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# Does body image influence the relationship between body weight and breastfeeding maintenance in new mothers?

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# British Journal of Health Psychology

## Does body image influence the relationship between body weight and breastfeeding maintenance in new mothers?

--Manuscript Draft--

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| <b>Manuscript Classifications:</b>   | Obesity; Diet/nutrition; Social cognition models   |
| <b>Abstract:</b>   | <p><b>Objectives.</b> Obese women have lower breastfeeding initiation and maintenance than healthy weight women. Research generally focuses on biomedical explanations for these differences. The impact of psychosocial factors, including women's post-childbirth well-being and body image cognitions in relation to breastfeeding are less well understood. We aimed to investigate women's body image after childbirth in hospital, and 6-8 weeks later, studying the impact of body image and psychological distress on breastfeeding maintenance at 6-8 weeks, comparing obese and healthy weight women.</p> <p><b>Design.</b> Longitudinal semi-structured questionnaire survey.</p> <p><b>Methods.</b> Demographic and biomedical factors were measured around childbirth. Body image and psychological distress were assessed within 72 hours of birth and by postal questionnaire at 6-8 weeks, for 70 obese and 70 healthy weight women initiating either exclusive (breastmilk only) breastfeeding or mixed feeding (with formula milk) in hospital. Breastfeeding status was re-assessed at 6-8 weeks.</p> <p><b>Results.</b> Obese women were less likely to exclusively breastfeed in hospital and maintain breastfeeding to 6-8 weeks. Although body satisfaction was lower overall in obese women, all women had relatively low body image satisfaction around childbirth, reducing further by 6-8 weeks postnatal. Better body image was related to maintaining breastfeeding at 6-8 weeks, and lower postnatal psychological distress, although education status was the most important factor in the final model. Body image mediated the relationship between weight and breastfeeding maintenance.</p> <p><b>Conclusions.</b> Health professionals should consider body satisfaction when discussing breastfeeding. Normalising post-childbirth bodies, encouraging women to focus on function over form may support breastfeeding for all women.</p> |
| <b>Additional Information:</b>   |  |
| <b>Question</b>  | <b>Response</b>  |
| If you have any potentially competing interests to declare, please enter them in the box below. If you have no interests to declare, please enter 'none'. Please declare any financial relationships (such | none   |

|   |                      |
|---|----------------------|
| <p>as employment, consultancies, stock ownership or options, honoraria, patents, paid expert testimony) or any personal relationships which could be perceived to undermine the credibility of your research. By conflict of interest, we are referring to cases where professional judgment in relation to the research, or the welfare of research participants, may be influenced by another interest, such as financial gain or personal relationships.</p> |                      |
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## **Body Image and Breastfeeding Maintenance**

### **Response to Reviewer #2:**

**Reviewer:** This is the second time I have reviewed this paper, and it has improved since the first version. Removing the TPB variables has meant a clearer focus. However, I still feel that the paper could be considerably sharper. The introduction especially seems very convoluted, and it is really hard to understand where you are taking the reader. It is very odd for example that you don't raise the difference in breastfeeding rates between obese and health weight women until page 5.

*Response: In response to these comments about focus we have changed the introduction and discussion quite a lot to re-focus on the RQs. This means there are lots of tracked changes so I'm sending a clean copy. Line numbers therefore refer to this new copy.*

*We have changed the introduction to re-order the different components - the comparison of obese/HW women's breastfeeding rates appears on page 3 , lines 50-61.*

**Reviewer:** It is also not really clear what is your primary research question? Are you interested in body image as a potential mediator of the relationship between body weight and breastfeeding? OR are you exploring the relationship between body image and breastfeeding more generally, and comparing health weight and obese women to see if this relationship changes (i.e. is body weight a moderator of relationship between body image and breastfeeding? Your research questions indicate the former, but the introduction, aims and title seems to suggest the latter. I think a sharper focus on one primary research question, addressed first in the results and discussion, and introduced more succinctly in the introduction would improve this paper.

*Response: I have re-ordered the introduction as above and set out the primary and secondary research questions in the introduction (page 5-6). The primary RQ is therefore: Does body image explain the relationship between body weight and breastfeeding maintenance at 6-8 weeks postnatal? I have retained the section on changes in body image between time 1 and 2, and using comparative norms (RQ iv, p6)*

### **Reviewer:**

P2 L27: "maintain breastfeeding for the recommended periods" - which periods?

*Response: Changed and re-worded this to clarify— see page , lines 35-39*

P2: L32-33 you refer to government policies but your citations are not government policies

*Response: Changed citations and reworded page 2, lines 29-39*

### **Reviewer:**

Page 3: L53-55: " since there are links between lower SES and overweight and obesity..." this seems a very odd statement particularly as you have not yet raised association between body weight and breastfeeding.

*The introduction has been reordered to achieve a better flow of argument (on page 2:lines 42-28)*

### **Reviewer:**

P16 L348: remove the reference to a trend. Your result is either significant or it is not. I

would remove and discussion of this as if it was significant too.

*This has been removed here and in the discussion.*

**Reviewer:**

P16: L350 : a mediator of breastfeeding and? is there something missing here?

*Response: Amended*

**Reviewer:**

P18 - L392-395: didn't appearance evaluation ratings also drop? would that mean that women are feeling less concerned about their appearance?

*Response: Appearance evaluation rating did drop overall but this is about how they rate their appearance –appearance orientation is about how concerned they are – which didn't change from Time 1 to Time 2.*

**Reviewer:** P18 L410-411: remove sentence about body satisfaction - not significant

*Response: this has been removed*

**Reviewer:** P19 L423-427. Although I agree with what the author is saying - many women do struggle - I think it is also important that we are careful not to paint breastfeeding as only a negative experience. For many it can be a very positive and fulfilling experience. Could there even be a role for breastfeeding in improving a women's view of her body, and being proud of what it can do?

*Response: This is a good point – and I would much rather present a more balanced view - have changed wording of several bits throughout to be less negative, including page 18, lines 400-407.*

**Additional Point:**

*We changed RQ (iii) (page 6) to refer to both mediation and moderation as this provides a more complete explanation of explanatory variables in the relationship between weight and breastfeeding. The moderation analysis is reported on page 13, reproduced below:*

*'To assess moderation effects we included product terms between weight status (healthy weight/obese) and body satisfaction, appearance orientation, and overweight preoccupation in a final block. This model was non-significant, (Nagelkerke  $R^2 = .21$ , n.s.) and no interaction terms were significant, suggesting no moderation effect. '*

**Does body image influence the relationship between body weight and breastfeeding maintenance in new mothers?**

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**Statement of Contribution: Does body image influence the relationship between body weight and breastfeeding maintenance in new mothers?**

**What is already known on this subject?**

Obesity can negatively affect breastfeeding initiation and maintenance, but there is little information about how psychosocial factors affect this relationship. Body image may be an important factor, but has not been studied in relation to breastfeeding maintenance.

**What does this study add?**

- This paper examines the influence of body image on obese and healthy-weight women's breastfeeding maintenance at 6-8 weeks.
- Different aspects of body image mediated but did not moderate the relationship between weight status and breastfeeding maintenance, but in multivariate regression, maternal education level was the most significant predictor.
- Obese women had poorer body image and were less likely to maintain breastfeeding, however, for all women, body image became more negative in this postpartum period.
- Interventions should normalise positive aspects of women's postnatal bodies, including function rather than form. Addressing body concerns could encourage new mothers to maintain breastfeeding, irrespective of weight status.

