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## Are food parenting practices gendered? Impact of mothers' and fathers' practices on their child's eating behaviors

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### ► To cite this version:

Kaat Philippe, Claire Chabanet, Sylvie Issanchou, Sandrine Monnery-Patris. Are food parenting practices gendered? Impact of mothers' and fathers' practices on their child's eating behaviors. *Appetite*, 2021, 166, pp.105433. 10.1016/j.appet.2021.105433 . hal-03269102

**HAL Id: hal-03269102**

**<https://hal.inrae.fr/hal-03269102>**

Submitted on 2 Aug 2023

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2 **child's eating behaviors.**

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## 12 **ABSTRACT**

13 Past research has mainly focused on the links between child eating behaviors and maternal food  
14 practices. The impact of fathers and of concordant/discordant food parenting practices within  
15 families has received much less attention. To fill this gap, both parents of 105 French children  
16 aged 2.01-6.51 years (54 boys,  $M_{\text{age}}= 3.88$  years,  $SD=1.40$ ) filled in a survey with items from  
17 validated questionnaires. Results showed that fathers and mothers perceived their child's eating  
18 behaviors in similar ways (Pearson correlations between 0.34 and 0.78;  $M=0.60$ ), despite  
19 mothers taking significantly more meals with their child than fathers. Fathers reported using  
20 significantly more pressure to eat and food as reward, but reported lower levels of "family meal  
21 setting" than mothers. Moderate to high correlations were observed between mothers' and  
22 fathers' feeding practices and styles. Regression analyses showed that both maternal and  
23 paternal practices and styles were predictors for child eating behaviors. One interaction effect  
24 was observed: in households where both parents used higher levels of pressure to eat, the child  
25 showed a significantly lower food enjoyment than expected if the effects were additive. Our  
26 findings underline the importance of studying the individual role of each parent in child feeding  
27 research and that both parents within families should avoid using coercive practices. This could  
28 finally stimulate new interventions and recommendations addressed to both parents.

29 **Key words:** preschoolers, parental feeding practices, parental feeding styles, child eating  
30 behaviors, fathers

## 31 **1 Introduction**

32 The period between the ages of 2-6 years is known as a sensitive period in feeding. On the one  
33 hand, this period is characterized by a deterioration of children's ability to self-regulate their  
34 food intake under the influence of the external environment (Fisher & Birch, 2002). Children  
35 are born with an innate ability to self-regulate their food intake. As they grow older, external  
36 stimuli like controlling food parenting practices (e.g., pressure to eat) and inappropriate portion  
37 sizes, can divert children from their internal feelings of hunger and satiation (Birch, Fisher,  
38 Davison, 2003; Fisher & Kral, 2008; Frankel, O'Connor, Chen, Nicklas, Power, Hughes, 2014;  
39 Monnery-Patris, Rigal, Peteuil, Chabanet, Issanchou, 2019). This could cause them to overeat  
40 and could induce weight gain (Kral, Allison, Birch, Stallings, Moore, Faith, 2012; Monnery-  
41 Patris et al., 2019).

42 On the other hand, this period is characterized by a peak in food rejections in children (Nicklaus  
43 & Monnery-Patris, 2018; Rioux, Lafraire, Picard, 2017). Two important kinds of food  
44 rejections are food neophobia, defined as a fear of novel, unknown foods (Pliner & Hobden,

45 1992), and food pickiness. Despite inconsistent definitions in the literature, key characteristics  
46 of food pickiness are the consumption of a limited amount and type of foods, and the rejection  
47 of foods based on their texture or sensory aspects (Boquin, Moscovitz, Donovan, Lee, 2014;  
48 Dovey, Staples, Gibson, Halford, 2008). Food neophobia and food pickiness are highly linked  
49 (Galloway, Lee, Birch, 2003; Rigal, Chabanet, Issanchou, Monnery-Patris, 2012) and these two  
50 concepts have often been used interchangeably in past research. Yet, it is suggested that they  
51 are behaviorally distinct (Dovey et al., 2008) and predicted by different sets of factors  
52 (Galloway et al., 2003), which could call for the need to study them separately. These two  
53 dimensions are considered as normal eating behaviors during early childhood with highest  
54 prevalence from age two to five years (Cardona Cano et al., 2015). For some children, however,  
55 these behaviors are expressed to a far greater degree, which can be linked to poorer health  
56 outcomes (Perry, Mallan, Koo, Mauch, Daniels, Magarey, 2015; Ventura & Worobey, 2013).  
57 In the same way, low food enjoyment in children and a low appetite are reported as common  
58 eating difficulties in early childhood (Rigal et al., 2012).

59 Knowing that eating habits established during early years contribute to the development of  
60 subsequent eating habits (Nicklaus, Boggio, Chabanet, Issanchou, 2005), it is important to  
61 promote healthy eating in children from a young age. It is well documented that parents and  
62 their food parenting practices and styles play a key role in shaping children's eating patterns  
63 and preferences (Birch, 1999). Moreover, children aged 2-6 years are still highly dependent on  
64 their parents for their food intake and consume most of their energy intake at home (Poti &  
65 Popkin, 2011). Vaughn and colleagues (2016) identify three "overarching, higher-order food-  
66 parenting constructs": coercive control, structure, and autonomy support. Coercive control  
67 refers to feeding practices that are rather parent-centered (e.g., restriction, pressure to eat, and  
68 the use of rewards and bribes), and are often linked to negative outcomes for the child. Structure  
69 refers to food practices that are also controlling but in a noncoercive way: parents provide  
70 certain rules and boundaries in order to organize children's environment and to facilitate their  
71 competences by modelling eating behavior, guiding food choices, and setting meal routines.  
72 Finally, autonomy support refers to offering choices to the child and allowing age-appropriate  
73 independent exploration (e.g., use of reasoning, child involvement).

74 Parental feeding styles are overarching and determined by two dimensions: parental  
75 demandingness (*i.e.*, how much the parents encourage eating), and responsiveness (*i.e.*, how  
76 responsive parents are when encouraging eating) (Hughes, Power, Fisher, Mueller, Nicklas,  
77 2005). This results in four feeding styles: authoritarian (high demanding, non-responsive),  
78 authoritative (high demanding, responsive), permissive/indulgent (low demanding,

79 responsive), and neglectful/uninvolved (low demanding, non-responsive). The authoritative  
80 feeding style has generally been associated with the most beneficial outcomes for the child, the  
81 permissive/indulgent feeding style has often been linked to a higher child body mass index (e.g.,  
82 Patrick, Nicklas, Hughes, Morales, 2005; Rigal et al., 2012; review Shloim, Edelson, Martin,  
83 Hetherington, 2015).

