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

Citation for published version:
Swanson, V, Keely, A & Denison, F 2017, 'Does body image influence the relationship between body weight and breastfeeding maintenance in new mothers?', British Journal of Health Psychology.
https://doi.org/10.1111/bjhp.12246

Digital Object Identifier (DOI):
10.1111/bjhp.12246

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Peer reviewed version

Published in:
British Journal of Health Psychology

General rights
Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.
Abstract: Objectives. 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.

Design. Longitudinal semi-structured questionnaire survey.

Methods. 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.

Results. 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.

Conclusions. 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.
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.

| Does this submission have any links or overlap with any other submitted or published manuscripts, for this or any other publication? (For example; as part of a long-term project, using a shared data set, a response to, or extension of, earlier work.) If yes, please give brief details. If no, please enter 'none'. Any overlap not declared and later discovered will result in the manuscript being withdrawn from consideration. |
|---|
| none |

| Please specify the word count of your manuscript (excluding the abstract, tables, figures and references). |
|---|
| Article, 4964 |

| Do you use Twitter for academic purposes? (If you do and your paper is accepted, we will 'mention' you when we share a link to the online article.) |
|---|
| yes |
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 R² =.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?

Vivien Swanson

Reader in Health Psychology,
Psychology Division, School of Natural Sciences, University of Stirling, Stirling FK9 4LA

Vivien.swanson@stir.ac.uk (corresponding author)

Alice Keely

PhD Student, Edinburgh Napier University
Sighthill Campus, Edinburgh EH11 4BN

40136837@napier.live.ac.uk

Fiona C Denison

Reader/Honorary Consultant in Maternal and Fetal Health
MRC Centre for Reproductive Health (Room W1.17)
Queen’s Medical Research Institute, 47 Little France Crescent, Edinburgh EH16 4TJ

Fiona.Denison@ed.ac.uk

Acknowledgements:

Funding: Funding for the study was received from NHS Lothian Health Services Research Programme
**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

Abstract

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

Design. Longitudinal semi-structured questionnaire survey.

Methods. 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 exclusive (breastmilk only) breastfeeding or mixed feeding (with formula milk) in hospital. Breastfeeding was re-assessed at 6-8 weeks.

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

Conclusions. Health professionals should consider women’s body image when discussing breastfeeding. A focus on breast function over form may support breastfeeding for all women. (247)
Introduction

Breastfeeding promotes health

There is clear evidence that breastfeeding is beneficial for the health of mother and infant (Victora et al., 2016). UK breastfeeding rates compare poorly with other western countries (Cai, Wardlaw & Brown, 2012). Initiation rates in Scotland have remained largely static over the past 25 years (Information Statistics Division (ISD), Scotland, 2015), and the most recent UK Infant Feeding Survey reports prevalence of maintaining ‘any breastfeeding’ (including breastfeeding supplemented with formula milk) falling sharply from 81% at birth to 69% at 1 week, 55% at 6 weeks and 34% at 6 months (McAndrew, Thompson, Fellows, Large, Speed & Renfrew, 2012). International recommendations suggest ‘exclusive’ breastfeeding (baby receives only breastmilk and no other fluids) should be maintained for at least six months (WHO 2009; Baby Friendly Health Initiative 2012), and these policies are promoted in UK hospitals ante-natally, around childbirth and post-natally (Renfrew, Wallace, D’Souza, McCormick, Spiby & Dyson 2005). In reality, although many women intend to breastfeed and initiate breastfeeding at birth, it is often terminated early and not maintained for this recommended period (Stuebe & Bonuck 2011; Hoddinott, Craig, Britten & McInnes, 2012). There are strong demographic differences in breastfeeding rates. In western countries, younger women, white ethnic groups, and those with lower socio-economic status (SES) are less likely to initiate and maintain breastfeeding (Barnes, Stein, Smith & Pollock 1997; Lawton, Ashley, Dawson, Waiblinger & Conner, 2012; McAndrew et al. 2012; Oakley, Renfrew, Kurinczuk & Quigley, 2013). Lower SES is also linked with more overweight, particularly in women (Sassi, Devaux, Cecchini & Rusticelli, 2009; Pampel, Denney & Krueger, 2012).