## Body Image and Breastfeeding Maintenance

### 1 **Abstract**

2 **Objectives.** Obese women have lower breastfeeding initiation and maintenance rates than  
3 healthy weight women. Research generally focuses on biomedical explanations for this.  
4 Psychosocial factors, including body image and well-being after childbirth are less well  
5 understood as predictors of breastfeeding. In obese and healthy weight women, we  
6 investigated changes in body image between 72 hours post-delivery and 6-8 weeks post-  
7 partum, studying how women's body image related to breastfeeding initiation and  
8 maintenance. We also investigated how psychological distress was related to body image.

9 **Design.** Longitudinal semi-structured questionnaire survey.

10 **Methods.** Body image and psychological distress were assessed within 72 hours of birth and  
11 by postal questionnaire at 6-8 weeks, for 70 obese and 70 healthy weight women initiating  
12 exclusive (breastmilk only) breastfeeding or mixed feeding (with formula milk) in hospital.  
13 Breastfeeding was re-assessed at 6-8 weeks.

14 **Results.** Obese women were less likely to exclusively breastfeed in hospital and maintain  
15 breastfeeding to 6-8 weeks. Better body image was related to maintaining breastfeeding  
16 and to lower postnatal psychological distress for all women, but education level was the  
17 most significant predictor of maintenance in multivariate regression including body image  
18 and weight status. Body image mediated, but did not moderate the relationship between  
19 weight and breastfeeding maintenance. Body image was lower overall in obese women, but  
20 all women had low body image satisfaction around childbirth, reducing further at 6-8 weeks.

21 **Conclusions.** Health professionals should consider women's body image when discussing  
22 breastfeeding. A focus on breast function over form may support breastfeeding for all  
23 women. (247)



24 **Introduction**

25

26 *Breastfeeding promotes health*

27

28           There is clear evidence that breastfeeding is beneficial for the health of mother and

29 infant (Victora *et al.*, 2016). UK breastfeeding rates compare poorly with other western

30 countries (Cai, Wardlaw & Brown, 2012). Initiation rates in Scotland have remained largely

31 static over the past 25 years (Information Statistics Division (ISD), Scotland, 2015), and the

32 most recent UK Infant Feeding Survey reports prevalence of maintaining ‘any breastfeeding’

33 (including breastfeeding supplemented with formula milk) falling sharply from 81% at birth

34 to 69% at 1 week, 55% at 6 weeks and 34% at 6 months (McAndrew, Thompson, Fellows,

35 Large, Speed & Renfrew, 2012). International recommendations suggest ‘exclusive’

36 breastfeeding (baby receives only breastmilk and no other fluids) should be maintained for

37 at least six months (WHO 2009; Baby Friendly Health Initiative 2012), and these policies are

38 promoted in UK hospitals ante-natally, around childbirth and post-natally (Renfrew,

39 Wallace, D’Souza, McCormick, Spiby & Dyson 2005). In reality, although many women

40 intend to breastfeed and initiate breastfeeding at birth, it is often terminated early and not

41 maintained for this recommended period (Stuebe & Bonuck 2011; Hoddinott, Craig, Britten

42 & McInnes, 2012). There are strong demographic differences in breastfeeding rates. In

43 western countries, younger women, white ethnic groups, and those with lower socio-

44 economic status (SES) are less likely to initiate and maintain breastfeeding (Barnes, Stein,

45 Smith & Pollock 1997; Lawton, Ashley, Dawson, Waiblinger & Conner, 2012; McAndrew *et*

46 *al.* 2012; Oakley, Renfrew, Kurinczuk & Quigley, 2013). Lower SES is also linked with more

47 overweight, particularly in women (Sassi, Devaux, Cecchini & Rusticelli, 2009; Pampel,

48 Denney & Krueger, 2012).

49 *Weight status and breastfeeding*

50 Women who are overweight or obese are less likely to initiate and maintain  
51 breastfeeding than healthy weight women (Amir & Donath, 2007; Wojicki 2011; Thompson  
52 *et al.*, 2012). A French study found that obese women were more likely than healthy weight  
53 women to introduce supplementary formula milk early (Mok, Multon, Piguel, Barroso &  
54 Gua, 2008), and obese first time mothers in Denmark were twice as likely to stop exclusive  
55 breastfeeding than healthy weight women (Kronborg, Vaeth & Rasmussen, 2012). There are  
56 several potential influences. Obese women may have more physical difficulties, for  
57 example, successfully latching their baby onto the breast or maintaining effective  
58 positioning, or problems with delayed onset of lactation (Hilson, Rasmussen & Kjolhede,  
59 2004). Additionally, caesarean section, more common in obese women (Leddy, Power &  
60 Schulkin, 2008; Denison *et al.*, 2014) is associated with early introduction of formula milk  
61 and early breastfeeding cessation (Schmied, Duff, Dahlen, Mills & Kolt, 2011).

62 Although we can identify demographic and clinical factors linked with lower  
63 breastfeeding rates in obese women, psychosocial influences may offer additional  
64 explanations for these differences, and are also potentially modifiable (Michie *et al.*, 2013).  
65 Social cognitive models, including the Theory of Planned Behaviour (Ajzen 1991) suggest  
66 breastfeeding attitudes and social norms are influential (Swanson & Power, 2004; Swanson,  
67 Power, Carter & Shepherd, 2006; Foulkes, Dundas & Denison, 2008; McMillan, Conner,  
68 Green, Dyson, Renfrew & Wooldridge, 2009; Lawton *et al.*, 2012), but generally do not  
69 account for weight status. Maternal identity (Virden, 1988; Marshall, Godfrey & Renfrew,  
70 2007), and cultural norms also affect breastfeeding initiation and maintenance (Steube &  
71 Bonuck, 2011; Scott *et al.*, 2015), and increasing self-efficacy (Bandura 1986) can improve  
72 women's breastfeeding duration (Dennis, 2006; Swanson, Nicol, McInnes, Cheyne, Mactier  
73 & Callander, 2012; Keeley, Lawton, Swanson & Denison, 2015).

74 *Body Image*

75 Women's body image (Grogan, 2007) may relate to both breastfeeding and body  
76 weight, but has received little research attention in this context. Pregnancy, childbirth and  
77 the postnatal period are characterised by intense changes to women's bodies (Hodgkinson,  
78 Smith & Wittowski, 2014; Orbach & Ruben, 2014), encompassing physical appearance and  
79 bodily functions, including breasts and breastfeeding. Women report satisfaction or  
80 dissatisfaction regarding their weight, shape, and evaluation of different body areas during  
81 pregnancy and after childbirth (Abraham, King & Llewellyn-Jones, 1994; Fern, Buckley &  
82 Grogan, 2014). For example, women may be concerned about the impact of pregnancy and  
83 breastfeeding on their breast shape and the shift in focus from form (appearance, the breast  
84 as a sexual object) to function (desire or ability to breastfeed) during this period, (Office of  
85 the Surgeon General (US), 2011). Alternatively, breastfeeding may increase or 'protect'  
86 against, body image dissatisfaction (Huang, Wang & Chen, 2004), and breastfeeding women  
87 may be less concerned about the 'thin ideal' postnatally (Fern *et al*, 2012). There is evidence  
88 of the benefits of breastfeeding for postnatal weight loss (Bobrow, Quigley, Green, Reeves &  
89 Beral, 2009), although this evidence is less clear for morbidly obese women (Baker,  
90 Gamborg, Heitmann, Lissner, Sørensen & Rasmussen, 2008). However, women may also be  
91 influenced by lay beliefs and contradictory social media posts (e.g. Daily Mail, 2014), which  
92 are critical of breastfeeding, particularly in social contexts. One US study found body  
93 dissatisfaction mediated, or explained how obesity reduced breastfeeding duration (Hauff  
94 & Demerath, 2012). However wider aspects of body image, including evaluation of external  
95 appearance, self-evaluation, and weight perception may also be relevant (Cash, 2000)  
96 Alternatively body image may moderate (affect the strength of ) the effect of weight on  
97 duration. Women can experience social disapproval for breastfeeding (Stewart-Knox,

98 Gardiner & Wright, 2003; Mok *et al.*, 2008), and negative body image may increase women's  
99 experience of embarrassment, becoming a disincentive to breastfeeding in social contexts.  
100 Obese women may therefore face 'double' disapproval, for being both overweight and  
101 breastfeeding, with negative psychological consequences.

