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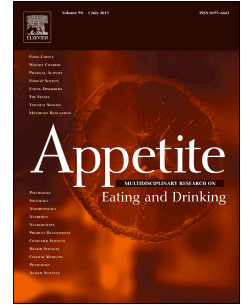
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Using food to soothe: Maternal attachment anxiety is associated with child emotional eating

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13 Attachment anxiety (fear of abandonment) is associated with disinhibited eating in adults. Both
14 maternal disinhibited eating and use of emotional feedings strategies are associated with
15 emotional eating in children. On this basis, the current study sought to determine whether
16 attachment anxiety is an underlying maternal characteristic that predicts parental reports of child
17 emotional over-eating via its effects on maternal disinhibited eating and emotional feeding.
18 Mothers of a preadolescent child ($N = 116$) completed an internet-delivered questionnaire.
19 Maternal attachment anxiety and dietary disinhibition were assessed by the Experiences in Close
20 Relationships questionnaire and the Three Factor Eating Questionnaire, respectively. The
21 Parental Feeding Strategies Questionnaire and the Child Eating Behaviour Questionnaire were
22 used to quantify emotional feeding and child emotional over-eating, respectively. Bias-corrected
23 bootstrapping indicated a significant direct effect of maternal attachment anxiety on child
24 emotional over-eating (*i.e.*, controlling for maternal disinhibited eating and emotional feeding).
25 There was also a significant indirect effect of maternal attachment anxiety on child emotional
26 over-eating via emotional feeding strategies. In a subsequent model to investigate bi-directional
27 relationships, the direct effect of maternal attachment anxiety on emotional feeding strategies
28 was not statistically significant after controlling for child emotional over-eating. There was,
29 however, a significant indirect effect of maternal attachment anxiety on emotional feeding
30 strategies via child emotional over-eating. These findings highlight the influence of maternal
31 attachment anxiety on parental reports of aberrant eating behaviour in children. While this may
32 be partly due to use of emotional feeding strategies, there is stronger evidence for a “child-
33 responsive” model whereby anxiously-attached mothers use these feeding practices in response
34 to perceived emotional over-eating in the child.

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39 Attachment orientation refers to a representational model of personal relationships that is
40 usually abstracted from early interactions with caregivers (Bowlby, 1969). Attachment
41 orientations are conceptualised in terms of two orthogonal dimensions; anxiety about
42 abandonment and avoidance of intimacy (Brennan, Clark, & Shaver, 1998). Anxiously-attached
43 individuals are thought to have an impaired ability to internally regulate emotion in response to
44 distress (Mikulincer & Florian, 1998), which may lead them to rely on external sources of
45 comfort such as consuming food (Maunder & Hunter, 2001). Consistent with this prospect,
46 previous research indicates that attachment anxiety in adults is associated with the general
47 propensity to over-eat (*i.e.*, disinhibited eating) (Wilkinson, Rowe, Bishop, & Brunstrom, 2010).
48 This disinhibited behaviour may be the result of a specific affect regulation strategy that is
49 employed by anxiously-attached individuals to alleviate negative emotional states.

50 The tendency to eat in response to negative emotions (*i.e.*, emotional over-eating) has
51 also been found in young children (Carper, Fisher, & Birch, 2000). This is cause for concern
52 because emotional over-eating in children is associated with greater caloric intake and obesity
53 (Braet & Van Strien, 1997). Emotional over-eating is likely to be a learned behaviour that is
54 transmitted to the child via interactions with parents or caregivers and this process may occur
55 through various pathways. First, children might model parental or caregiver disinhibited eating.
56 In support of this “role-modelling” hypothesis, studies have shown that maternal disinhibited
57 eating is associated with disinhibited eating and overweight status in the child (Cutting, Fisher,
58 Grimm-Thomas, & Birch, 1999; de Lauzon-Guillain et al., 2009; Zocca et al., 2011).

