.17	.865
Child Sex	-0.04	-0.04	-0.92	.357	-0.05	-0.05	-1.06	.291
University Educated	0.02	0.02	0.35	.726	0.02	0.02	0.37	.711
Income Quintile 1	0.01	0.00	0.07	.946	-0.00	-0.00	-0.02	.984
Income Quintile 2	0.03	0.02	0.33	.739	0.09	0.06	1.17	.242
Income Quintile 3	-0.06	-0.04	-0.80	.422	-0.05	-0.04	-0.72	.470
Income Quintile 4	-0.03	-0.02	-0.40	.689	0.00	0.00	0.01	.992
Ireland	0.25	0.16	3.29	<b>.001</b>	0.26	0.16	3.46	<b>.001</b>
Scotland	0.11	0.10	2.12	<b>.035</b>	0.08	0.08	1.59	.114
Other UK	-0.10	-0.04	-0.79	.431	-0.08	-0.03	-0.70	.487
Child “Underweight”	-0.15	-0.07	-1.43	.153	-0.17	-0.08	-1.75	.082
Child “Overweight”	0.60	0.19	4.07	<b>&lt;.001</b>	0.64	0.20	4.59	<b>&lt;.001</b>
AFA Dislike					0.07	0.14	3.01	<b>.003</b>
AFA Fear					0.05	0.14	2.87	<b>.004</b>
AFA Blame					0.05	0.12	2.48	<b>.014</b>
	<i>R</i>			.30				.43
	<i>R</i> <sup>2</sup>			.09				.18
	$\Delta R^2$			<b>.09***</b>				<b>.09***</b>

766 *Note.* Significant values are bolded. \**p* < .05; \*\**p* < .01; \*\*\**p* < .001; AFA = Anti-fat attitudes.  
 767 Reference categories for dummy coding variables: income quintile 5, England, & child “normal  
 768 weight”.

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 770

771 Table 3  
 772 Results of Hierarchical Regression Analyses Predicting Restrictive Feeding Practices for Health  
 773

Predictor	Restriction for Health							
	Step 1 ( <i>df</i> = 457)				Step 2 ( <i>df</i> = 454)			
	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>
Parent Age	0.02	0.09	1.87	.062	0.01	0.09	1.75	.081
Parent Sex	-0.13	-0.04	-0.80	.425	-0.17	-0.05	-1.07	.285
Child Age	-0.04	-0.06	-1.23	.220	-0.05	-0.07	-1.57	.117
Child Sex	-0.02	-0.01	-0.28	.779	-0.01	-0.00	-0.09	.928
University Educated	0.02	0.01	0.25	.801	0.02	0.01	0.20	.842
Income Quintile 1	-0.58	-0.17	-3.37	<b>.001</b>	-0.54	-0.16	-3.24	<b>.001</b>
Income Quintile 2	-0.10	-0.04	-0.77	.444	0.00	0.00	0.01	.994
Income Quintile 3	-0.14	-0.06	-1.22	.223	-0.11	-0.05	-1.06	.289
Income Quintile 4	-0.05	-0.03	-0.53	.597	-0.01	-0.01	-0.12	.905
Ireland	0.45	0.18	3.63	<b>&lt;.001</b>	0.44	0.18	3.66	<b>&lt;.001</b>
Scotland	0.30	0.18	3.54	<b>&lt;.001</b>	0.24	0.14	2.89	<b>.004</b>
Other UK	0.20	0.05	1.04	.298	0.21	0.05	1.13	.258
Child "Underweight"	-0.07	-0.02	-0.40	.693	-0.06	-0.02	-0.36	.721
Child "Overweight"	0.14	0.03	0.62	.533	0.19	0.04	0.85	.394
AFA Dislike					0.09	0.11	2.21	<b>.027</b>
AFA Fear					-0.01	-0.02	-0.40	.691
AFA Blame					0.12	0.20	4.02	<b>&lt;.001</b>
	<i>R</i>			.28				.38
	<i>R</i> <sup>2</sup>			.08				.14
	$\Delta R^2$			.08***				.06***

774 Note. Significant values are bolded. \* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001; AFA = Anti-fat attitudes.  
 775 Reference categories for dummy coding variables: income quintile 5, England, & child "normal  
 776 weight".  
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779 Table 4  
 780 Results of Hierarchical Regression Analyses Predicting Covert Restrictive Feeding Practices  
 781