### 102 *Psychological Well-being*

103 Women's psychological well-being during pregnancy, childbirth and postpartum  
104 influences breastfeeding initiation (Barnes *et al.*, 1997) and maintenance (Zanardo *et al.*,  
105 2014). Stress, anxiety and depression can characterise the perinatal period for some  
106 women, and are related to more perceived difficulty breastfeeding and earlier cessation  
107 (Thome, Alder & Ramel, 2006). Obesity has also been associated with stress and distress  
108 post-natally, including depression and anxiety (Mina, Denison, Forbes, Stirrat, Norman &  
109 Reynolds, 2015), and 'embodied' cognitions, defined as cognitive interpretations of physical  
110 state or bodily functions, may be influential as either positive or negative cues (Meier,  
111 Schnall, Schwarz, & Bargh, 2012; Sheeran, Gollwitzer & Bargh, 2013). Negative 'embodied'  
112 emotional responses to physical sensations of breastfeeding (such as suckling or nipple pain)  
113 have also been related to postnatal depression (Watkinson, Murray & Simpson, 2016).

### 114 **Aims**

115 Body image is influenced by women's weight status, and weight status influences  
116 breastfeeding, but we do not fully understand how body image influences breastfeeding  
117 maintenance, and whether this varies in obese compared with healthy weight women. We  
118 investigated this relationship, considering mediation (how) and moderation (for whom)  
119 effects (MacKinnon & Leucken, 2008) and whether body image changed in relation to  
120 weight status in the period from immediately post-childbirth to 6-8 weeks later. The primary  
121 research question was:

122 (i) Does body image explain the relationship between body weight and  
123 breastfeeding maintenance at 6-8 weeks postnatal?

124 Secondary research questions were:

125 (ii) How does body weight relate to socio-demographic and biomedical predictors of  
126 breastfeeding (exclusive vs. mixed feeding) in hospital and maintenance (any  
127 breastfeeding) at 6-8 weeks?

128 (iii) Does body image mediate or moderate the effect of weight status on  
129 breastfeeding maintenance?

130 (iv) How do aspects of body image change, comparing obese and healthy weight  
131 from childbirth to 6-8 weeks postnatal?

132 (v) How is postnatal psychological distress related to body image, and to women's  
133 breastfeeding maintenance?

134

### 135 **Participants and Methods**

136 This was a longitudinal questionnaire-based study. We compared healthy weight  
137 (defined as body mass index (BMI)  $18.5 < 25 \text{ kg/m}^2$ ) and obese women (defined as BMI  
138  $> 30 \text{ kg/m}^2$ ). Recruitment was by a research midwife from January 2011 to March 2013.

139 Women were eligible for inclusion if they had breastfed at first feed, given birth to a single

140 baby at  $> 37$  weeks gestation and had a BMI at any stage of pregnancy of either

141  $18.5 < 25 \text{ kg/m}^2$  or  $> 30 \text{ kg/m}^2$  (from maternal records). Women were ineligible if they were

142  $< 18$  years old, were not being discharged home with their baby, or were unable to give

143 informed consent. Women whose baby is admitted to a neonatal unit are likely to face

144 additional challenges in relation to postnatal recovery and in initiating breastfeeding, so

145 were not included in this study. We specifically recruited equal numbers of 'healthy weight'  
146 and 'obese weight' women to explore predictors of breast-feeding maintenance in these  
147 groups. Although it is of interest to study underweight women, we wanted to focus on how  
148 body image affected breastfeeding for obese and 'healthy' weight women in this research.  
149 Eligible women were approached on the postnatal ward within 72 hours of giving birth.  
150 Following informed consent, women completed a questionnaire prior to hospital discharge  
151 (Time 1) and a second postal questionnaire at 6-8 weeks postpartum (Time 2). This time  
152 point is selected in many studies as a period when women have established some routine in  
153 their home/family context, and some stability in their infant feeding behaviour. The project  
154 gained ethical approval from the Lothian NHS Research Ethics Committee (Ref  
155 10/S1102/55).

156

### 157 **Sample Size.**

158

159 From previous research, we expected fewer obese women to breastfeed at 6-8  
160 weeks postnatal, but did not know what effect size to expect in relation to body image.  
161 Studies using socio-cognitive predictors of health behaviours generally show a medium  
162 effect size using multiple regression to predict behaviour (Francis *et al.*, 2004). Using  
163 G\*Power, for an effect size of  $r = .3$ , power .80 and alpha .05, a sample of approximately 80  
164 at follow-up (Time 2) (40 per group) is required (Faul, Erdfelder, Lang, & Buchner, 2007).  
165 Based on a predicted response rate of 50-60% at Time 2, we aimed to recruit around 140  
166 women at Time 1 (70 per group) which would provide sufficient power for follow-up  
167 analysis.

### 168 **Measures**

169 *Maternal demographics and Biomedical variables*

170 Women's education level has repeatedly been shown to influence breastfeeding  
171 rates (Barnes *et al.* 1997; McAndrew *et al.* 2012) and is a useful proxy for SES. We measured  
172 highest level of education, on a 5 point scale from 0=none to 4 = postgraduate qualification.  
173 Smoking status (yes/no) was assessed as a potential predictor of breastfeeding  
174 maintenance. Mode of delivery (spontaneous vertex delivery (SVD), instrumental vaginal  
175 delivery (forceps/ventouse), caesarean section (emergency/elective) was collected from  
176 maternal records, and collapsed into 'other' (SVD and instrumental vaginal delivery) vs  
177 'caesarean section' for analysis.

178 *Breastfeeding status*

179 Information about maternal breastfeeding behaviour was collected at Time 1 and 2.  
180 Since 'exclusive' breastfeeding for the first 6 months is recommended (WHO 2009), we  
181 classified this behaviour at Time 1 as:

182 i) Exclusive breastfeeding: 'No other liquids or solids are given to my baby apart  
183 from breastmilk',

184 ii) Mixed feeding: 'My baby receives both breastmilk and formula milk'.

185 To reflect variation in breastfeeding maintenance, we added a third category at Time 2  
186 (6-8 weeks):

187 iii) Exclusive formula feeding: 'My baby no longer receives breastfeeds or  
188 breastmilk. I am currently feeding my baby with formula milk'.

189 For analysis we developed a dichotomous variable to measure breastfeeding  
190 maintenance, representing 'any' breastfeeding (exclusive or mixed) vs. none, i.e. 'only'  
191 formula feeding at Time 2.