59 Second, parents may “teach” children to emotionally eat via use of emotional feeding
60 strategies. This is where the parent offers food when the child is anxious, angry or upset. There is

62 emotional eating (Blissett, Haycraft, & Farrow, 2010; Rodgers et al., 2013; Rodgers et al., 2014).
63 For example, Blissett et al. (2010) found that children whose mothers often used emotional
64 feeding strategies ate more chocolate in response to a negative mood induction than children
65 whose mothers used this feeding practice infrequently. Emotional feeding strategies are likely to
66 serve a variety of functions; however, one possibility is that offering food for emotion regulation
67 may increase interpersonal closeness between parent and child (Hamburg, Finkenauer, &
68 Schuengel, 2014).

69 Third, parents might feed their children in the same way that they feed themselves.
70 Wardle et al. (2002) found that mothers with high emotional eating scores reported higher levels
71 of emotional feeding. In addition, the association between parent and child emotional eating was
72 found to be mediated by emotional feeding (Tan & Holub, 2015). Furthermore, negative affect in
73 mothers (depression, anxiety and stress) has recently been shown to predict maternal emotional
74 eating and, in turn, use of emotional feeding strategies and child emotional eating (Rodgers et al.,
75 2014).

76 Given that attachment anxiety tends to be associated with disinhibited eating,
77 interpersonal insecurity and negative affect, it may be an underlying maternal characteristic that
78 predicates use of emotional feeding strategies and child emotional eating. This possibility has not
79 been previously investigated; however, it is consistent with recent evidence that insecure
80 caregiver-child attachment is associated with high-calorie food intake in preadolescent children
81 (Faber & Dube, 2015). On this basis, the current study sought to determine whether there is an
82 association between maternal attachment anxiety and emotional over-eating in the child.
83 Specifically, it examined whether the relationship would be explained by one or more of the

107 study protocol was approved by the university's Human Research Ethics Committee.

108 *Measures*

109 Maternal attachment anxiety was quantified using the 18-item attachment anxiety
110 subscale from the Experiences in Close Relationships (ECR) questionnaire (Brennan, et al.,
111 1998). On a seven-point scale ranging from 'disagree strongly' (1) to 'agree strongly' (7),
112 participants rated their level of agreement with statements about their experiences of
113 interpersonal relationships (*e.g.*, "I worry a lot about my relationships"). The attachment anxiety
114 scale score was obtained by calculating the mean response on all items comprising the scale
115 (minimum score = 1, maximum = 7). In the current sample, Cronbach's α for the anxiety scale
116 was 0.93. It is to be noted that the ECR measures global attachment orientation (general
117 approach to relationships), as opposed to specific attachment orientation (approach to a particular
118 relationship).

119 Maternal disinhibited eating was assessed using the 16-item disinhibition subscale of the
120 Three Factor Eating Questionnaire (TFEQ) (Stunkard & Messick, 1985). Items on this subscale
121 refer to over-eating and loss of dietary control, for example "When I feel anxious, I find myself
122 eating". The disinhibited eating scale score was obtained by summing the responses of all items
123 comprising the scale (minimum score = 0, maximum = 16). Cronbach's α for the current sample
124 was 0.83.

125 Maternal use of emotional feeding strategies was assessed using the Parental Feeding
126 Strategies Questionnaire (PFSQ) (Wardle, et al., 2002). This 27-item instrument assesses
127 parental use of feeding strategies in relation to four scales (Instrumental feeding, Control,
128 Emotional feeding, Encouragement). Responses on the Emotional Feeding scale only (*e.g.*, "I

130 examined in the current study. For each item, the response options were “Never; Rarely;
131 Sometimes; Often; Always”. The Emotional Feeding scale score was obtained by calculating the
132 mean response on all items comprising the scale (minimum score = 1, maximum = 5).
133 Cronbach’s α for the current sample was 0.70.