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

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

Women’s body image (Grogan, 2007) may relate to both breastfeeding and body weight, but has received little research attention in this context. Pregnancy, childbirth and the postnatal period are characterised by intense changes to women’s bodies (Hodgkinson, Smith & Wittowski, 2014; Orbach & Ruben, 2014), encompassing physical appearance and bodily functions, including breasts and breastfeeding. Women report satisfaction or dissatisfaction regarding their weight, shape, and evaluation of different body areas during pregnancy and after childbirth (Abraham, King & Llewellyn-Jones, 1994; Fern, Buckley & Grogan, 2014). For example, women may be concerned about the impact of pregnancy and breastfeeding on their breast shape and the shift in focus from form (appearance, the breast as a sexual object) to function (desire or ability to breastfeed) during this period, (Office of the Surgeon General (US), 2011). Alternatively, breastfeeding may increase or ‘protect’ against, body image dissatisfaction (Huang, Wang & Chen, 2004), and breastfeeding women may be less concerned about the ‘thin ideal’ postnatally (Fern et al, 2012). There is evidence of the benefits of breastfeeding for postnatal weight loss (Bobrow, Quigley, Green, Reeves & Beral, 2009), although this evidence is less clear for morbidly obese women (Baker, Gamborg, Heitmann, Lissner, Sørensen & Rasmussen, 2008). However, women may also be influenced by lay beliefs and contradictory social media posts (e.g. Daily Mail, 2014), which are critical of breastfeeding, particularly in social contexts. One US study found body dissatisfaction mediated, or explained how obesity reduced breastfeeding duration (Hauff & Demerath, 2012). However wider aspects of body image, including evaluation of external appearance, self-evaluation, and weight perception may also be relevant (Cash, 2000). Alternatively body image may moderate (affect the strength of) the effect of weight on duration. Women can experience social disapproval for breastfeeding (Stewart-Knox,
Gardiner & Wright, 2003; Mok et al., 2008), and negative body image may increase women’s experience of embarrassment, becoming a disincentive to breastfeeding in social contexts. Obese women may therefore face ‘double’ disapproval, for being both overweight and breastfeeding, with negative psychological consequences.

Psychological Well-being

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

Aims

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

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

Secondary research questions were:

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

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

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

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

Participants and Methods

This was a longitudinal questionnaire-based study. We compared healthy weight (defined as body mass index (BMI) 18.5<25kg/m²) and obese women (defined as BMI >30kg/m²). Recruitment was by a research midwife from January 2011 to March 2013. Women were eligible for inclusion if they had breastfed at first feed, given birth to a single baby at >37 weeks gestation and had a BMI at any stage of pregnancy of either 18.5<25kg/m² or >30kg/m² (from maternal records). Women were ineligible if they were <18 years old, were not being discharged home with their baby, or were unable to give informed consent. Women whose baby is admitted to a neonatal unit are likely to face additional challenges in relation to postnatal recovery and in initiating breastfeeding, so
were not included in this study. We specifically recruited equal numbers of ‘healthy weight’
and ‘obese weight’ women to explore predictors of breast-feeding maintenance in these
groups. Although it is of interest to study underweight women, we wanted to focus on how
body image affected breastfeeding for obese and ‘healthy’ weight women in this research.
 eligible women were approached on the postnatal ward within 72 hours of giving birth.
Following informed consent, women completed a questionnaire prior to hospital discharge
(Time 1) and a second postal questionnaire at 6-8 weeks postpartum (Time 2). This time
point is selected in many studies as a period when women have established some routine in
their home/family context, and some stability in their infant feeding behaviour. The project
gained ethical approval from the Lothian NHS Research Ethics Committee (Ref
10/S1102/55).

Sample Size.

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

Measures

Maternal demographics and Biomedical variables
Women’s education level has repeatedly been shown to influence breastfeeding rates (Barnes et al. 1997; McAndrew et al. 2012) and is a useful proxy for SES. We measured highest level of education, on a 5 point scale from 0=none to 4 = postgraduate qualification.

Smoking status (yes/no) was assessed as a potential predictor of breastfeeding maintenance. Mode of delivery (spontaneous vertex delivery (SVD), instrumental vaginal delivery (forceps/ventouse), caesarean section (emergency/elective) was collected from maternal records, and collapsed into ‘other’ (SVD and instrumental vaginal delivery) vs ‘caesarean section’ for analysis.

Breastfeeding status

Information about maternal breastfeeding behaviour was collected at Time 1 and 2.

Since ‘exclusive’ breastfeeding for the first 6 months is recommended (WHO 2009), we classified this behaviour at Time 1 as:

i) Exclusive breastfeeding: ‘No other liquids or solids are given to my baby apart from breastmilk’,

ii) Mixed feeding: ‘My baby receives both breastmilk and formula milk’.