## 192 *Psychosocial Measures*

193 Psychosocial measures were collected at both time points.

### 194 **Body Image**

195 The concept of 'body image' captures a range of attitudes towards the physical self.  
196 The experience of childbirth and becoming a mother presents a significant challenge to  
197 women's physical self-concept (Lupton, 2012). We were interested in women's appraisals of  
198 their body (evaluations, affective reactions) and overall importance of (investment in) their  
199 appearance, comparing women's attitudes in the immediate postnatal period with 6-8  
200 weeks later, and in relation to breastfeeding maintenance. We used a short version of a  
201 previously validated measure, which assesses 'trait' (long-term, stable, schema-based)  
202 appraisal, and 'state' (current, context dependent appraisals) aspects of body image to  
203 reflect women's reactions to the challenges of childbirth and breastfeeding. The MBSRQ  
204 (Multidimensional Body-Self Relations Questionnaire; Cash, 2000; Cash, Fleming, Alindogan,  
205 Steadman & Whitehead, 2002) investigates appearance related concerns. Rather than using  
206 a total score, subscales representing different aspects of body image were developed by  
207 factor analysis of data from USA studies. All items are scored on 5 point scales from 1  
208 'strongly disagree' to 5 'strongly agree'. Item means were calculated by dividing by the  
209 number of items in the subscale, according to manual instructions (Cash 2000). Cronbach  
210 alpha values given below are from the current study (Time 1). The following appearance-  
211 related subscales were included:



212 **Appearance Evaluation (7 Items):** Feelings of physical attractiveness or unattractiveness  
213 and satisfaction or dissatisfaction with physical appearance. High scores reflect feeling  
214 mostly positive and satisfied with their appearance ( $\alpha = .79$ ).

215 **Appearance Orientation (12 items):** Measures the importance of appearance. High scorers  
216 pay more attention towards their appearance ( $\alpha = .86$ ).

217 **Body Areas Satisfaction Scale (9 items):** This measures satisfaction with specific areas of the  
218 body: face (features and complexion), upper body (including breasts, arms and shoulders),  
219 hair (colour, thickness, texture), lower body (hips, thighs, buttocks, legs), and mid-body  
220 (waist, stomach), in addition to muscle tone, weight, height and overall appearance. Higher  
221 scores suggest overall body satisfaction ( $\alpha = .82$ ).

222 **Overweight Preoccupation (4 items):** Measures anxiety about weight, vigilance, dieting, and  
223 eating restraint. Higher scores indicate more weight anxiety ( $\alpha = .79$ ).

224 **Self-classified weight (2 items):** Reflects how weight is perceived by self and others from  
225 very underweight to very overweight. High scores reflect more overweight ( $\alpha = .93$ ).

226 **Psychological Distress:** *Psychological distress* was measured using the General Health  
227 Questionnaire-12 form (GHQ) (Goldberg & Williams, 1988) total score. It has twelve  
228 questions, assessing general affect, depressive and anxiety symptoms and sleep disturbance  
229 over the last four weeks. Interpretation is based on a four point Likert scale scored 0= 'not at  
230 all' to 3='much more than usual'. A cut-off of 11/12 indicates psychological distress requiring  
231 therapeutic intervention (Goldberg *et al.*, 1997) ( $\alpha = .75$ ).

## 232 **Analysis**

233 We examined the distribution of study variables to check for non-normal distributions,  
234 outliers and missing data. We investigated breastfeeding differences between obese vs.  
235 healthy weight women using Chi square tests. Effect sizes were assessed using partial eta

236 squared. Although body image is generally stable over time, childbirth and initiating  
237 breastfeeding are uniquely challenging embodied events, so it was important to consider  
238 whether body image scores at Time 1 or Time 2 were likely to be best predictors of  
239 breastfeeding maintenance at 6-8 weeks. We reasoned that Time 1 in hospital was unlikely  
240 to provide a realistic 'baseline' since women's perception of their bodies at this time may be  
241 influenced by extreme emotions, cognitions and physical sensations such as pain from an  
242 operative delivery, and/or pleasure due to close contact with their baby. Time 2  
243 psychosocial variables were therefore used in analysis as more proximal and reliable  
244 predictors of breastfeeding maintenance at 6-8 weeks. Significant Pearson correlations  
245 directed selection of potential predictor variables for logistic regression analysis with  
246 'breastfeeding (or not) at 6 weeks' as the binary dependent variable. Mediation (Baron &  
247 Kenny, 1986) was investigated using logistic regression and bootstrapping techniques  
248 (Preacher & Hayes 2008). Indirect effects were investigated using bias corrected estimates  
249 (BCa) of confidence intervals at 95% with 1000 bootstrap samples (Hayes, 2009).  
250 Moderation effects were investigated in regression by creating product terms of relevant  
251 variables and including as a final block (Baron & Kenny, 1986). Finally, repeated measures  
252 ANOVAs were calculated to investigate changes in body image and psychological distress  
253 from Time 1 to Time 2 with weight status as between subjects factor, and time within  
254 subjects.

## 255 **Results**

256

### 257 *Demographics*

258 140 participants were recruited (n=70 healthy weight and n=70 obese). The overall response  
259 rate at follow-up was 84%, (n= 117) with no difference in response rates between healthy  
260 weight and obese women (86% vs 81%, respectively, p=0.65).

261 Healthy weight women were more likely than obese women to be exclusively breastfeeding  
262 at recruitment at Time 1 (p=0.018), and to have maintained exclusive or 'mixed'  
263 breastfeeding at Time 2, (p=0.052) as shown in Table 1.

264 TABLE 1 ABOUT HERE

265

266 Participant demographic and clinical information is presented in Table 2. There was  
267 no difference in age, parity, baby's weight, baby's gender, or smoking status between  
268 healthy weight and obese women. Overall, 66 (47%) women had a degree and 36 (26%)  
269 women had a postgraduate qualification, and obese women had lower levels of education.

270 TABLE 2 ABOUT HERE

271

272 Obese women were more likely to give birth by caesarean section (39% compared to 16%).  
273 Women who had a caesarean section were less likely to be exclusively breastfeeding at Time  
274 1 (26, 68%) compared with those who had vaginal delivery (87, 85%),  $\chi^2(1) = 5.06, p=.03$ .  
275 Mode of delivery was not related to breastfeeding maintenance at Time 2.

276

### 277 *Body Image, Weight status and Breastfeeding Maintenance*

278

279 Correlations between breastfeeding maintenance at 6-8 weeks, weight status, body image  
280 and psychological distress at Time 2, are shown in Table 3. Education level and delivery  
281 method (vaginal vs. caesarean) were included as potential covariates. Body image variables  
282 were positively or negatively inter-correlated as expected. Appearance evaluation and body

283 satisfaction were highly inter-correlated ( $r=.83$ ). After exploratory analyses we excluded  
284 'appearance evaluation' from further regression analysis. Psychological distress was related  
285 to less breastfeeding maintenance, lower appearance evaluation and body satisfaction, and  
286 higher weight self-classification.

287 TABLE 3 ABOUT HERE

288

289 We used logistic regression to predict breastfeeding at 6-8 weeks. A model including only  
290 weight status (Nagelkerke  $R^2 = .06$ ,  $p=.03$ ; Wald 4.42,  $p=.035$ ) was significant. Adding four  
291 body image variables (excluding appearance evaluation) increased variance predicted by  
292 14% (Nagelkerke  $R^2 = .20$ ), with body satisfaction being a significant predictor ( $B=1.7$  (SE.60),  
293 Wald =7.98,  $p=.005$ ). To assess moderation effects we included interactions (product  
294 terms) of weight status (healthy weight/obese) and body satisfaction, appearance  
295 orientation, overweight preoccupation and self-classified weight in a final block. This model  
296 was non-significant, (Nagelkerke  $R^2 = .21$ , n.s) suggesting no moderation effect.