84 Maternal feeding practices and styles have been the predominant focus in past research,  
85 supported by the idea that mothers are the primary caregiver of the child (Patrick et al., 2005)  
86 or primary responsible for feeding (Blissett, Meyer, & Haycraft, 2006). However, this focus  
87 neglects the role of fathers in feeding and provides an incomplete picture of the child's family  
88 feeding environment. To illustrate **this point, one can refer to a study conducted** in the United  
89 States **in which** 72% of fathers living with their children reported feeding their child under the  
90 age of five daily or eating meals with them (Jones & Mosher, 2013). In the scant research with  
91 fathers, differences in maternal and paternal feeding practices were noted: e.g., fathers used  
92 more pressure to eat than mothers (Daniels, Mallan, Jansen, Nicholson, Magarey, Thorpe, 2020;  
93 Hendy, Williams, Camise, Eckman, Hedemann, 2009; Loth, MacLehose, Fulkerson, Crow,  
94 Neumark-Sztainer, 2013; Tschann et al., 2013) and more restriction (Daniels et al., 2020;  
95 Musher-Eizenman, Holub, Hauser, Young, 2007), but less reasoning and praise (Orrell-  
96 Valente, Hill, Brechwald, Dodge, Pettit, Bates, 2007), and fathers placed less limits on snacks  
97 (Hendy et al., 2009). Father's practices were also found predictive for child eating and  
98 adiposity, underlining the importance of including fathers in feeding research (for reviews, see  
99 Khandpur, Blaine, Fisher, Davison, 2014; Litchford, Savoie Roskos, Wengreen, 2020). The  
100 role of family feeding interactions has also been studied to a very limited extent. Only a few  
101 studies explored the associations between concordances/discordances between maternal and  
102 paternal feeding practices and child eating behaviors. Harris and colleagues (2018) found that  
103 food fussiness was less reported in children when mothers and fathers were concordant in  
104 avoiding nonresponsive feeding practices in the household. In interviews, fathers also expressed  
105 that dissimilarities in food parenting practices at home were linked to more child food rejections  
106 and tantrums (Khandpur, Charles, & Davison, 2016).

107 As a contribution to filling this gap in the literature, this study had two objectives. The first  
108 objective was to identify possible differences and similarities in maternal and paternal food  
109 parenting practices, and in maternal and paternal perceptions of the child's eating behaviors. In  
110 order to obtain a more complete picture of the role of the mothers and fathers in feeding in our  
111 sample, the division of feeding related tasks in the families and the number of meals parents  
112 take with their children were also explored. Our second objective was to assess the associations

113 between maternal and paternal feeding practices and child eating behaviors, and to study  
114 possible effects of concordant/discordant feeding practices in families. Based on the results of  
115 the literature described above, we hypothesized to observe some gender differences in food  
116 parenting practices. We also hypothesized that families where one or both parents use coercive  
117 practices would report more problematic eating behaviors in children (less food enjoyment,  
118 more food neophobia and food pickiness, more eating in the absence of hunger, and a poorer  
119 eating compensation ability) than families where parents concordantly avoid coercive practices.

## 120 **2 Methods**

### 121 **2.1 Ethics and Recruitment**

122 This study was part of a bigger study project with several separate study objectives. An ethical  
123 approval (n°19-591) was granted by the Institutional Review Board (IRB00003888,  
124 IORG0003254, FWA00005831) of the French Institute of Medical Research and Health, and a  
125 study registration was done by the data protection service involved (CNRS).

126 In day care centers and preschools in Dijon, parents of children aged two to six years old  
127 received an envelope with two identical exemplars of a questionnaire (one for *Parent 1*, one for  
128 *Parent 2*). They were invited to independently complete the questionnaires and to return them  
129 to the teacher/caregiver. Some day care centers and preschools preferred to hand out flyers or  
130 to send an e-mail with the link to the online version of the questionnaire (available on the  
131 platform SurveyMonkey). In addition, parents all over France were recruited online with the  
132 use of social media (Facebook, Twitter), e-mails to contacts working with children, and through  
133 our internal database (ChemoSens Platform's PanelSens, CNIL no.1148039). They were all  
134 invited to fill in the online version of the questionnaire. All caregivers fulfilling a parent role  
135 for a child aged 2-6 years were eligible to fill in the questionnaire. Participation was voluntary  
136 and no compensation was offered. The questionnaire was pretested with three mothers and a  
137 father, whose responses were not included in the present analyses.

### 138 **2.2 Measures**

#### 139 **2.2.1 Sociodemographic characteristics**

140 The sex of the child, some letters of the child's name and his/her date of birth were completed  
141 in order to ensure correct matching of both parents of the same child later on. This was  
142 necessary as parents were asked to fill in their questionnaire without full identification and  
143 independently from their (ex-)partner. After the matching procedure, possible identifying  
144 information of the children (*i.e.*, letters of their name and birth date) were replaced by a child

145 code and by the child's age. Parents were also asked to report demographic characteristics about  
146 themselves: their relation to child, age, employment status, perception of financial status, family  
147 composition, number of children in the household, and county of residence in France.

### 148 **2.2.2 Number of shared meals, division of feeding related tasks in the household**

149 Parents were asked to report the number of breakfasts, lunches, and dinners generally taken  
150 with the child per week (ranging from 0-7 for each meal). Taking a meal with the child was  
151 defined as either eating with the child or feeding the child. Parents were also asked to report  
152 who was the main responsible for three feeding related tasks (*i.e.*, grocery shopping, cooking,  
153 feeding/eating with child). The answer options were "Predominantly/ Always me",  
154 "Predominantly/ Always my partner", "Both at equal parts", and "Not applicable".