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

iii) Exclusive formula feeding: ‘My baby no longer receives breastfeeds or breastmilk. I am currently feeding my baby with formula milk’.
For analysis we developed a dichotomous variable to measure breastfeeding maintenance, representing ‘any’ breastfeeding (exclusive or mixed) vs. none, i.e. ‘only’ formula feeding at Time 2.

**Psychosocial Measures**

Psychosocial measures were collected at both time points.

**Body Image**

The concept of ‘body image’ captures a range of attitudes towards the physical self. The experience of childbirth and becoming a mother presents a significant challenge to women’s physical self-concept (Lupton, 2012). We were interested in women’s appraisals of their body (evaluations, affective reactions) and overall importance of (investment in) their appearance, comparing women’s attitudes in the immediate postnatal period with 6-8 weeks later, and in relation to breastfeeding maintenance. We used a short version of a previously validated measure, which assesses ‘trait’ (long-term, stable, schema-based) appraisal, and ‘state’ (current, context dependent appraisals) aspects of body image to reflect women’s reactions to the challenges of childbirth and breastfeeding. The MBSRQ (Multidimensional Body-Self Relations Questionnaire; Cash, 2000; Cash, Fleming, Alindogan, Steadman & Whitehead, 2002) investigates appearance related concerns. Rather than using a total score, subscales representing different aspects of body image were developed by factor analysis of data from USA studies. All items are scored on 5 point scales from 1 ‘strongly disagree’ to 5 ‘strongly agree’. Item means were calculated by dividing by the number of items in the subscale, according to manual instructions (Cash 2000). Cronbach alpha values given below are from the current study (Time 1). The following appearance-related subscales were included:
Appearance Evaluation (7 Items): Feelings of physical attractiveness or unattractiveness and satisfaction or dissatisfaction with physical appearance. High scores reflect feeling mostly positive and satisfied with their appearance ($\alpha = .79$).

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

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

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

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

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

Analysis

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

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

Results

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

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

TABLE 1 ABOUT HERE

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

TABLE 2 ABOUT HERE

Obese women were more likely to give birth by caesarean section (39% compared to 16%).

Women who had a caesarean section were less likely to be exclusively breastfeeding at Time 1 (26, 68%) compared with those who had vaginal delivery (87, 85%), $\chi^2 (1) = 5.06, p=.03$).

Mode of delivery was not related to breastfeeding maintenance at Time 2.

Body Image, Weight status and Breastfeeding Maintenance

Correlations between breastfeeding maintenance at 6-8 weeks, weight status, body image and psychological distress at Time 2, are shown in Table 3. Education level and delivery method (vaginal vs. caesarean) were included as potential covariates. Body image variables were positively or negatively inter-correlated as expected. Appearance evaluation and body
satisfaction were highly inter-correlated (r=.83). After exploratory analyses we excluded ‘appearance evaluation’ from further regression analysis. Psychological distress was related to less breastfeeding maintenance, lower appearance evaluation and body satisfaction, and higher weight self-classification.

TABLE 3 ABOUT HERE

We used logistic regression to predict breastfeeding at 6-8 weeks. A model including only weight status (Nagelkerke R² = .06, p=.03; Wald 4.42, p=.035) was significant. Adding four body image variables (excluding appearance evaluation) increased variance predicted by 14% (Nagelkerke R² = .20), with body satisfaction being a significant predictor (B=1.7 (SE.60), Wald =7.98, p=.005). To assess moderation effects we included interactions (product terms) of weight status (healthy weight/obese) and body satisfaction, appearance orientation, overweight preoccupation and self-classified weight in a final block. This model was non-significant, (Nagelkerke R² = .21, n.s) suggesting no moderation effect.

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

TABLE 4 ABOUT HERE

Weight category significantly predicted breastfeeding maintenance at 6-8 weeks (p=.03), but became non-significant in subsequent models with education level, four body image variables, and psychological distress included. Body image variables predicted an additional
9% of variance. The final model was significant (predicting 31% of variance, p<.001).

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

As body satisfaction had previously been identified as a mediator of breastfeeding (Hauff & Demerath, 2012) we tested Time 2 body image variables as potential mediators of the relationship between weight status and breastfeeding maintenance at 6-8 weeks (Baron & Kenny 1986). Breastfeeding outcome (any breastfeeding vs no breastfeeding) was the dependent variable in separate logistic regression analyses with weight status entered first, followed by the potential mediator, using bootstrapping (BCa95%CI) to evaluate effects (Table 5).