297

298 Building on this in a more comprehensive model, we included weight status (healthy  
299 weight/obese) (Model 1), education level and delivery method (Model 2), Time 2 body  
300 image variables (Model 3), and Time 2 psychological distress (Model 4), shown in Table 4.

301 TABLE 4 ABOUT HERE

302

303 Weight category significantly predicted breastfeeding maintenance at 6-8 weeks ( $p=.03$ ),  
304 but became non-significant in subsequent models with education level, four body image  
305 variables, and psychological distress included. Body image variables predicted an additional

306 9% of variance. The final model was significant (predicting 31% of variance,  $p < .001$ ).

307 Women's education level was the only significant predictor in the final model.

308

309 As body satisfaction had previously been identified as a mediator of breastfeeding (Hauff &

310 Demerath, 2012) we tested Time 2 body image variables as potential mediators of the

311 relationship between weight status and breastfeeding maintenance at 6-8 weeks (Baron &

312 Kenny 1986). Breastfeeding outcome (any breastfeeding vs no breastfeeding) was the

313 dependent variable in separate logistic regression analyses with weight status entered first,

314 followed by the potential mediator, using bootstrapping (BCa95%CI) to evaluate effects

315 (Table 5).

316 TABLE 5 ABOUT HERE

317

318 Weight status was a significant predictor in model 1, but became non-significant with

319 appearance evaluation, body satisfaction, overweight preoccupation and weight self-

320 classification, suggesting partial mediation effects of these variables.

321

### 322 *Changes in Body Image and Psychological Distress after Childbirth*

323 We considered how body image changed from Time 1 to Time 2 for obese and healthy

324 weight women. Table 6 shows mean body image scores at both time points for MBSRQ

325 components comparing healthy weight and obese women.

326 TABLE 6 ABOUT HERE

327

328 Obese women had poorer body image at both time points, in relation to *appearance*

329 *evaluation* and body satisfaction. Obese women recorded more *overweight preoccupation*

330 and higher weight *self-classification* with medium to large effects (partial  $\eta^2$ ). There was  
331 no difference, or change over time in *appearance orientation*.

332 *Appearance evaluation* and *body satisfaction* were significantly lower, irrespective of  
333 weight status at Time 2. Interactions (between weight status and time) were not significant.

334 *Overweight preoccupation* increased significantly over time for both healthy weight and  
335 obese women, with no significant interaction effect.

336 *Self-classified weight* did not change over time, however there was a significant interaction  
337 effect, whereby healthy weight women experienced a larger perceived increase between  
338 Time 1 and Time 2 ( $F(1,115) = 4.37, p = .035, \eta^2 = .04$ ).

339 We compared mean values for each of the MBSRQ subscales from the total sample at both  
340 time points with the published norms for US females aged 15 and over (Cash 2000), using  
341 one-sample t-tests, as shown in Table 6.

342 Women's *appearance evaluation*, *appearance orientation* and *overweight preoccupation*,  
343 were significantly lower (for both healthy weight and obese women) in our sample  
344 compared with norms (all  $p < .001$ ). There was no difference in *body satisfaction*, or *weight*  
345 *self-classification* at Time 1 however, obese women had lower *body satisfaction* and higher  
346 *weight self-classification* than norms at Time 2.

347 *Psychological Distress (GHQ)*

348 There was no difference in psychological distress between obese and healthy weight  
349 women, or significant change in scores between Time 1 and Time 2, and no significant  
350 interaction. However, mean scores for both groups (at both time points) were close to the  
351 suggested 11/12 cut-off (Goldberg *et al.*, 1997) indicating 'caseness' or psychological  
352 distress requiring intervention. We compared our Time 1 and Time 2 GHQ data with British

353 Household Survey data from women at 3-6 months postnatal (van Bussel, Spitz, &  
354 Demyttenaere, 2006), and found no significant difference.

355

## 356 **Discussion**

357 Breastfeeding is an important health behaviour, which is rewarding for most women  
358 but can be challenging to initiate and maintain, contributing to the challenges of early  
359 motherhood. Health psychology has much to add to our understanding of this behaviour.  
360 The experience of childbirth has a huge influence on how women perceive their body, and  
361 self-referent cognitions and emotions during this period have an important influence on  
362 breastfeeding (Thome *et al.*, 2006; Figueiredo, Canario & Field, 2014). Since obese women  
363 may have poorer body image than healthy weight women, we studied body image in the  
364 postnatal period, and its influence on breastfeeding in relation to weight status.

365 Healthy weight women were much more likely to be 'exclusively' breastfeeding in  
366 hospital, and maintain breastfeeding at 6-8 weeks than obese women, as found elsewhere  
367 (Amir & Donath, 2007). Socio-demographic and biomedical factors were important as found  
368 previously (Barnes *et al.*, 1997; McAndrew *et al.* 2012; Oakley *et al.*, 2013). Education level  
369 was the most significant predictor of breastfeeding in our final model. Obese women were  
370 more likely to have a caesarean section. This is related to less 'exclusive' breastfeeding in  
371 hospital, and in turn to shorter breastfeeding duration (Langellier, Pia Chaparro & Whalley,  
372 2012).

373 The primary research question focused on predicting breastfeeding maintenance  
374 (exclusive or mixed) at 6-8 weeks postnatal. We found all body image components, except  
375 appearance orientation were correlated with breastfeeding maintenance and weight status.  
376 Higher satisfaction and appearance evaluation were positively related to breastfeeding and

377 negatively related to weight status. Greater preoccupation with overweight and weight  
378 self-classification were negatively related to breastfeeding and positively related to weight  
379 status. In regression analysis including weight status, body image components as a block  
380 added significantly to the variance predicted. Individually, body satisfaction was a significant  
381 predictor, and appearance evaluation, body satisfaction, overweight preoccupation and  
382 weight self-classification mediated the relationship between weight status and  
383 breastfeeding to differing degrees. This replicates and extends findings from Hauff and  
384 Demerath's (2012) study, showing body satisfaction and 'comfort' mediated breastfeeding  
385 in overweight and obese women (this study had a larger sample, but used a less reliable  
386 single-item measure of body satisfaction).

387 Moderation effects of body image on weight status were not significant in this model. This  
388 suggests that body image may explain 'how' weight affects breastfeeding maintenance, but  
389 not 'who for' (MacMillan & Leucken, 2008).

390 It is important to note that building a more comprehensive model, including weight  
391 status, education level, delivery method and psychological distress as well as body image,  
392 somewhat negated these effects. Education level, used as a proxy for SES, exemplified the  
393 powerful effects of socio-economic status on breastfeeding outcomes. We do not know  
394 from this study what specific mechanisms are important here, although research suggests  
395 that social and cultural norms which are often unsupportive of breastfeeding in these  
396 contexts may be a key factor (Macmillan *et al.* 2009; Darwent, McInnes & Swanson, 2016)

397 Psychological distress was also related to more body dissatisfaction, lower  
398 appearance evaluation and higher weight self-classification, but unrelated to weight status  
399 and not a significant predictor of breastfeeding maintenance in the final model. However,  
400 mean values exceeded accepted cut-offs for 'caseness', suggesting a need for psychological



401 support for some women. New motherhood can be a period of intense positive and  
402 negative emotions. Whilst norms tend to emphasise happiness and wellbeing, it is  
403 important to recognise that some women may struggle to cope emotionally and practically  
404 with the demands of a new baby. Although breastfeeding is a positive, fulfilling and  
405 empowering experience for many women it can also be an additional source of stress,  
406 particularly where women experience negative emotional states related to embodied  
407 aspects of breastfeeding (Watkinson *et al.*, 2016) or self-critical emotions such as failure,  
408 guilt or embarrassment, and this merits further study.