### 155 **2.2.3 Child eating behaviors**

#### 156 **Child food rejection**

157 The Children Food Rejection Scale (CFRS; Rioux, Lafraire, & Picard, 2017) was used to  
158 measure the child's food pickiness (five items; e.g., *My child sorts his/her food on the plate*)  
159 and food neophobia (six items; e.g., *My child is suspicious of new foods*), the two main kinds  
160 of food rejection in children. Caregiver's agreement with each item was rated on a five-point  
161 Likert scale (*Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree*).  
162 Higher scores indicated higher levels of food pickiness and neophobia.

#### 163 **Low appetite and low food enjoyment**

164 The Children's Eating Difficulties Questionnaire (CEDQ; Rigal et al., 2012) was used to  
165 measure the child's levels of low appetite (three items; e.g., *My child eats small quantities (even*  
166 *if the food is liked)*) and low food enjoyment (three items; e.g., *My child looks forward to*  
167 *mealtimes* (Reversed item)). Parents were asked to rate their agreement with each item on a  
168 five-point Likert scale (*Strongly disagree, Disagree, Neither agree nor disagree, Agree,*  
169 *Strongly agree*), according to their child's eating behavior. Higher scores indicated a lower  
170 appetite and a lower food enjoyment in the child.

#### 171 **Self-regulation of eating**

172 A questionnaire proposed recently by Monnery-Patris and colleagues (2019) was used to  
173 measure two dimensions of children's self-regulation of eating: eating in the absence of hunger  
174 (EAH), which may reflect responses to external cues, and eating compensation ability, which  
175 may reflect responses to internal cues. The child's EAH was measured with six items, his/her  
176 eating compensation ability with four items. For some items, parents had to rate their answer  
177 on a five-point scale ranging from "Never" to "Always" (e.g., for eating compensation ability:

178 *My child eats less at meal times when s/he has eaten something before the meals*). For other  
179 items, parents had to choose one out of three options to describe their child's behavior: e.g., for  
180 the item: "After s/he has finished his meal, if candies are available and I let him/her" (EAH),  
181 they could choose either the answer (1) "s/he doesn't eat them", (2) "s/he eats one or two to  
182 taste them", or (3) "s/he eats many of them". All items are presented in Appendix 1. Higher  
183 scores indicate a worse self-regulation, meaning higher levels of EAH and a poorer ability of  
184 eating compensation.

## 185 **2.2.4 Food parenting practices**

### 186 **Snacking/flexibility and feeding on a schedule**

187 Six items from the questionnaire presented before (Monnery-Patris et al., 2019) were also used  
188 to measure to what degree caregivers allow snacking/flexibility in eating for their child (e.g.,  
189 *After being physically active (walking, swimming, ..), my child has something to eat*). Answers  
190 were rated on a five-point scale ranging from "Never" to "Always". Higher scores indicated  
191 more snacking/flexibility in eating. The present questionnaire also used Baughcum and  
192 colleagues' (2001) dimension feeding on a schedule retrieved from the Infant Feeding  
193 Questionnaire (three items, e.g., *During the week, do you make him/her eat at set times?*).  
194 Monnery-Patris and colleagues (2019) validated the use of this dimension for French parents  
195 of children aged one to six years old. Parents were asked to rate their agreement on a five-point  
196 scale ranging from "Never" to "Always". Higher scores indicated stricter times for eating.

### 197 **Family meal setting**

198 In order to measure the dimension family meal setting, a single item "My child eats the same  
199 meals as the rest of the family" from the Feeding Practices and Structure Questionnaire (FPSQ-  
200 28; Jansen, Williams, Mallan, Nicholson, Daniels, 2016) was used. **Parents were asked to rate  
201 their agreement on a five-point scale ranging from "Never" to "Always"**. Jansen and colleagues  
202 propose to use this item as a single item indicator since they found that it was wholly  
203 representative of the latent variable family meal setting.

### 204 **Coercive control practices**

205 The Comprehensive Feeding Practices Questionnaire (Musher-Eizenman & Holub, 2007) was  
206 used to measure four dimensions indicating coercive control: food as reward (three items, e.g.,  
207 *I offer my child his/her favorite foods in exchange for good behavior*), pressure to eat (four  
208 items, e.g., *My child should always eat all of the food on his/her plate*), restriction for health  
209 (four items, e.g., *If I did not guide or regulate my child's eating, he/she would eat too many  
210 junk foods*), and restriction for weight control (eight items, e.g., *I often put my child on a diet  
211 to control his/her weight*). Parents were asked to rate their agreement with each item on a five-



212 point scale ranging from “Strongly disagree” to “Strongly agree”, or from “Never” to “Always”.  
213 The psychometric properties of this questionnaire have been demonstrated in both US and  
214 French samples, and for the use with mothers and fathers (Musher-Eizenman & Holub, 2007,  
215 Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, & Charles, 2009). Higher scores  
216 indicated higher levels of coercive control.

### 217 **2.2.5 Parental feeding styles**

218 The Feeding Style Questionnaire (Rigal et al., 2012) was used to measure the three most  
219 reported parental feeding styles: authoritarian, authoritative and permissive/indulgent style.  
220 This questionnaire conceptualizes feeding styles as dimensional rather than categorical. Parents  
221 were presented with seven feeding situations (e.g., *Your child wants to eat pasta when you*  
222 *intended to cook vegetables*) and were asked to rate the probability of each of three possible  
223 practices (an authoritarian response, an authoritative, and a permissive response) on a four-  
224 point scale from “Very unlikely” to “Very likely”. Scores were calculated for each of the three  
225 parental feeding styles by averaging the items associated with each style.

226 In addition to the measures on parental feeding practices and styles, we asked parents if they  
227 thought they had similar feeding practices and ideas with regard to feeding their child as their  
228 (ex-)partner. Parents could either choose “Rather yes”, “Rather no”, or “Not applicable”.

### 229 **2.3 Statistical analyses**

230 R version 3.6.1 (R Core Team, 2019) was used to clean and analyze the data. The significance  
231 level was set at  $p < 0.05$  for all analyses.

#### 232 **2.3.1 Data cleaning**

233 As this study is part of a bigger study project, the data cleaning was performed on the entire  
234 sample of the project ( $n = 1197$  parents). Questionnaires were excluded when the child’s sex or  
235 date of birth were missing, when the child was younger than 2 years or older than 6.9 years,  
236 when the child had an illness susceptible of influencing his/her eating (e.g., food allergies),  
237 when the child was born premature ( $< 37$  weeks of gestation) or when this information was  
238 missing. This resulted in a cleaned sample of 790 questionnaires: 621 filled in by mothers and  
239 169 filled in by fathers.