TABLE 5 ABOUT HERE

Weight status was a significant predictor in model 1, but became non-significant with appearance evaluation, body satisfaction, overweight preoccupation and weight self-classification, suggesting partial mediation effects of these variables.

Changes in Body Image and Psychological Distress after Childbirth

We considered how body image changed from Time 1 to Time 2 for obese and healthy weight women. Table 6 shows mean body image scores at both time points for MBSRQ components comparing healthy weight and obese women.

TABLE 6 ABOUT HERE

Obese women had poorer body image at both time points, in relation to appearance evaluation and body satisfaction. Obese women recorded more overweight preoccupation
and higher weight self-classification with medium to large effects (partial eta²). There was no difference, or change over time in appearance orientation. Appearance evaluation and body satisfaction were significantly lower, irrespective of weight status at Time 2. Interactions (between weight status and time) were not significant. Overweight preoccupation increased significantly over time for both healthy weight and obese women, with no significant interaction effect. Self-classified weight did not change over time, however there was a significant interaction effect, whereby healthy weight women experienced a larger perceived increase between Time 1 and Time 2 (F(1,115) = 4.37, p=.035, eta² = .04).

We compared mean values for each of the MBSRQ subscales from the total sample at both time points with the published norms for US females aged 15 and over (Cash 2000), using one-sample t-tests, as shown in Table 6. Women’s appearance evaluation, appearance orientation and overweight preoccupation, were significantly lower (for both healthy weight and obese women) in our sample compared with norms (all p<.001). There was no difference in body satisfaction, or weight self-classification at Time 1 however, obese women had lower body satisfaction and higher weight self-classification than norms at Time 2.

Psychological Distress (GHQ)

There was no difference in psychological distress between obese and healthy weight women, or significant change in scores between Time 1 and Time 2, and no significant interaction. However, mean scores for both groups (at both time points) were close to the suggested 11/12 cut-off (Goldberg et al., 1997) indicating ‘caseness’ or psychological distress requiring intervention. We compared our Time 1 and Time 2 GHQ data with British
Household Survey data from women at 3-6 months postnatal (van Bussel, Spitz, & Demyttenaere, 2006), and found no significant difference.

**Discussion**

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

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

The primary research question focused on predicting breastfeeding maintenance (exclusive or mixed) at 6-8 weeks postnatal. We found all body image components, except appearance orientation were correlated with breastfeeding maintenance and weight status. Higher satisfaction and appearance evaluation were positively related to breastfeeding and
negatively related to weight status. Greater preoccupation with overweight and weight self-classification were negatively related to breastfeeding and positively related to weight status. In regression analysis including weight status, body image components as a block added significantly to the variance predicted. Individually, body satisfaction was a significant predictor, and appearance evaluation, body satisfaction, overweight preoccupation and weight self-classification mediated the relationship between weight status and breastfeeding to differing degrees. This replicates and extends findings from Hauff and Demerath’s (2012) study, showing body satisfaction and ‘comfort’ mediated breastfeeding in overweight and obese women (this study had a larger sample, but used a less reliable single-item measure of body satisfaction).

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

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

Psychological distress was also related to more body dissatisfaction, lower appearance evaluation and higher weight self-classification, but unrelated to weight status and not a significant predictor of breastfeeding maintenance in the final model. However, mean values exceeded accepted cut-offs for ‘caseness’, suggesting a need for psychological
new support for some women. New motherhood can be a period of intense positive and negative emotions. Whilst norms tend to emphasise happiness and wellbeing, it is important to recognise that some women may struggle to cope emotionally and practically with the demands of a new baby. Although breastfeeding is a positive, fulfilling and empowering experience for many women it can also be an additional source of stress, particularly where women experience negative emotional states related to embodied aspects of breastfeeding (Watkinson et al., 2016) or self-critical emotions such as failure, guilt or embarrassment, and this merits further study.