409         Few studies have examined changes in body image for women in the few weeks  
410 after childbirth. Compared with available US norms (Cash 2000), body image satisfaction  
411 was low in our sample. Unfortunately comparable norms were not available for postpartum  
412 women (see 'limitations', below). Although the immediate postnatal period is not an ideal  
413 time to obtain an accurate 'baseline' for women's body image beliefs, it is suggested that  
414 aspects of body image have enduring trait characteristics which change little (Cash, 2002;  
415 Nevill, Lane & Duncan, 2015). This applied to appearance orientation (investment) which  
416 did not change, but we might have expected to see improvement in some body image  
417 perceptions as women moved from a post-pregnancy body, settling into early motherhood  
418 and a 'new normality' with a new baby. Instead, we found that overall satisfaction with  
419 components of body image reduced for all women between childbirth in hospital and 6-8  
420 weeks postnatal, and this was significant for appearance evaluation, body satisfaction  
421 (which both reduced) and overweight preoccupation (which increased), confirming that  
422 some body image 'states' are context dependent. This dissatisfaction may also reflect  
423 undesirable social pressure for women to conform to ideals and stereotypes (Grogan, 2007;  
424 Fern *et al.*, 2012) which suggest 'getting back to normal' is seen as both desirable and

425 achievable post childbirth. Pressure to lose weight may be more overt (and hence stressful)  
426 for obese women who are stigmatised in relation to their weight and appearance (Puhl &  
427 Heuer, 2010). Overall, obese women reported lower body image satisfaction than healthy  
428 weight women in hospital postnatally, echoing other research (Hauff & Demerath, 2012;  
429 Zanardo *et al.*, 2014) and similarly at 6-8 weeks postnatal. Different aspects of body image  
430 (reduced satisfaction, evaluation; increased overweight preoccupation and weight self-  
431 classification) changed for both obese and healthy weight women in the 6-8 weeks following  
432 childbirth.

433

#### 434 **Methodological Limitations**

435 It would have been ideal to assess baseline body image, and other psychosocial variables  
436 either pre- or during pregnancy rather than after childbirth, when a woman's body is in  
437 recovery from a life-changing event and emotional arousal is high. Women experiencing  
438 pain from caesarean sections or complicated deliveries may have had biased responses.  
439 Although the MBSRQ is widely used internationally in clinical samples, the only available  
440 population norms were for non-pregnant US women (Cash 2000). It has also been  
441 suggested that some MBSRQ components (particularly 'appearance evaluation') show a lack  
442 of stability over time with overweight participants (Neville *et al.*, 2015) which may have  
443 affected our findings. Breastfeeding as an embodied behaviour undoubtedly influences  
444 women's psychological self-concept and 'body confidence' either positively or negatively  
445 (Watkinson *et al.* 2016), and we did not explicitly measure embodied cognitions in this  
446 study.

447 We deliberately compared discrete groups of healthy weight and obese women but  
448 recognise underweight and overweight women may also have different experiences of

449 breastfeeding. We categorised women's weight according to case notes at booking in early  
450 pregnancy, acknowledging that this may have changed at Time 2. We followed up the  
451 sample at 6-8 weeks, a common time-point chosen in research, however longer follow-up of  
452 breastfeeding maintenance would have been useful in relation to assessing body image.  
453 Our main outcome measure constructed to represent 'breastfeeding' versus 'no  
454 breastfeeding' at Time 2, also did not reflect how long women had breastfed on discharge  
455 from hospital, and may have lacked sensitivity, as many women switch to formula in the  
456 first 2 weeks post-discharge (McAndrew *et al.*, 2012). Additionally, the study was slightly  
457 over-powered at Time 2, with potential for Type 1 error given a relatively large number of  
458 variables and multiple testing.

459

#### 460 **Conclusions and Recommendations for Research and Practice**

461 Women's experience of body dissatisfaction is increasingly common in western  
462 cultures which stress conformity to a 'thin ideal'. This may have a negative impact on  
463 women's postnatal psychological well-being and breastfeeding maintenance. Further study  
464 of embodied cognitions and their emotional impact is a fruitful area for health psychologists  
465 promoting initiation or breastfeeding maintenance in this context, and could inform and  
466 augment social cognitive models (e.g.TPB) or those which identify negative physiological  
467 and psychological states as barriers to developing self-efficacy (Bandura, 1986). Using a  
468 'dual process' approach (Sheeran, Gollwitzer & Bargh, 2013) to understand how  
469 physiological, social or emotional breastfeeding cues experienced at a sub-conscious level,  
470 might influence breastfeeding behaviour would be useful. The biological provision of  
471 breastmilk is linked with developing positive maternal identity and self-efficacy (Swanson *et*.  
472 *al.*, 2012). Conversely negative appraisals, including feelings of failure, embarrassment and

473 discomfort breastfeeding in front of others, are associated with earlier discontinuation  
474 (Scott *et al.*, 2015). Open discussion of these issues, including the relationship between  
475 weight status, body image and social stigma could help health professionals working with  
476 potential new parents, to anticipate barriers to breastfeeding and develop advance coping  
477 plans.

478

479 The results have important implications for intervention for those supporting new mothers.

480 Family, peers and health professional's support targeted at individual women's needs is

481 particularly important in the first few weeks of motherhood (Hoddinott *et al.*, 2012). Health

482 promotion interventions normalising women's post-pregnancy and breastfeeding bodies,

483 and de-stigmatising weight issues in this context could encourage new mothers to focus on

484 the body's function, rather than form (Office of Surgeon General, 2011; Fern *et al.*, 2012),

485 increasing women's breastfeeding and maternal confidence, and improve mental health and

486 well-being in this important postnatal period. (4976)

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760 **Table 1: Women’s Breastfeeding Status at Time 1 (In hospital) and Time 2 ( 6-8 Weeks**  
 761 **Postnatal.**  
 762

|               |                | <b>FEEDING METHOD</b>          |                      |                                  |                                   |
|---------------|----------------|--------------------------------|----------------------|----------------------------------|-----------------------------------|
|               |                | <b>Exclusive Breastfeeding</b> | <b>Mixed feeding</b> | <b>Exclusive Formula Feeding</b> | <b>χ<sup>2</sup>, p</b>           |
| <b>Time 1</b> |                |                                |                      |                                  |                                   |
| <b>n=70</b>   | <b>Healthy</b> | 62 (89%)                       | 8 (11%)              | -                                | χ <sup>2</sup> (1) = 5.56, p=.018 |
|               | <b>Weight</b>  |                                |                      |                                  |                                   |
| <b>n=70</b>   | <b>Obese</b>   | 51 (73%)                       | 19 (27%)             | -                                |                                   |
|               | <b>TOTAL</b>   | 113                            | 27                   | -                                |                                   |
| <b>Time 2</b> |                |                                |                      |                                  |                                   |
| <b>n=60</b>   | <b>Healthy</b> | 32 (53%)                       | 18 (30%)             | 10 (17%)                         | χ <sup>2</sup> (2) = 5.93, p=.052 |
|               | <b>Weight</b>  |                                |                      |                                  |                                   |
| <b>n=58</b>   | <b>Obese</b>   | 25 (43%)                       | 12 (21%)             | 21 (36%)                         |                                   |
|               | <b>TOTAL</b>   | 57                             | 30                   | 31                               |                                   |