134 Child emotional eating was assessed using the parent-reported Child Eating Behaviour
135 Questionnaire (CEBQ) (Wardle, Guthrie, Sanderson, & Rapoport, 2001). This 35-item
136 instrument assesses eight dimensions of eating style in children, however only responses on the
137 Emotional Over-eating scale (*e.g.*, “My child eats more when worried”) were examined in the
138 current study. For each item, the response options were “Never; Rarely; Sometimes; Often;
139 Always”. The Emotional Over-eating scale score was obtained by calculating the mean response
140 on all items comprising the scale (minimum score = 1, maximum = 5). Cronbach’s α for the
141 current sample was 0.83.

142 *Procedure*

143 Participants who expressed an interest in the study were provided with the website
144 address of the internet-delivered questionnaire. Before beginning the questionnaire, they
145 provided informed consent by ticking a checkbox. Participants first provided basic descriptive
146 information about themselves and their child (age, gender, height, weight). As a proxy measure
147 of socio-economic status, they also indicated their highest level of educational attainment (None,
148 GCSE/equivalent, BTEC/NVQ/Diploma, A-level/ equivalent, University degree, Other) (Clark et
149 al., 2008). Participants then went on to complete, in chronological order, the ECR, the TFEQ, the
150 PFSQ and the CEBQ (each of these was presented on a separate webpage). The final screen
151 thanked participants for completing the questionnaire and gave them the option to provide their

153 approximately 20 minutes. The website was coded in XHTML and PHP. Responses were stored
154 and questionnaire scale scores were automatically coded in preparation for analysis.

155 *Statistical Analyses*

156 Only participants who completed the questionnaire in its entirety were included in the
157 analysis ($n = 77$). Pearson's correlation coefficients were computed between the main variables
158 of interest. Maternal reports of child height and weight were converted to BMI z-scores using the
159 World Health Organisation AnthroPlus software (<http://www.who.int/growthref/tools/en/>).
160 Hypothesised indirect effects were analysed using PROCESS (Hayes, 2012). In order to
161 standardise the measurement scales, all variables were log-transformed prior to running the
162 mediation analyses. Firstly, a serial multiple mediation analysis was conducted; the independent
163 variable (IV) was maternal attachment anxiety, the dependent variable (DV) was child emotional
164 over-eating, and the mediators were maternal disinhibition (M1) and emotional feeding (M2).
165 Secondly, in order to test the alternative hypothesis, a simple mediation analysis was conducted
166 to investigate the hypothesised bi-directional relationship (*i.e.*, that maternal anxiety (IV) affects
167 emotional feeding strategies (DV) via its effects on child emotional eating (M)). PROCESS
168 compares the magnitude of the direct effect (IV-DV; controlling for the mediators) with the total
169 effect of the IV on the DV including the indirect pathway via the mediators. It produces bias-
170 corrected bootstrap confidence intervals for indirect effects via individual mediators and for the
171 serial effect of the two mediators in the serial mediation model. A significant indirect effect is
172 inferred by upper and lower confidence intervals that do not include zero.

174 Descriptive characteristics of the final included sample ($n = 77$) are shown in Table 1.

175 Half of the children (51%) were female.

176 The inter-correlations between the key variables are shown in Table 2. With regard to
177 relationships between the questionnaire measures, all correlation coefficients were statistically
178 significant ($p < .05$), with the exception of that between maternal attachment anxiety and
179 maternal disinhibited eating. Maternal BMI was significantly and positively correlated with
180 maternal disinhibition, use of emotional feeding strategies, child emotional over-eating and child
181 BMI z-score. Child BMI z-score also correlated significantly and positively with maternal
182 attachment anxiety and child emotional over-eating.