240 For the current study we are only interested in children of whom two parents filled in the  
241 questionnaire. Among the remaining questionnaires ( $n = 790$ ), 121 children were identified with  
242 completed questionnaires of both parents ( $n = 242$  parents). One couple filled in the  
243 questionnaire for two of their children, the questionnaires corresponding to the second child  
244 were deleted. For four children, the items measuring child eating behaviors and parental feeding

245 practices/styles were found exactly identical for both mother and father. This indicated that the  
246 questionnaires were not filled in independently, and they were consequently deleted. For eleven  
247 other children, these items were almost identical for both parents (between 82-99% identical),  
248 thus these questionnaires were also deleted. The threshold of 82% was determined with a stem  
249 and leaf used to visualize the distribution of the percentage of identical responses. Finally, 105  
250 children were retained (n = 210 parents).

### 251 2.3.2 Preliminary analyses

252 Confirmatory factor analyses (CFA) with a structural equation modeling approach (Bollen,  
253 1989; Kaur et al., 2006) were performed on the data set of the whole study project, first on the  
254 mothers' data set (n = 621), then on the fathers' only data set (n = 169 fathers). Some minor  
255 differences were found between the acceptable factor structures for mothers and fathers, and it  
256 was decided to retain the items that presented a good fit for the fathers' sample as they also  
257 presented an acceptable fit for the mothers' sample. These factor structures were used for the  
258 analyses of the data subset corresponding to the present study (n = 210 parents: 105 mothers,  
259 105 fathers). Cronbach's alphas were calculated with the retained items to report the internal  
260 consistency of the dimensions. For fathers in the current study, they ranged between 0.55  
261 (pressure to eat) and 0.88 (low child food enjoyment), for mothers between 0.49 (permissive  
262 feeding style) and 0.87 (low child appetite). More details are available in Appendix 2.

### 263 2.3.3 Primary analyses

264 Scores were calculated for child eating behaviors and for food parenting practices and styles by  
265 averaging the scores on the corresponding items. Pearson correlations were calculated to  
266 determine the associations between mothers' and fathers' perceptions of their child eating  
267 behaviors. Paired-sample *t*-tests were also performed to study if maternal and paternal ratings  
268 of the child's eating behaviors were significantly different or not. The results indicated that  
269 parental perceptions of their child's eating behaviors were significantly correlated, and no  
270 significant differences in mean scores were observed between mothers and fathers. Therefore,  
271 the scores of the child eating behaviors were averaged between mother-father pairs to create  
272 composite child scores.

273 Then, Pearson correlations were calculated to determine the associations between mothers' and  
274 fathers' feeding practices and styles. Paired-sample *t*-tests were performed to identify  
275 significant differences between maternal and paternal involvement in meals with the child, and  
276 in their feeding practices and styles. Regressions were performed to study the effects of  
277 maternal and paternal feeding practices or styles on each child eating behavior. Each regression

278 model explained one child eating behavior by one food parenting practice or style, namely the  
279 mother's practice or style, the father's practice or style and the interaction between both:

280 Child eating behavior =  $\beta_0 + \beta_1$  practice mother +  $\beta_2$  practice father +  $\beta_3$  interaction practice mother : practice father

281 Mothers' practices and styles were always put upfront in the model as mothers were found to  
282 spend more meals with the child than fathers. The effects of paternal feeding practices were  
283 consequently always adjusted for the maternal effects. When a significant interaction was  
284 found, it was checked that the conclusion did not change if the most influent observation(s) (the  
285 highest absolute df beta value(s)) was/were deleted. If the significance of the interaction was  
286 merely the result of one or a few highly influent observations, the interpretation was finally  
287 based on the model with no interaction. For each child eating behavior, we selected those food  
288 parenting practices and styles we hypothesized to be influential based on previous studies. For  
289 low food enjoyment, food neophobia and food pickiness, the assumed influential practices  
290 were: pressure to eat, family meal setting and the three feeding styles. For EAH and poor eating  
291 compensation ability, these were restriction for health, restriction for weight control, food as  
292 reward and the three feeding styles.

### 293 **3 Results**

#### 294 **3.1 Participants**

295 Both caregivers of 105 children aged 2.01-6.51 years (54 boys and 51 girls, mean age = 3.88  
296 years,  $SD = 1.40$ ) participated in this study. The characteristics of the caregivers can be found  
297 in Table 1. Most children lived with both parents, one child was in a co-parenting situation, and  
298 one child lived with his mother and her partner. This partner filled in the questionnaire as a  
299 father figure, and will always be referred to as "father" in this study.

300

**Table 1.**  
Characteristics of the parents who completed the questionnaire.

	Mothers	Fathers
Number of participants	105	105
Hardcopy/Online participation	79/26	79/26
Age, mean ( <i>SD</i> )	34.52 (4.18)	36.37 (4.95)
Level of education [ratios]		
No diploma	0.02	0.03
A level or a high-school diploma/degree	0.04	0.09
Diploma of higher education or 12 <sup>th</sup> grade	0.12	0.15
Three-year university degree	0.18	0.16
Master's degree or Master 2	0.39	0.35
Higher than a Master 2 (PhD, medical studies)	0.25	0.23
Work status [ratios]		
Working (part-time or full-time)	0.81	0.96
Unemployed, job seeker	0.06	0.02
Student	0.01	0.01
Other (e.g., parental leave, parent at home)	0.13	0.01
Perception of financial situation [ratios]		
You can't make ends meet without going into debt	0.01	0.01
You get by but only just	0.05	0.07
Should be careful	0.16	0.18
It's OK	0.53	0.47
At ease	0.25	0.26

302

### 303 3.2 Concordance in perceptions of child eating behaviors

304 Mother-father pairs perceived their child's eating behaviors similarly (Table 2): strong  
 305 correlations were observed for the child's low appetite ( $r = 0.78$ ), low food enjoyment ( $r =$   
 306  $0.74$ ), food neophobia ( $r = 0.74$ ), and food pickiness ( $r = 0.59$ ). Moderate but significant  
 307 correlations were observed for the child's eating in the absence of hunger ( $r = 0.39$ ) and poor  
 308 eating compensation ability ( $r = 0.34$ ), the two dimensions of self-regulation of eating.  
 309 Additionally, all paired-sample  $t$ -tests indicated no significant differences between fathers' and  
 310 mothers' perception of their child's eating behaviors, highlighting the congruent mother-father  
 311 perception of children's eating behaviors.