763

764 **Table 2: Participant characteristics at Time 1 (In hospital)**

| <i>Characteristic</i>                     | <i>Healthy Weight</i> | <i>Obese</i> | <i>P</i> |
|---|-----------------------|--------------|----------|
|   | <b>N=70</b>           | <b>N=70</b>  |          |
| <b>Age (years)<sup>1</sup></b>            | 32.7 (5.2)            | 31.4 (5.5)   | 0.15     |
| <b>BMI (kg/m<sup>2</sup>)<sup>1</sup></b> | 22.7 (1.7)            | 35.6 (4.6)   | N/A      |
| <b>Baby weight (g)<sup>1</sup></b>        | 3519 (450)            | 3510 (563)   | 0.92     |
| <b>Parity<sup>2</sup></b>                 |                       |              | 0.32     |
| 0   | 43 (61%)              | 43 (61%)     |          |
| 1-2                                       | 26 (37%)              | 23 (32%)     |          |
| 3+  | 1 (1%)                | 4 (7%)       |          |
| <b>Delivery<sup>2</sup></b>               |                       |              | 0.009    |
| SVD                                       | 45 (64%)              | 31 (44%)     |          |
| Instrumental Vaginal                      | 14 (20%)              | 12 (17%)     |          |
| CS  | 11 (16%)              | 17 (39%)     |          |
| <b>Baby Gender<sup>2</sup></b>            |                       |              | 0.61     |
| Male                                      | 34 (49%)              | 30 (43%)     |          |
| Female                                    | 36 (51%)              | 40 (57%)     |          |
| <b>Smoke<sup>2</sup></b>                  |                       |              | 0.65     |
| No  | 60(86%)               | 57(81%)      |          |
| Ever                                      | 10(14%)               | 13(19%)      |          |
| <b>Education<sup>2</sup></b>              |                       |              | 0.02     |
| None                                      | 1 (1%)                | 2 (3%)       |          |
| Standard                                  | 6 (9%)                | 12 (17%)     |          |
| Highers                                   | 4 (6%)                | 13 (19%)     |          |
| Degree/Dip                                | 35 (50%)              | 31 (44%)     |          |
| Postgraduate                              | 24 (34%)              | 12 (17%)     |          |

765 Key: <sup>1</sup> Mean (SD), <sup>2</sup> N (%), BMI – Body Mass Index; SVD – Spontaneous Vertex Delivery; CS -  
766 Caesarean Section

|                                    | 1 | 2     | 3      | 4    | 5       | 6    | 7       | 8       | 9       | 10      |
|------------------------------------|---|-------|--------|------|---------|------|---------|---------|---------|---------|
| 1 <b>Breastfeeding<sup>a</sup></b> | - | -.02* | .39*** | -.13 | .21*    | -.06 | .36***  | -.23*   | -.23*   | -.19*   |
| 2 <b>Weight status</b>             |   | -     | -.25** | .20* | -.40*** | -.02 | -.48*** | .43***  | .78***  | .06     |
| 3 <b>Education level</b>           |   |       | -      | -.15 | .12     | -.01 | .29**   | -.23*   | -.15    | -.15    |
| 4 <b>Delivery<sup>b</sup></b>      |   |       |        | -    | -.09    | -.09 | -.23*   | .04     | .21*    | .03     |
| 5 <b>Appearance evaluation</b>     |   |       |        |      | -       | .08  | .83***  | -.56*** | -.61*** | -.36*** |
| 6 <b>Appearance orientation</b>    |   |       |        |      |         | -    | .11     | .25**   | -.02    | -.04    |
| 7 <b>Body satisfaction</b>         |   |       |        |      |         |      | -       | -.56*** | -.62*** | -.41*** |
| 8 <b>Overweight preoccupation</b>  |   |       |        |      |         |      |         | -       | .46***  | .10     |
| 9 <b>Self classification</b>       |   |       |        |      |         |      |         |         | -       | .20*    |
| 10 <b>Psychological distress</b>   |   |       |        |      |         |      |         |         |         | -       |

767 **Table 3: Pearson Correlations between Breastfeeding<sup>a</sup>, Education Level, Delivery Method<sup>b</sup>, Body Image (MBSRQ) and Psychological Distress**  
768 **at Time 2 (6-8 weeks)**

769  
770 <sup>a</sup>Breastfeeding, 1 = no breastmilk; 2 = any breastmilk; <sup>b</sup>Delivery Method 1 = Vaginal, 2= Caesarean Section  
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772 **Table 4: Logistic Regression Predicting Breastfeeding at 6-8 weeks from Weight status,**  
 773 **Education level, Delivery Method, Body Image (MBSRQ) and Psychological Distress at**  
 774 **Time 2 (6-8 weeks)**

|                                 | <i>B(SE)</i> | <i>Wald</i>  | <i>p</i>        | <i>Model <math>\chi^2, p</math></i> | <i><sup>a</sup>R<sup>2</sup></i> |
|---------------------------------|--------------|--------------|-----------------|-------------------------------------|----------------------------------|
| <b>Model 1:</b>                 |              |              |                 | $\chi^2 = 4.60, p=.03$              | .06                              |
| <i>Weight status</i>            | .95 (.45)    | 4.42         | <b>.03</b>      |                                     |                                  |
| <b>Model 2:</b>                 |              |              |                 | $\chi^2 = 18.29, p<.001$            | .22                              |
| <i>Weight Status</i>            | .54 (.50)    | 1.17         | .28             |                                     |                                  |
| <i>Education level</i>          | .88 (.26)    | <b>11.72</b> | <b>&lt;.001</b> |                                     |                                  |
| <i>Delivery Method</i>          | .16 (.52)    | .09          | .76             |                                     |                                  |
| <b>Model 3:</b>                 |              |              |                 | $\chi^2 = 26.21, p<.001$            | .31                              |
| <i>Weight status</i>            | -.05 (.81)   | .004         | .94             |                                     |                                  |
| <i>Education Level</i>          | .80 (.27)    | 8.46         | <b>.004</b>     |                                     |                                  |
| <i>Delivery Method</i>          | .17 (.55)    | .09          | .76             |                                     |                                  |
| <i>Appearance orientation</i>   | -.95 (.71)   | 1.80         | .18             |                                     |                                  |
| <i>Body satisfaction</i>        | 1.33 (.63)   | 4.47         | <b>.03</b>      |                                     |                                  |
| <i>Overweight preoccupation</i> | .20 (.43)    | .23          | .63             |                                     |                                  |
| <i>Self-classification</i>      | -.17 (.56)   | .09          | .77             |                                     |                                  |
| <b>Model 4:</b>                 |              |              |                 | $\chi^2 = 26.40, p=.001$            | .31                              |
| <i>Weight status</i>            | .02 (.83)    | .001         | .98             |                                     |                                  |
| <i>Education Level</i>          | .79 (.28)    | 8.03         | <b>.005</b>     |                                     |                                  |
| <i>Delivery Method</i>          | .17 (.55)    | .09          | .76             |                                     |                                  |
| <i>Appearance orientation</i>   | -.93 (.71)   | 1.70         | .19             |                                     |                                  |
| <i>Body satisfaction</i>        | 1.21 (.69)   | 3.08         | .07             |                                     |                                  |
| <i>Overweight</i>               | .17 (.43)    | .16          | .70             |                                     |                                  |