Few studies have examined changes in body image for women in the few weeks after childbirth. Compared with available US norms (Cash 2000), body image satisfaction was low in our sample. Unfortunately comparable norms were not available for postpartum women (see ‘limitations’, below). Although the immediate postnatal period is not an ideal time to obtain an accurate ‘baseline’ for women’s body image beliefs, it is suggested that aspects of body image have enduring trait characteristics which change little (Cash, 2002; Nevill, Lane & Duncan, 2015). This applied to appearance orientation (investment) which did not change, but we might have expected to see improvement in some body image perceptions as women moved from a post-pregnancy body, settling into early motherhood and a ‘new normality’ with a new baby. Instead, we found that overall satisfaction with components of body image reduced for all women between childbirth in hospital and 6-8 weeks postnatal, and this was significant for appearance evaluation, body satisfaction (which both reduced) and overweight preoccupation (which increased), confirming that some body image ‘states’ are context dependent. This dissatisfaction may also reflect undesirable social pressure for women to confirm to ideals and stereotypes (Grogan, 2007; Fern et al., 2012) which suggest ‘getting back to normal’ is seen as both desirable and
achievable post childbirth. Pressure to lose weight may be more overt (and hence stressful) for obese women who are stigmatised in relation to their weight and appearance (Puhl & Heuer, 2010). Overall, obese women reported lower body image satisfaction than healthy weight women in hospital postnatally, echoing other research (Hauff & Demerath, 2012; Zanardo et al., 2014) and similarly at 6-8 weeks postnatal. Different aspects of body image (reduced satisfaction, evaluation; increased overweight preoccupation and weight self-classification) changed for both obese and healthy weight women in the 6-8 weeks following childbirth.

Methodological Limitations

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

We deliberately compared discrete groups of healthy weight and obese women but recognise underweight and overweight women may also have different experiences of
breastfeeding. We categorised women’s weight according to case notes at booking in early pregnancy, acknowledging that this may have changed at Time 2. We followed up the sample at 6-8 weeks, a common time-point chosen in research, however longer follow-up of breastfeeding maintenance would have been useful in relation to assessing body image.

Our main outcome measure constructed to represent ‘breastfeeding’ versus ‘no breastfeeding’ at Time 2, also did not reflect how long women had breastfed on discharge from hospital, and may have lacked sensitivity, as many women switch to formula in the first 2 weeks post-discharge (McAndrew et al., 2012). Additionally, the study was slightly over-powered at Time 2, with potential for Type 1 error given a relatively large number of variables and multiple testing.

Conclusions and Recommendations for Research and Practice

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

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

The results have important implications for intervention for those supporting new mothers. Family, peers and health professional’s support targeted at individual women’s needs is particularly important in the first few weeks of motherhood (Hoddinott et al., 2012). Health promotion interventions normalising women’s post-pregnancy and breastfeeding bodies, and de-stigmatising weight issues in this context could encourage new mothers to focus on the body’s function, rather than form (Office of Surgeon General, 2011; Fern et al., 2012), increasing women’s breastfeeding and maternal confidence, and improve mental health and well-being in this important postnatal period. (4976)
References

Abraham, S., King, W., & Llewellyn-Jones, D. (1994) Attitudes to body-weight, weight-gain and eating behavior in pregnancy. *Journal of Psychosomatic Obstetrics & Gynecology*, 15, 189-195.

Ajzen, I. (1991) The theory of planned behaviour. *Organizational Behavior and Human Decision Processes*, 50, 179–211.

Amir, L.H., & Donath, S. (2007) A systematic review of maternal obesity and breastfeeding intention, initiation and duration. *BMC Pregnancy and Childbirth* 7:9, 1-14. doi:10.1186/1471-2393-7-9

Baby Friendly Health Initiative (2012) 10 Steps to Successful Breastfeeding. Available at: http://www.babyfriendly.org.au/about-bfhi/ten-steps-tosuccessful-breastfeeding/

Baker, J.L., Gamborg, M., Heitmann, B.L., Lissner, L., Sørensen, T.L.A., & Rasmussen, K.M. (2008) Breastfeeding reduces postpartum weight retention. *American Journal of Clinical Nutrition*, 8, 88, 1543–51.

Bandura, A. (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J.: Prentice-Hall.

Barnes, J., Stein, A., Smith, T., & Pollock, J.I. (1997) Extreme attitudes to body shape, social and psychological factors and a reluctance to breast feed. ALSPAC Study Team. Avon
Body Image and Breastfeeding Maintenance

Longitudinal Study of Pregnancy and Childhood. *Journal of the Royal Society of Medicine*, 90, 10, 551–559.

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.

Bobrow, K., Quigley, M., Green, J., Reeves, G., & Beral, V. (2009) The long term effects of childbearing and breastfeeding on body mass index in middle aged women, results from the Million Women Study. *Journal of Epidemiology and Community Health*, 63:56. Doi:10.1136/jech.2009.096727d.