312

313 **Table 2.**  
 314 Pearson correlations between mothers and fathers for the dimensions representing child eating behaviors and  
 315 parental feeding practices/styles.

<b>Dimension</b>	<b>Pearson correlation mothers -fathers</b>
<b>Child eating behaviors</b>	
Low appetite	0.78
Low food enjoyment	0.74
Food neophobia	0.73
Food pickiness	0.59
Poor eating compensation ability	0.34
Eating in the absence of hunger	0.39
<b>Parental feeding practices and styles</b>	
Pressure to eat	0.37
Restriction for health	0.46
Restriction for weight control	0.60
Food as reward	0.55
Snacking/flexibility	0.64
Feeding on a schedule	0.50
Family meal setting	0.58
Authoritative feeding style	0.30
Authoritarian feeding style	0.33
Permissive feeding style	0.44

316

### 317 **3.3 Mothers vs. fathers: meals, food parenting practices and styles, feeding related tasks**

318 Paired-sample *t*-tests showed that fathers reported taking significantly fewer meals (breakfast,  
 319 lunch and dinner) with their child than did mothers (Table 3). Meanwhile, they reported higher  
 320 levels of the use of pressure to eat and of food as reward, but a lower level of family meal setting  
 321 than did mothers.

322 When parents in our study were asked if they thought they had similar feeding practices and  
 323 ideas concerning feeding their child as their (ex-)partner, 95% of mothers and 91% of fathers  
 324 responded “Rather yes”. There was a 93% agreement rate between fathers and mothers for this  
 325 question. Furthermore, significant correlations were observed between fathers’ and mothers’  
 326 feeding practices and styles (Table 2). For parental feeding practices, correlations ranged  
 327 between 0.37 (pressure to eat) and 0.64 (food as reward); for parental feeding styles, they ranged  
 328 between 0.30 (authoritative style) and 0.44 (permissive/indulgent style).

329 The agreement between mothers and fathers was high for their answers regarding the division  
 330 of the feeding related tasks: they had an agreement rate of 86% for food shopping, of 78% for

331 cooking, and of 78% for eating with the child. In approximately half of the households, mothers  
 332 were mainly responsible for cooking (in 53% of households according to mothers; in 47%  
 333 according to fathers), in some households, fathers were mainly responsible for cooking (in 14%  
 334 of households according to mothers; in 18% according to fathers), and in some it was a shared  
 335 responsibility (in 33% of households according to mothers; in 36% according to fathers). Eating  
 336 with the child **was a shared responsibility in most households** (in 76% of households according  
 337 to both mothers and fathers). It was mainly the mother or both parents at equal parts who were  
 338 responsible **for grocery shopping** (in respectively 45% and 37% of households according to  
 339 mothers, 41% and 42% according to fathers).

**Table 3.**

Number of meals **taken with the child**, and food parenting practices and styles: means, standard deviations, and significance levels of differences between mothers and fathers (paired-sample *t*-tests).

	Mothers			Fathers	
Number of meals (0-7), mean (SD)					
Number of breakfasts per week	5.42	(1.97)	***	4.22	(2.18)
Number of lunches per week	3.15	(1.67)	**	2.68	(1.41)
Number of dinners per week	6.10	(1.50)	*	5.76	(1.78)
Food parenting practices and styles (scores between 1-5), mean (SD)					
Pressure to eat	2.53	(1.06)	*	2.79	(1.00)
Restriction for health	3.07	(1.00)		3.10	(0.91)
Restriction for weight control	1.67	(0.72)		1.75	(0.75)
Food as reward	1.67	(0.65)	**	1.86	(0.78)
Snacking/flexibility	1.95	(0.58)		1.97	(0.64)
Feeding on a schedule	4.33	(0.67)		4.30	(0.72)
Family meal setting	4.49	(0.74)	*	4.33	(0.85)
Authoritative feeding style	3.33	(0.61)		3.30	(0.53)
Authoritarian feeding style	2.15	(0.72)		2.23	(0.74)
Permissive feeding style	2.07	(0.62)		2.03	(0.64)

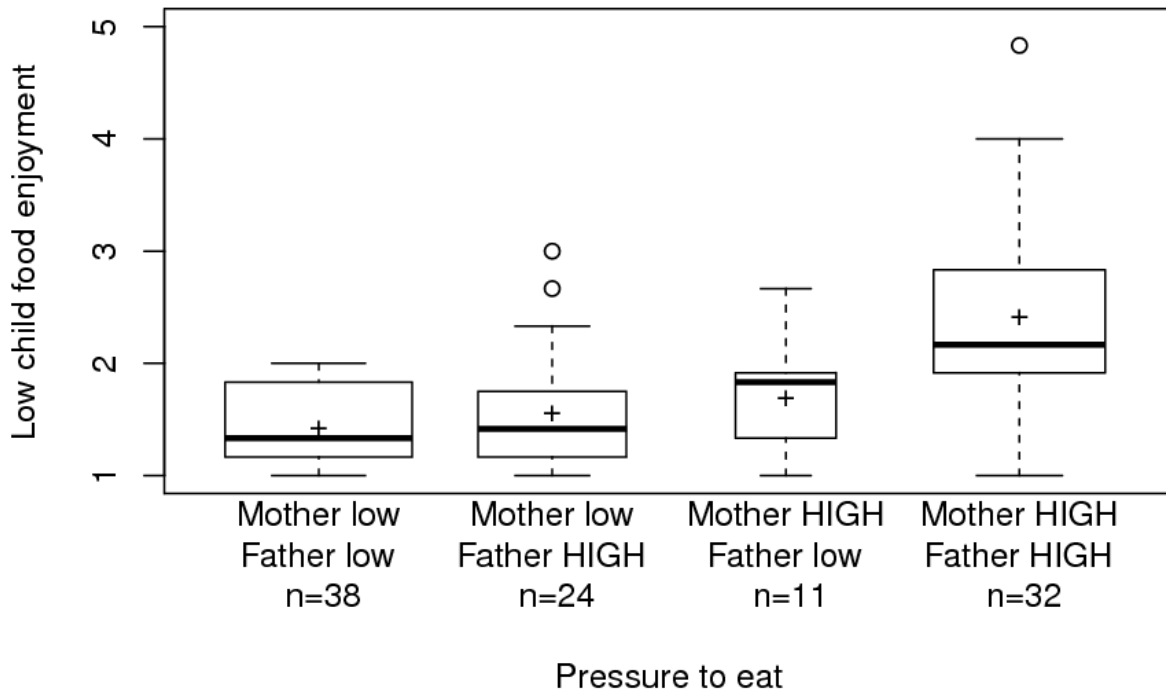
Significance levels: \* $p < 0.05$ ; \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### 340 3.4 Effects of food parenting practices and styles on child eating behaviors