183 *Effect of maternal attachment anxiety on child emotional over-eating via maternal disinhibited*
184 *eating and emotional feeding strategies (Figure 2)*

185 The serial multiple mediation model indicated a significant total effect of maternal
186 attachment anxiety on child emotional over-eating, $b(SE) = .32 (.10)$, $p = .002$. With regard to
187 the indirect pathways, there was a significant indirect effect of maternal attachment anxiety on
188 increased child emotional over-eating via emotional feeding strategies (*i.e.*, pathway ii. in Figure
189 1); $b(SE) = .08 (.05)$, 95%CI = .013 to .212. There were no other significant indirect effects
190 (pathway i. via maternal disinhibited eating, $b(SE) = .01 (.02)$, 95%CI = -.013 to .071; pathway
191 iii via maternal disinhibited eating and emotional feeding strategies operating in series, $b(SE) =$
192 $.01 (.01)$, 95%CI = -.007 to .033). Notably, the direct effect of maternal attachment anxiety on
193 child emotional over-eating remained statistically significant after controlling for the indirect
194 effects, $b(SE) = .22 (.10)$, $p = .02$, suggesting that emotional feeding strategies only partially
195 mediate the effect of maternal attachment anxiety on child emotional over-eating.

198 The simple mediation analysis indicated a significant total effect of maternal attachment
199 anxiety on emotional feeding strategies, $b(SE) = .21 (.08)$, $p = .01$. There was a significant
200 indirect effect of maternal attachment anxiety on increased emotional feeding strategies via child
201 emotional over-eating, $b(SE) = .09 (.04)$, 95%CI = .030 to .205. Notably, the direct effect of
202 maternal attachment anxiety on emotional feeding strategies was no longer statistically
203 significant after controlling for the indirect effect, $b(SE) = .11 (.08)$, $p = .16$, suggesting that
204 child emotional over-eating fully mediated the effect of maternal attachment anxiety on
205 emotional feeding strategies.

208 To our knowledge, this is the first study to consider a potential link between a mother's
209 global representational model of close personal relationships (*i.e.*, dispositional attachment
210 orientation) and eating behaviour in the child. The key finding was that maternal attachment
211 anxiety was associated with reports of child emotional over-eating. Taken together, these
212 findings highlight attachment anxiety as a previously-unconsidered maternal characteristic that
213 may underpin aberrant eating behaviour in children.

214 The findings also provide insight into potential mechanisms by suggesting that the
215 relationship between maternal attachment anxiety and child emotional over-eating was, in part,
216 explained by maternal use of emotional feeding strategies. Specifically, anxiously-attached
217 mothers were more likely to use emotional feeding strategies with their children which, in turn,
218 were associated with increased child emotional over-eating (pathway ii. in our model).
219 Attachment anxiety relates specifically to a fear of abandonment and one possibility is that
220 anxiously-attached mothers use emotional feeding strategies in order to feel closer to their child.
221 This may occur via emphatic emotion regulation (Hamburg, et al., 2014); specifically, offering
222 food in times of distress may act as a means to increase positive affect for both the recipient and
223 the provider. In addition, the sharing of food resources may increase interpersonal closeness
224 (Hamburg, et al., 2014). An alternative possibility is that anxiously-attached mothers feel less
225 competent in their parenting role. This could be relevant because, in a previous study, mothers
226 who rated themselves as low on parenting self-efficacy were more likely to use food to soothe
227 their child's distress (Stifter, Anzman-Frasca, Birch, & Voegtline, 2011).

228 However, the above finding is qualified by the subsequent observation that there was a
229 relatively more robust indirect effect of maternal attachment anxiety on emotional feeding

231 on emotional feeding was no longer significant after controlling for child emotional over-eating).