Cai, X., Wardlaw, T., & Brown, D.W. (2012) Global trends in exclusive breastfeeding. *International Breastfeeding Journal*, 7, 12. Published online 2012 Sep 28. doi: 10.1186/1746-4358-7-12

Cash, T. F. (2000). *Users’ manuals for the Multidimensional Body-Self Relations Questionnaire, the Situational Inventory of Body-Image Dysphoria, and the Appearance Schemas Inventory*. Available from the author at [www.body-images.com](http://www.body-images.com)

Cash, T.F., Fleming, E.C., Alindogan, J., Steadman, L., & Whitehead, A. (2002) Beyond Body Image as a Trait: The Development and Validation of the Body Image States Scale. *Eating Disorders*, 10,103–113, DOI: 10.1080/10640260290081678
Body Image and Breastfeeding Maintenance

Daily Mail Newspaper, (2014) The Great Myth of Breastfeeding Weight Loss. Retrieved from the Internet, 1/6/16. www.dailymail.co.uk/.../The-great-myth-breastfeeding-weightloss-
New-mothers-told-...28 May 2014 -

Darwent, KL., McInnes, RJ., Swanson, V. (2016) The Infant Feeding Genogram: A tool for exploring family infant feeding history and identifying support needs. 2*
*BMC Pregnancy and Childbirth, 16:315, DOI 10.1186/s12884-016-1107-

Denison, F.C., Norwood, P., Bhattacharya, S., Duffy, A., Mahmood, T., Morris, C., Raja, E.A., Norman, J.E., Lee, A.J., & Scotland, G. (2014) Association between maternal body mass index during pregnancy, short-term morbidity, and increased health service costs: a population-based study. *British Journal of Obstetrics and Gynaecology*, 121, 1, 72-81. doi: 10.1111/1471-0528.12443.

Dennis, C-L. (2006) The Breastfeeding Self-Efficacy Scale: Psychometric Assessment of the Short Form *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 32, 6, 734-744.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.
Body Image and Breastfeeding Maintenance

Fern, V.A., Buckley B., Grogan, S. (2012) Women’s experiences of body image and weight loss after childbirth. *British Journal of Midwifery*, 20, 860-865.

Figueiredo, B., Canario, C., & Field, T. (2014) Breastfeeding is negatively affected by prenatal depression and reduces postpartum depression. *Psychological Medicine*, 44, 5, 927-936.

Foulkes, J.L., Dundas, K.C., & Denison, F.C. (2008) Infant feeding intentions of Scottish adolescents. *Scottish Medical Journal*. May, 53, 2, 9-11.

Francis, J.J., Eccles, M.P., Johnston, M., Walker, A., Grimshaw, J., Foy, R...Bonetti, D. (2004). *Constructing questionnaires based on the theory of planned behavior: A manual for health services researchers*. Newcastle upon Tyne: Centre for Health Services Research.

Goldberg, D.P. & Williams, D.P.M. (1988) *A user’s guide to the General Health Questionnaire*, NFER-Nelson, Windsor, Berks.

Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O., Rutter, C. (1997) The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, 191-197.
Body Image and Breastfeeding Maintenance

Grogan, S. (2008) *Body image: Understanding body dissatisfaction in men, women and children* (2nd ed): New York, NY, US: Routledge/Taylor & Francis Group.

Hauff, L.E., & Demerath, E.W. (2012) Body Image Concerns and Reduced Breastfeeding Duration in Primiparous Overweight and Obese Women. *American Journal of Human Biology, 24*, 339–349.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408-420.

Hilson, J.A., Rasmussen, K.M., Kjolhede, C.L. (2004) High pre-pregnant Body Mass Index is associated with poor lactation outcomes among rural white women independent of psychosocial and demographic correlates. *Journal of Human Lactation, 20*,1, 18-29.

Hodgkinson, P., Craig, L.C.A, Britten, J, & McInnes, R.J. (2012). A serial qualitative interview study of infant feeding experiences: idealism meets realism. *British Medical Journal Open, 2*:e000504. doi:10.1136/bmjopen-2011-000504

Hodgkinson, E.L., Smith, D.M.,& Wittkowski, A. (2014) Women’s experiences of their pregnancy and postpartum body image: a systematic review and meta-synthesis. *BMC Pregnancy and Childbirth, 23*, 14:330.
Huang, H., Wang, S., & Chen, C. (2004) Body image, maternal-fetal attachment, and choice of infant feeding method: A study in Taiwan. *Birth, 31*, 183-88

Information Statistics Division, Scotland. (2015). Breastfeeding Statistics Scotland. Scottish Government, 27th October 2015.

Keely, A., Lawton, J., Swanson, V., & Denison, F.C. (2015) Barriers to breast-feeding in obese women: A qualitative exploration. *Midwifery*. 31, 5, 532-9. doi: 10.1016/j.midw.2015.02.001.