#### 341 3.4.1 Explaining child low food enjoyment

342 Maternal pressure to eat ( $F(1, 101) = 66.31, p < 0.001$ ), paternal pressure to eat ( $F(1, 101) =$   
 343  $9.30, p < 0.01$ ), and the interaction between maternal and paternal pressure to eat ( $F(1, 101) =$   
 344  $13.55, p < 0.001, \beta = 0.17$ ) all significantly predicted low food enjoyment in the child. More  
 345 pressure to eat was linked to a lower food enjoyment in the child, and this effect was even  
 346 significantly larger than expected if the effects were additive when both mother and father used  
 347 higher levels of pressure to eat (Fig. 1 illustrates this result).

348 Mothers who were more authoritarian also reported having children with a lower food  
 349 enjoyment and a parental interaction effect was initially found. However, neither the mother  
 350 effect nor the interaction effect remained significant after removing the most influent  
 351 observation ( $F(1, 99) = 1.30, p = 0.26$ ;  $F(1, 99) = 0.76, p = 0.39$ ) respectively).  
 352 The other regressions (effects of family meal setting, authoritative style and permissive style)  
 353 resulted in non-significant results.



354  
 355 **Fig. 1** Boxplots illustrating the links between the child’s low food enjoyment and maternal and  
 356 paternal pressure to eat. Median splits were used to divide mothers and fathers in high scoring  
 357 and low scoring groups on pressure to eat. The higher the number of observations, the larger  
 358 the boxes.

359  
 360 **3.4.2 Explaining child food pickiness**

361 For the models explaining child food pickiness, no mother-father interaction was observed.  
 362 Meanwhile, higher maternal pressure to eat ( $F(1, 101) = 14.23, p < 0.001$ ) and higher  
 363 permissiveness in mothers ( $F(1, 100) = 14.42, p < 0.001$ ) were linked to more food pickiness.  
 364 The other regressions (effects of family meal setting, authoritarian style and authoritative style)  
 365 resulted in non-significant results.

### 366 3.4.3 Explaining child food neophobia

367 Higher maternal pressure to eat ( $F(1, 101) = 21.12, p < 0.001$ ) and higher maternal  
368 authoritarianism ( $F(1, 100) = 9.45, p = 0.003$ ) were linked to more food neophobia. Higher  
369 levels of family meal setting in mothers predicted less food neophobia ( $F(1, 100) = 17.09, p <$   
370  $0.001$ ). Fathers who were more authoritative were found to have children being significantly  
371 less neophobic ( $F(1, 101) = 4.76, p = 0.031$ ). It is interesting to note that higher paternal pressure  
372 to eat ( $F(1, 101) = 9.06, p = 0.003$ ) also significantly predicted higher child food neophobia,  
373 but only when it was not adjusted for the effect of maternal pressure to eat (adjusted for the  
374 mother's effect:  $F(1, 101) = 2.02, p = 0.158$ ). **No significant effect of maternal or paternal**  
375 **permissive style or an interaction effect was observed.**

### 376 3.4.4 Explaining child eating in the absence of hunger

377 For the models explaining children's eating in the absence of hunger (EAH), restriction for  
378 health, restriction for weight control, and authoritative feeding style were significant predictors.  
379 Regarding restriction for health, both mothers' ( $F(1, 101) = 22.56, p < 0.001$ ) and fathers' ( $F(1,$   
380  $101) = 9.48, p = 0.003$ ) restriction significantly predicted higher levels of eating in the absence  
381 of hunger in the child. There was no significant interaction effect.

382 For the model with restriction for weight control, a significant interaction was initially found.  
383 After deletion of four observations that showed a high df beta measure of influence regarding  
384 the interaction, the interaction was found to be no longer significant. Without these four  
385 influential observations, only mothers' restriction for weight control ( $F(1,97) = 6.14, p = 0.01$ )  
386 significantly predicted higher levels of EAH in children.

387 Lastly, mothers who were more authoritative reported children expressing more EAH ( $F(1,$   
388  $101) = 7.79, p = .006$ ). Although no maternal effect of food as reward on EAH was observed,  
389 it is interesting to note that a paternal effect of food as reward on EAH was observed ( $F(1, 101)$   
390  $= 5.14, p = 0.026$ ), but only when not adjusted for maternal effect.

391 The other regressions (**effects of authoritarian style and permissive style**) resulted in non-  
392 significant results.

### 393 3.4.5 Explaining child eating compensation ability

394 No significant predictors were found for children's eating compensation ability.

## 395 4 Discussion

396 With data from both parents of 105 children, this study first mapped the division of feeding  
397 related tasks in French families and the number of meals fathers and mothers take with their  
398 children. Then, gender differences in food parenting practices and in parental perceptions of the



399 child's eating behaviors were explored. Finally, associations between maternal and paternal  
400 feeding practices and child eating behaviors, and possible effects of concordant/discordant  
401 feeding practices in families were assessed.