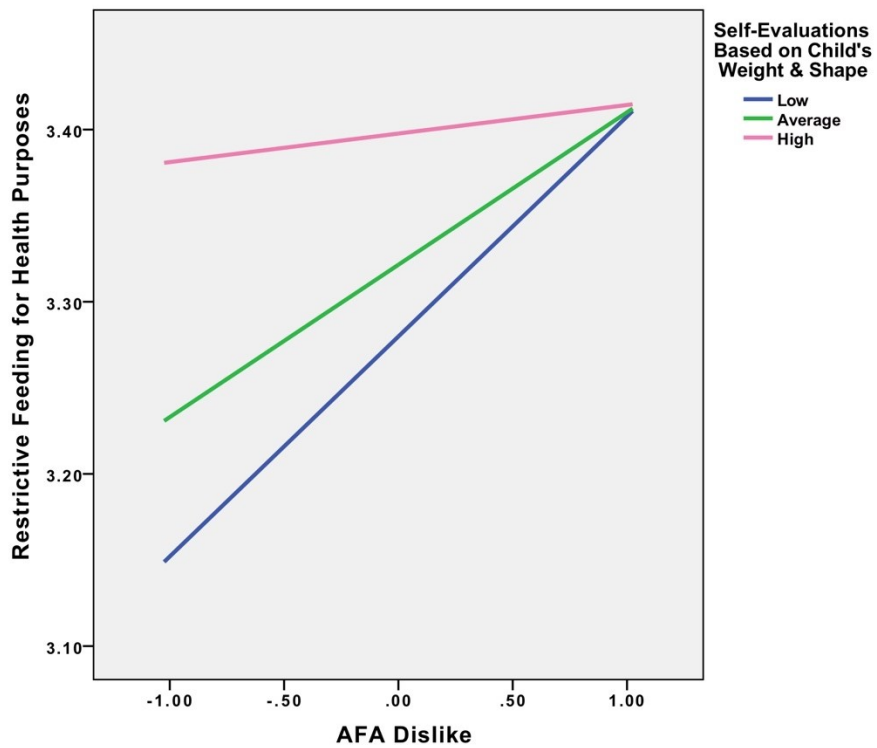
Predictor	Covert Restriction							
	Step 1 ( <i>df</i> = 457)				Step 2 ( <i>df</i> = 454)			
	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>	<i>b</i>	$\beta$	<i>t</i>	<i>p</i>
Parent Age	0.00	0.01	0.25	.801	0.00	0.00	0.07	.944
Parent Sex	-0.26	-0.07	-1.44	.151	-0.30	-0.08	-1.66	.098
Child Age	-0.10	-0.14	-2.90	<b>.004</b>	-0.11	-0.15	-3.21	<b>.001</b>
Child Sex	0.07	0.04	0.77	.439	0.07	0.04	0.84	.400
University Educated	0.09	0.04	0.84	.400	0.08	0.04	0.80	.422
Income Quintile 1	-0.30	-0.08	-1.53	.127	-0.28	-0.07	-1.46	.146
Income Quintile 2	-0.15	-0.06	-1.07	.284	-0.06	-0.02	-0.39	.698
Income Quintile 3	-0.14	-0.06	-1.13	.261	-0.12	-0.05	-1.00	.320
Income Quintile 4	-0.16	-0.07	-1.32	.187	-0.11	-0.05	-1.00	.319
Ireland	0.50	0.18	3.52	<b>&lt;.001</b>	0.49	0.17	3.56	<b>&lt;.001</b>
Scotland	0.33	0.17	3.46	<b>.001</b>	0.28	0.15	2.98	<b>.003</b>
Other UK	0.41	0.09	1.88	.061	0.43	0.09	1.99	<b>.047</b>
Child "Underweight"	0.10	0.02	0.52	.607	0.09	0.02	0.50	.615
Child "Overweight"	0.40	0.07	1.51	.132	0.45	0.08	1.75	.081
AFA Dislike					0.12	0.12	2.51	<b>.013</b>
AFA Fear					0.01	0.02	0.47	.636
AFA Blame					0.09	0.13	2.64	<b>.009</b>
	<i>R</i>			.28				.35
	<i>R</i> <sup>2</sup>			.076				.124
	$\Delta R^2$			<b>.076**</b>				<b>.048***</b>

782  
 783 Note. Significant values are bolded. \**p* < .05; \*\**p* < .01; \*\*\**p* < .001; AFA = Anti-fat attitudes.  
 784 Reference categories for dummy coding variables: income quintile 5, England, & child "normal  
 785 weight".  
 786

787



788 Figure 1  
789 Interaction between anti-fat attitudes dislike subscale scores and self-evaluations based on  
790 child's weight and shape predicting restrictive feeding for health



791 Note. AFA Dislike = dislike subscale from the Anti-Fat Attitudes Questionnaire (Crandall,  
792 1994).  
793