Body Image and Breastfeeding Maintenance

|                               |            |     |     |
|-------------------------------|------------|-----|-----|
| <i>preoccupation</i>          |            |     |     |
| <i>Self-classification</i>    | -.14 (.57) | .06 | .80 |
| <i>Psychological Distress</i> | -.03 (.05) | .18 | .67 |

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776 <sup>a</sup>Nagelkerke R<sup>2</sup>

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779 **Table 5: Logistic Regression Models investigating Body image variables (Time 2) as**  
 780 **mediators of the relationship between weight status and breastfeeding at 6-8 weeks**

| <i>Body Image</i>               |                | <i>B (SE)</i>          | <i>Wald (p)</i> | <i>Exp B</i> | <i>BCa 95% CI</i> |       |      |
|---------------------------------|----------------|------------------------|-----------------|--------------|-------------------|-------|------|
|                                 |                |                        |                 |              | Lower             | Upper |      |
| <b>Appearance evaluation</b>    | <b>Model 1</b> | Weight status          | 1.08 (.44)      | 5.91 (.015)  | 2.90              | 1.23  | 7.01 |
|                                 | <b>Model 2</b> | Weight status          | .83 (.47)       | 3.08 (.08)   | 2.31              | .91   | 5.86 |
|                                 |                | Appearance Evaluation  | .47 (.35)       | 1.86 (.17)   | 1.60              | .81   | 3.18 |
| <b>Appearance orientation</b>   | <b>Model 1</b> | Weight status          | 1.02 (.44)      | 5.36 (.02)   | 2.78              | 1.17  | 6.72 |
|                                 | <b>Model 2</b> | Weight status          | 1.04 (.44)      | 5.49 (.02)   | 2.81              | 1.18  | 6.71 |
|                                 |                | Appearance orientation | -.39 (1.1)      | .55 (.45)    | 3.96              | .24   | 1.89 |
| <b>Body satisfaction</b>        | <b>Model 1</b> | Weight status          | .99 (.44)       | 5.01 (.025)  | 2.73              | 1.13  | 6.45 |
|                                 | <b>Model 2</b> | Weight status          | .32 (.50)       | .42 (.52)    | 1.38              | .52   | 3.65 |
|                                 |                | Body satisfaction      | 1.40 (.45)      | 9.79 (.002)  | 4.07              | 1.69  | 9.81 |
| <b>Overweight preoccupation</b> |                |                        |                 |              |                   |       |      |

Body Image and Breastfeeding Maintenance

|                            |                          |            |            |      |      |      |
|----------------------------|--------------------------|------------|------------|------|------|------|
| <b>Model 1</b>             | Weight status            | 1.00 (.45) | 5.01 (.03) | 2.74 | 1.13 | 6.61 |
|                            |                          |            |            |      |      |      |
| <b>Model 2</b>             | Weight status            | .69 (.49)  | 1.99 (.16) | 1.99 | .76  | 5.21 |
|                            |                          |            |            |      |      |      |
| <b>Self-classification</b> | Overweight preoccupation | -.49 (.30) | 2.57 (.11) | .61  | .34  | 1.12 |
|                            |                          |            |            |      |      |      |
| <b>Model 1</b>             | Weight status            | 1.07 (.44) | 5.84 (.02) | 2.91 | 1.22 | 6.97 |
|                            |                          |            |            |      |      |      |
| <b>Model 2</b>             | Weight status            | .61 (.66)  | .84 (.35)  | 1.84 | .50  | 6.77 |
|                            |                          |            |            |      |      |      |
|                            | Self-classification      | .41 (.44)  | .86 (.35)  | 1.50 | .64  | 3.53 |

781



782 **Table 6: Means, Group Comparisons, and Normative Comparisons for Multidimensional Body-Self Relations Questionnaire (MBSRQ) Items,**  
 783 **and Psychological Distress (GHQ), Comparing Healthy Weight and Obese Women at Time 1 (After Childbirth) and Time 2 (6-8 weeks**  
 784 **postnatal).**

|   | <i>Time 1</i>         |              | <i>Time 2</i>         |              | <i>Effect</i> | <i>F, p</i><br><i>(1,114)</i> | <i>Partial</i><br><i>Eta<sup>2</sup></i> | <i>Norm<sup>a</sup></i> | <i>p<sup>2</sup></i> |
|---|-----------------------|--------------|-----------------------|--------------|---------------|-------------------------------|--|-------------------------|----------------------|
|   | <b>Healthy Weight</b> | <b>Obese</b> | <b>Healthy Weight</b> | <b>Obese</b> |               |                               |  |                         |                      |
| <b>Appearance Evaluation<sup>1</sup></b>    | 3.48 (.44)            | 2.75 (.60)   | 3.11 (.64)            | 2.57 (.63)   | <b>Time</b>   | 29.21,<br>p<.001              | .21                                      | 3.4 (.87)               | p<.001<br>p<.001     |
|   |                       |              |                       |              |               | <b>Weight Status</b>          | 42.51,<br>p<.0001                        | .27                     |                      |
| <b>Appearance Orientation<sup>1</sup></b>   | 2.16 (.46)            | 2.07 (.44)   | 2.09 (.41)            | 2.07 (.41)   | <b>Time</b>   | 3.09,<br>p=.08                | .03                                      | 3.9 (.60)               | p<.001<br>p<.001     |
|   |                       |              |                       |              |               | <b>Weight Status</b>          | .62,<br>p=.43                            | .005                    |                      |
| <b>Body satisfaction<sup>1</sup></b>        | 3.71 (.32)            | 2.94 (.56)   | 3.41 (.54)            | 2.80 (.50)   | <b>Time</b>   | 25.30,<br>p<.001              | .18                                      | 3.2 (.07)               | p=.07<br>p=.03       |
|   |                       |              |                       |              |               | <b>Weight Status</b>          | 74.09,<br>p<.0001                        | .39                     |                      |
| <b>Overweight preoccupation<sup>1</sup></b> | 2.12 (.70)            | 2.74 (.78)   | 2.26 (.70)            | 2.93 (.76)   | <b>Time</b>   | 14.28,<br>p<.001              | .12                                      | 3.0 (.96)               | p<.001<br>p<.001     |
|   |                       |              |                       |              |               | <b>Weight Status</b>          | 23.25,<br>p<.0001                        |                         |                      |

Body Image and Breastfeeding Maintenance

|   |            |            |             |             |                          |                    |     |             |                 |
|---|------------|------------|-------------|-------------|--------------------------|--------------------|-----|-------------|-----------------|
| <b>Self -<br/>Classification<sup>1</sup></b>        | 3.02 (.34) | 4.32 (.51) | 3.17 (.38)  | 4.31 (.56)  | <b>Time</b>              | 3.46,<br>p=.07     | .02 | 3.6 (.73)   | p=.09<br>p=.02  |
|   |            |            |             |             | <b>Weight<br/>Status</b> | 263.48,<br>p<.0001 | .70 | -           | -               |
| <b>Psychological<br/>Distress (GHQ)<sup>1</sup></b> | 11.05(4.5) | 13.09(4.8) | 11.98 (5.3) | 12.42 (6.0) | <b>Time</b>              | .06,<br>p=.90      | .01 | 11.16 (5.4) | p= .24<br>p=.06 |
|   |            |            |             |             | <b>Weight<br/>Status</b> | 1.66,<br>p=.20     | .02 | -           | -               |

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<sup>1</sup>Mean (SD); <sup>2</sup>One sample t-tests for whole sample Time 1 and Time 2

<sup>a</sup>Norms from Cash (2002); Comparison data from van Bussell et al. (2006)