402 First, the results indicated that even though fathers in this sample took significantly less meals  
403 with their children than mothers, they still take on average six dinners and four breakfasts a  
404 week with their child. Both fathers and mothers take only a few lunches a week with their child,  
405 which is not surprising knowing that between 50-70% of French preschoolers frequently take  
406 their lunch at school (Math, 2019). When children are taking their meals at home, they are thus  
407 often accompanied by both their parents, especially in the evening. Our questions regarding the  
408 division of feeding-related tasks confirm this: in most households, mothers and fathers stated  
409 that they were equally responsible for eating with the child (76%). Approximately half of the  
410 fathers were also either equally (35%) or mainly responsible for cooking (15%). For food  
411 shopping, it was mainly both parents who were responsible at equal parts (in approx. 40% of  
412 households) or only the mother (in approx. 40% of households). Taken together, these results  
413 show that many fathers in France take an active part in feeding their child or eating with them,  
414 and thus highlight the importance of including them in research related to food parenting  
415 practices. This was previously also highlighted by researchers in the United States (Jones &  
416 Mosher, 2013) and in Australia (Mallan et al., 2014), as they found that many fathers have daily  
417 meals with their child, and that many are responsible for organizing meals for their  
418 preschoolers.

419 Since most parents reported that they are equally responsible for eating with their child, and are  
420 both present at many eating occasions together, we can assume they share the same experiences.  
421 This might explain why we found moderate to high correlations between fathers' and mothers'  
422 perceptions of their child's eating behaviors. Pearson correlations were especially high for child  
423 low appetite, low food enjoyment, food neophobia, and food pickiness ( $r$ 's between 0.59 and  
424 0.78), corresponding to the correlation found by Harris and colleagues (2018) for mother-father  
425 reports of child food fussiness ( $r = 0.74$ ). In the present study, Pearson correlations were lower  
426 for mother-father perceptions of the child's eating in the absence of hunger and low eating  
427 compensation ability ( $r = 0.39$  and  $0.34$ ), two facets of children's self-regulation of eating. We  
428 assume that it could be possible that parents find it more difficult to evaluate (and thus agree  
429 on) children's ability to self-regulate because this is based on children's inner sensations of  
430 hunger and satiety, which may not always be easy to read, especially among very young  
431 children with limited verbal abilities. Another possible explanation is that parents highly limit  
432 situations where children have free access to preferred foods after mealtimes or situations in

433 which children eat something just before the meal. Therefore, parents are less likely to be  
434 exposed to situations in which they could observe the expression/behavior of children's  
435 regulation of food intake. In this study, the mean scores of restriction for health (limiting  
436 unhealthy foods the child likes) and feeding on a schedule (eating at set times) were quite high,  
437 which could support that parents highly limit the previously described situations and are thus  
438 less exposed to observing their child's self-regulation capacities. Finally, we can also  
439 hypothesize that French parents are more attentive to "qualitative" aspects of their child's  
440 eating, like their food pleasure and food rejections/ food diversity because they represent  
441 important values in the French food culture (Ducrot, Méjean, Bellisle, Allès, Hercberg, Péneau,  
442 2019; Riou, Lefèvre, Parizot, Lhuissier, Chauvin, 2015). In contrast, "quantitative" aspects of  
443 eating, such as self-regulation of food intake and portion sizes, are less embedded in the French  
444 food culture and receive far less attention in nutritional recommendations. Parents may thus be  
445 less attentive to these "quantitative" aspects and may experience more difficulties in adopting  
446 an attitude towards them and in deciding what values or behaviors to pass on to their child.  
447 Unlike the studies of Blissett and Haycraft (2008; 2011), but in accordance with other studies  
448 (Daniels et al., 2020; Hendy et al., 2009; Loth et al., 2013; Tschann et al., 2013), we found that  
449 French fathers reported using significantly more pressure to eat for their child than mothers.  
450 They also reported using significantly more food rewards than mothers (as in the study of Harris  
451 et al., 2018). Fathers also reported lower levels of the practice "family meal setting" than  
452 mothers (i.e., the child eats the same meals as the rest of the family). However, it must be noted  
453 that the mean score of both mothers and fathers for this practice was very high (4.49 and 4.33  
454 respectively, on a scale from 1-5). Pressure to eat and food rewards are both coercive control  
455 practices and have often been associated with less favorable child eating behaviors and  
456 outcomes (e.g., Galloway, Fiorito, Francis, Birch, 2006; Monnery-Patris et al., 2019). Our study  
457 seems to confirm this, as we found that higher levels of maternal and/or paternal pressure to eat  
458 were significantly linked to less favorable eating behaviors in children (higher levels of food  
459 pickiness and food neophobia, and lower levels of food enjoyment). A higher use of food as  
460 reward in fathers was linked to more eating in the absence of hunger in the child. Restriction,  
461 another coercive control practice, and a permissive or authoritarian feeding style in mothers  
462 were also linked to less favorable eating behaviors in children. On the contrary, an authoritative  
463 feeding style in fathers was found to be linked to less child food neophobia. The review of  
464 Vollmer and Mobley (2013) previously identified the authoritative feeding style as the most  
465 protective feeding style for the child, but stressed the need for studies with fathers. Our results  
466 seem to confirm that, also in fathers, the authoritative feeding style has a protective function.

467 Finally, the practice family meal setting in mothers was found protective against child food  
468 neophobia, which may confirm that it is of importance that parents decide on what the child  
469 eats (Satter, 1990; Vaughn et al., 2016) but also that food acceptance in young children is  
470 stimulated by seeing others eating the same foods (Addessi, Galloway, Visalberghi, Birch,  
471 2005). Overall, we found that **several links between child eating behaviors and paternal feeding**  
472 **practices or styles were significant and still significant even** after controlling for the effect of  
473 maternal feeding practices or styles, confirming the need for studying both mothers' and  
474 fathers' food parenting practices in relation to child eating behaviors.

475 Following the results of Harris and colleagues (2018), we further hypothesized that families  
476 where one or both parents use coercive practices would report more problematic eating  
477 behaviors in the child. We could not replicate Harris and colleagues' results regarding child  
478 food fussiness/pickiness; *i.e.*, that concordant low levels of persuasive feeding (**a construct**  
479 **linked to pressure to eat**) in parents are linked to less food fussiness. **This is** possibly due to the  
480 selection of different measures, **to the** statistical method, **and/or** to our smaller sample size. In  
481 our study, we only found one interaction effect: for the link between parental pressure to eat  
482 and child food enjoyment. When both parents used higher levels of this coercive feeding  
483 practice, lower levels of food enjoyment were observed in the child.