Kronborg, H., Vaeth, M., & Rasmussen, K.M. (2012). Obesity and early cessation of breastfeeding in Denmark. *European Journal of Public Health*, 135, 316-322. DOI: http://dx.doi.org/10.1093/eurpub/cks135 316-322

Langellier, B.A., Pia Chaparro, M., & Whaley, S.E. (2012) Social and institutional factors that affect breastfeeding duration among WIC participants in Los Angeles County, California. *Maternal and Child Health Journal*, 16,9, 1887-1895. doi:10.1007/s10995-011-0937-z

Lawton, R., Ashley, L., Dawson, S., Waiblinger, D., & Conner, M. (2012) Employing an extended Theory of Planned Behaviour to predict breastfeeding intention, initiation, and maintenance in White British and South-Asian mothers living in Bradford. *British Journal of Health Psychology*, 4, 854-71. doi: 10.1111/j.2044-8287.2012.02083.x.
Body Image and Breastfeeding Maintenance

615
616  Leddy, M.A., Power, M.L., & Schulkin, J. (2008) The impact of maternal obesity on maternal
617  and fetal health. Review of Obstetrics and Gynecology. 1, 4,170-178.
618
619  Lupton, D. (2012) Configuring Maternal, Preborn and Infant Embodiment. Sydney Health &
620  Society Group Working Paper No. 2. Sydney: Sydney Health & Society Group. Available at
621  http://hdl.handle.net/2123/8363
622
623  McAndrew, F., Thompson, J., Fellows, L., Large, A., Speed, M., & Renfrew, M.J. (2012) UK
624  Infant Feeding Survey. NHS England, Health and Social Care Information Centre.
625
626  MacKinnon, D.P., & Luecken, L.J. (2008). How and for Whom? Mediation and Moderation
627  in Health Psychology. Health Psychology, 27, 2 (Suppl), S99 doi: 10.1037/0278.
628
629
630  McMillan, B., Conner, M., Green, J. Dyson, L., Renfrew, M, & Woolridge, M. (2009) Using an
631  extended theory of planned behavior to inform interventions aimed at increasing
632  breastfeeding uptake in primiparas experiencing material deprivation. British Journal of
633  Health Psychology, 14, 379–403
634
635  Marshall, J.L., Godfrey, M., Renfrew, M.J. (2007) Being a ‘good mother’: Managing
636  breastfeeding and merging identities. Social Science & Medicine, 65, 2147–2159. doi:
637  10.1016/j.socscimed.2007.06.015
638
Body Image and Breastfeeding Maintenance

Meier, B. P., Schnall, S., Schwarz, N., Bargh, J.A. (2012). Embodiment in Social Psychology.
Topics in Cognitive Science, 4, 4, 705–716. DOI: 10.1111/j.1756-8765.2012.01212.x

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M.P., Cane, J., Wood, C.E. (2013) The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. Annals of Behavioral Medicine, 46, 1,81-95. doi: 10.1007/s12160-013-9486-6.

Mina, T.H., Denison, F.C., Forbes, S., Stirrat, L.I., Norman, J.E., & Reynolds, R.M. (2015) Associations of mood symptoms with ante- and postnatal weight change in obese pregnancy are not mediated by cortisol. Psychological Medicine, 45, 15, 3133-46. doi: 10.1017/S0033291715001087.

Mok, E., Multon, C., Piguel, L., Barroso, E., & Goua, V. (2008) Decreased full practices, perceptions and infant weight change in infants of pre-pregnant obese women: a need for extra support Pediatrics, 121, 5 e1319-1324

Nevill, A.M., Lane, A.M., & Duncan, M.J. (2015) Are the Multidimensional Body Self-Relations Questionnaire Scales stable or transient?, Journal of Sports Sciences, 33,18, 881-1889. DOI: 10.1080/02640414.2015.1018930
Oakley, L.L., Renfrew, M.J., Kurinczuk, J.J., & Quigley, M.A. (2013) Factors associated with breastfeeding in England: an analysis by primary care trust. *BMJ Open*; 3:e002765
doi:10.1136/bmjopen-2013-002765

Office of the Surgeon General (US), (2011). The Surgeon General's Call to Action to Support Breastfeeding. Rockville (MD): Office of the Surgeon General (US); *Barriers to Breastfeeding in the United States*. Available from: http://www.ncbi.nlm.nih.gov/books/NBK52688

Orbach, S., & Ruben, H. (2014) *Two for the price of one. The impact of body image during pregnancy*. UK Department for Culture, Media & Sport and Government Equalities Office

Pampel, F.C., Denney, J.T., & Krueger, P.M. (2012). Obesity, SES, and Economic Development: A Test of the Reversal Hypothesis. *Social Science and Medicine* 74, 7. 1073-81.