232 In line with our alternative hypothesis, this suggests that anxiously-attached mothers use

233 emotional feeding strategies primarily *in response to* their child's emotional over-eating. This

234 result is consistent with previous research which indicates that maternal choice of feeding

235 practice is "child responsive" (Rodgers, et al., 2013; Webber, et al., 2010). The reason for the

236 direct association between maternal attachment anxiety and child emotional over-eating (*i.e.*, the

237 direct effect in Figure 2) remains to be determined. One possibility is that insecure child

238 attachment is the intervening variable. There is evidence for transmission of attachment from

239 mothers to children (Benoit & Parker, 1994; Hautamäki, Hautamäki, Neuvonen, & Maliniemi-

240 Piispanen, 2009). Furthermore, child attachment insecurity (towards parents specifically) has

241 been associated with high-calorie food intake, loss of control over eating, and eating pathology

242 (Faber & Dube, 2015; Goossens, Braet, Bosmans, & Decaluwe, 2011; Goossens, Braet, Van

243 Durme, Decaluwe, & Bosmans, 2012). On this basis, it would be informative for future studies in

244 this area to include a measure of child attachment orientation, for example, by using the 'strange

245 situation' paradigm (Ainsworth & Bell, 1970) or, for older children, the Child Attachment

246 Interview (Target, Fonagy, & Shmueli-Goetz, 2003).

247 It was additionally predicted that the association between maternal attachment anxiety

248 and child emotional over-eating would be mediated by maternal disinhibited eating (pathway i.

249 in our model); however, the results provide little evidence for this role-modelling hypothesis. In

250 addition, there was little evidence for an association mediated by maternal disinhibited eating

251 and emotional feeding operating in series (pathway iii. in our model). Maternal disinhibited

252 eating, emotional feeding and child emotional over-eating were positively inter-correlated,

254 2014; Wardle, et al., 2002); though maternal disinhibited eating was no longer directly associated
255 with child emotional over-eating in the model.

256 According to attachment theory, anxiously-attached individuals are inclined to use
257 external affect regulators, such as food, due to an impaired ability to internally regulate emotion
258 (Maunder & Hunter, 2001; Mikulincer & Florian, 1998). Contrary to this perspective, and
259 previous empirical findings (Wilkinson, et al., 2010), there was no significant association
260 between maternal attachment anxiety and maternal disinhibited eating in this sample of mothers.
261 It is possible that alternative affect regulation strategies were being used, such as consuming
262 alcohol and smoking tobacco (Maunder & Hunter, 2001); however the occurrence of such
263 behaviours was not assessed in the current study. In addition, it may be important to differentiate
264 between affect regulation in response to negative emotions *per se* and a more specific form of
265 affect regulation in which eating increases felt security (Gibson, 2012). The latter appears more
266 relevant to anxiously-attached individuals and, on this basis, future studies might consider
267 applying existing measures of felt security (Luke, Sedikides, & Carnelley, 2012) to the current
268 context.

269 The current study also found that parent reports of child emotional over-eating correlated
270 significantly with child BMI z-score. This association has been found in some studies (Braet &
271 Van Strien, 1997) but not in others (Braden et al., 2014). In addition, the positive correlation
272 between maternal attachment anxiety and child BMI z-score is a novel finding that warrants
273 further attention. However, it is important to exercise caution when interpreting these results
274 given that the data are parent reports of child height and weight which may be prone to bias and
275 inaccuracies. Future research should seek to replicate these associations using objective measures

277 on parental reports of their own eating behaviour, feeding strategies and their child's eating
278 behaviour. We did not include measurements of child perceptions nor was it feasible to obtain
279 measures of actual eating behaviours, and this is a limitation of the current study. The inclusion
280 of child-reported measures of parenting style (*e.g.*, as used by Braden et al., 2014) would be
281 informative in future research. It will also be important to examine the relationship between
282 maternal attachment anxiety and objectively-measured child eating behaviour using, for
283 example, the laboratory-based emotional eating paradigm developed by Blissett et al. (2010).