484 Even though we only found one interaction effect, our results support what Harris and  
485 colleagues suggested: that it is important to encourage a lower use of coercive, nonresponsive  
486 food practices in both mothers and fathers. Both parents should be included in feeding  
487 interventions in order to create an optimal eating environment for the child.

## 488 **5 Strengths and limitations**

489 An important strength of this study is the inclusion of both mothers and fathers. Literature  
490 reviews examining fathers' role in feeding highlighted the key role of fathers in influencing  
491 child eating behaviors and the need for more studies with fathers (reviews of Khandpur et al.,  
492 2014; Litchford et al., 2020). The separate questionnaires we used for fathers and mothers made  
493 it possible to obtain information on fathers' independent view on their child's eating behaviors,  
494 their own feeding practices, and the division of the feeding related tasks in the household. This  
495 is a valuable addition to the research where maternal feeding practices and their effects were  
496 often exclusively assessed or used as proxy for both parents. Moreover, to our knowledge, there  
497 are currently almost no studies investigating paternal feeding practices in France (except e.g.,  
498 Musher-Eizenman et al., 2009) and no French studies examining the links between these  
499 paternal practices and child eating behaviors. For a more comprehensive understanding, we

500 think it is important to conduct studies on fathers and feeding in different countries and contexts  
501 because cultural differences exist with regard to eating habits, food attitudes (e.g., Rozin,  
502 Fischler, Imada, Sarubin, Wrzesniewski, 1999; Rozin, Kurzer, Cohen, 2002) and to food  
503 parenting practices (Musher-Eizenman et al., 2009; Schwartz, Madrelle, Vereijken, Weenen,  
504 Nicklaus, Hetherington, 2013). We think that our results are therefore also a valuable addition  
505 to studies on fathers in other countries than France.

506 A limitation of this study, however, is its cross-sectional design, limiting the findings to mere  
507 associations between food parenting practices and styles and child eating behaviors.  
508 Longitudinal studies are needed to study the causality of these relationships. Recent literature  
509 suggests that the relationships between child eating behaviors and parental feeding practices  
510 are likely to be bi-directional (e.g., Jansen, de Barse, Jaddoe, Verhulst, Franco, Tiemeier, 2017;  
511 Mallan, Jansen, Harris, Llewellyn, Fildes, Daniels, 2018). Furthermore, maternal and paternal  
512 feeding practices and styles were self-reported here and may be subject to social desirability  
513 bias even though the questionnaires were anonymous. Children's eating behaviors were also  
514 parent-reported and thus reflected parental perceptions of these behaviors. Powell and  
515 colleagues (2018) questioned the validity of parental reports of food parenting practices in their  
516 study as they could not validate these reports with independent observations. Haycraft and  
517 Blissett (2008) found that fathers', but not mothers' self-reports of mealtime practices were  
518 reliable. On the other hand, Powell and colleagues (2018) validated parental reports of  
519 children's eating behaviors in their study. This is supported by the high concordances between  
520 fathers and mothers' independent reports we found in our study. **Further, Cronbach's alphas**  
521 **were below 0.60 for the dimensions pressure to eat ( $\alpha = 0.55$  for both mothers and fathers),**  
522 **authoritative feeding style (0.58 for fathers) and permissive feeding style (0.49 for mothers),**  
523 **indicating a weak internal reliability.** Lastly, it must be noted that the sample size in our study  
524 was not very large and the sample included many high-educated parents. The parents who  
525 (voluntarily) filled in the questionnaire were possibly also those fathers and mothers who are  
526 generally interested and involved in feeding, and may already pay attention to their feeding  
527 practices. This makes it difficult to draw comprehensive and representative conclusions.  
528 Nevertheless, our results are coherent with results and ideas that have been reported in previous  
529 studies.

## 530 **6 Conclusions and perspectives**

531 This study showed that mothers and fathers perceived their child's eating behaviors in similar  
532 ways, and that both maternal and paternal feeding practices and styles were significant

533 predictors for child eating behaviors. Fathers reported using significantly more pressure to eat  
534 and food as reward than mothers, two practices that were associated with less favorable eating  
535 behaviors in children. Moreover, when both parents used higher levels of pressure to eat, the  
536 effect on child low food enjoyment was stronger than a simple additive effect. Overall, our  
537 findings underline the importance of studying the individual role of each parent in child feeding  
538 research, and that it is important that both mothers and fathers avoid the use of coercive feeding  
539 practices at home. This may have implications for future studies, interventions and  
540 recommendations: they should strive to focus on both parents in order to create an optimal  
541 eating environment for the child.

542 More research is recommended: studies with bigger sample sizes and more diverse populations  
543 are needed to draw more comprehensive conclusions. Studies investigating feeding coparenting  
544 among parents (i.e., how mothers and fathers cooperate with regard to feeding their child; Tan,  
545 Domoff, Peschn Lumeng, Miller, 2019; Tan, Lumeng, Miller, 2019) but also studies with  
546 divorced/separated parents can be of interest. Furthermore, it is important to keep in mind that  
547 including fathers in feeding research and interventions can be challenging (e.g., Jansen, Harris,  
548 Daniels, Thorpe, Rossi, 2018). There is an urgent need for targeted recruitment strategies,  
549 tailored intervention messages and materials, and validated outcome measures and methods. It  
550 is essential to find ways to engage fathers and to account for diversity among fathers (Daniels  
551 et al., 2020; Peeters, Davison, Ma, Haines, 2019).

## 552 **Acknowledgements**

553 The authors would like to thank all parents who participated in the study, as well as the schools,  
554 childcare centers, and contacts in France that helped recruiting these parents. They also thank  
555 the ChemoSens platform, and especially Betty Hoffart for assistance with data entering.

## 556 **Authors Contributions**

557 KP, SI and SM-P conceptualized the study. KP and CC conducted all analyses. KP drafted a  
558 first version of the manuscript, all authors thereafter contributed to editing the manuscript. All  
559 authors read and approved the final version of the manuscript.

## 560 **Funding sources**

561 This work was supported by the European Union's horizon 2020 research and innovation  
562 program (Marie Skłodowska-Curie grant agreement No 764985: EDULIA project).

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