284 The current study reports the results of cross-sectional associations and hence it is not
285 possible to infer causality. Critically, attachment orientation tends to remain stable into and
286 throughout adulthood (Waters, Merrick, Treboux, Crowell, & Albersheim, 2000) and
287 determining the extent to which it predicts longitudinal changes in child emotional eating would
288 now be informative. The current study focused on the extent to which a mother's global
289 representational model of close personal relationships (*i.e.*, dispositional attachment orientation)
290 would influence child eating behaviour. Whilst there is evidence that there are relationship-
291 specific attachment orientations (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996), the
292 prevailing view is that the global attachment orientation will anchor these and represent the
293 majority of the relationship-specific attachments that people hold (Baldwin, et al., 1996; Rowe &
294 Carnelley, 2003, 2005). However, anxiously-attached individuals can still possess
295 representations of secure relationships (Baldwin, et al., 1996); accordingly, some of the
296 anxiously-attached mothers in the current study may have had secure attachment relationships
297 with their child. Future research should thus explore whether mother-child attachment status
298 moderates the association between maternal dispositional attachment anxiety and child emotional

300 have recently been found to predict child emotional over-eating in a longitudinal study (Farrow,
301 Haycraft, & Blissett, 2015). It would therefore be interesting to determine whether maternal
302 attachment anxiety also predicts these alternative feeding behaviours.

303 In conclusion, the current study highlights the influence of maternal attachment
304 orientation on aberrant eating behaviour in children; maternal attachment anxiety was associated
305 with higher child emotional over-eating. While this may be partly due to use of emotional
306 feeding strategies, there was stronger evidence for a “child-responsive” model whereby
307 anxiously-attached mothers used these feeding practices in response to their child’s emotional
308 over-eating. Further research to understand the exact nature of the relationship between maternal
309 attachment anxiety and child emotional eating is now warranted.

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313

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Variable	Mean (<i>SD</i>)
Maternal age (y)	39.23 (5.68)
Maternal BMI (kg/m ²)	25.93 (6.14)
Maternal highest educational qualification ^a	3.59 (1.38)
Child age (y)	8.63 (1.83)
Child BMI z-score ^b	0.17 (1.53)
Maternal attachment anxiety	2.92 (1.10)
Maternal disinhibited eating	5.43 (3.70)
Emotional feeding strategies	1.62 (0.45)
Child emotional over-eating	1.70 (0.69)

425 ^a 6-point scale: 0 = none, 1 = other, 2 = GCSE, 3 = BTEC, 4 = A-level, 5 = university degree.

426 ^b $n = 57$ for BMI z-score due to incomplete parental reports of child height and weight.

427

429 questionnaire measures, mother BMI and child BMI z-score.

	1	2	3	4	5	6
1. Maternal ANX	-					
2. Maternal DIS	.11	-				
3. EFS	.27*	.24*	-			
4. Child EOE	.43**	.25*	.38**	-		
5. Maternal BMI	.09	.51**	.25*	.32**	-	
6. Child BMI z-score	.37**	.08	.22	.51**	.30*	-

430 * $p < .05$ ** $p < .01$

431 Key: ANX attachment anxiety; DIS disinhibited eating; EFS emotional feeding strategies; EOE

432 emotional over-eating

433

434

436 *Figure 1:* Schematic representation of the proposed relationship between maternal attachment
437 anxiety and child emotional over-eating via one or more of the following pathways; (i.) maternal
438 disinhibited eating, (ii.) maternal use of emotional feeding strategies, (iii.) the two mediators
439 operating in series.

440
441 *Figure 2:* Serial multiple mediation analysis with maternal attachment anxiety as the independent
442 variable (IV), child emotional over-eating as the dependent variable (DV), and maternal
443 disinhibited eating and emotional feeding strategies as first and second mediators, respectively.
444 Values are unstandardized regression coefficients (*SEs* in parentheses) and associated *p*-values.
445 Bracketed association = direct effect (controlling for indirect effects).

446
447 *Figure 3:* Simple mediation analysis with maternal attachment anxiety as the independent
448 variable (IV), emotional feeding strategies as the dependent variable (DV), and child emotional
449 over-eating as the mediator. Values are unstandardized regression coefficients (*SEs* in
450 parentheses) and associated *p*-values. Bracketed association = direct effect (controlling for
451 indirect effects).

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