Preacher, K.J., & Hayes, A.F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers*, 36, 717-721.

Puhl, R.M., & Heuer, C.A. (2010) Obesity Stigma: Important Considerations for Public Health. *American Journal of Public Health*, 100, 6, 1019–1028. doi: 10.2105/AJPH.2009.159491

Renfrew, M.J., Wallace, L.M., D’Souza, L., McCormick, F., Spiby, H, & Dyson, L. (2005). *The effectiveness of public health interventions to promote the duration of breastfeeding*: 
systematic reviews of the evidence. National Institute for Health and Clinical Excellence, London.

Sassi, F., Devaux, M., Cecchini, M., & Rusticelli, E. (2009). The Obesity Epidemic: Analysis of Past and Projected Future Trends in Selected OECD Countries. OECD Health Working Papers, France, 45, 81. DOI:10.1787/225215402672

Schmied, V.M., Duff, M., Dahlen, H.G., Mills, A.E., & Kolt, G.S. (2011) ‘Not waving but drowning’; a study of the experiences and concerns of midwives and other health professionals caring for obese childbearing women Midwifery, 27,4, 424-430.

Scott, J.A., Kwok, Y.Y., Synnott, K., Bogue, J., Amarri, S., Norin, E., Gil, A., Edwards, C.A., INFABIO Project Team. (2015) A Comparison of Maternal Attitudes to Breastfeeding in Public and the Association with Breastfeeding Duration in Four European Countries: Results of a Cohort Study. Birth, 42, 1, 75-86.

Sheeran, P., Gollwitzer, P. M., & Bargh, J. A. (2013). Nonconscious processes and health. Health Psychology, 32, 460–473. doi:10.1037/a0029203

Stewart-Knox, B., Gardiner, K., & Wright, M. (2003) What is the problem with breastfeeding? A qualitative analysis of infant feeding perceptions. Journal of Human Nutrition and Diet, 16, 265–273.
Body Image and Breastfeeding Maintenance

Stuebe, A.M., & Bonuck, K. (2011) What predicts intent to breastfeed exclusively? Breastfeeding knowledge, attitudes, and beliefs in a diverse urban population. *Breastfeeding Medicine: The Official Journal of the Academy of Breastfeeding Medicine*. 6, 6,413-20.

Swanson, V., & Power, K.G. (2004) Attitudes and normative beliefs: factors influencing initiation and continuation of breastfeeding. *Journal of Advanced Nursing*. 50, 3, 272-282.

Swanson, V., Power, K.G., Kaur, B., Carter, H. & Shepherd, K. (2006) The impact of knowledge and social influences on adolescents’ breastfeeding beliefs and intentions. *Public Health Nutrition*, 9, 3, 297-305.

Swanson, V., Nicol, H., McInnes, R., Cheyne, H., Mactier, H., & Callander, E. (2012) Developing Maternal Self-efficacy for Feeding Pre-term Babies in the Neonatal Unit. *Qualitative Health Research*. 22, 10, 1-14. doi:10.1177/1049732312451872

Thome, M., Alder, E.M., & Ramel, A. (2006) A population-based study of exclusive breastfeeding in Icelandic women: is there a relationship with depressive symptoms and parenting stress? *International Journal of Nursing Studies*, 43, 1, 11–20. DOI: http://dx.doi.org/10.1016/j.ijnurstu.2004.10.009

Thompson, L.A., Zhang, S., Black, E., Das, R., Ryngaert, M., Sullivan, S., Roth, J. (2012) The Association of Maternal Pre-pregnancy Body Mass Index with Breastfeeding Initiation. *Maternal Child Health Journal*, (published online) DOI 10.1007/s10995-012-1204-7
van Bussel, J.C.H., Spitz, B., & Demyttenaere, K. (2006) Women’s Mental Health Before, During, and After Pregnancy: A Population-Based Controlled Cohort Study. *Birth*, 33, 4, 297-302.

Victora, C.G., Bahl, R., Barros, A.J.D., França, G.V.A., Horton, S., Krasevec, J., Murch, M., Sankar, J., Walker, N., & Rollins, N.G. For The Lancet Breastfeeding Series Group. (2016) Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet*, 30 January–5 February, 475–490.

Virden, S. F. (1988). The relationship between infant feeding method and maternal role adjustment. *Journal of Nurse-Midwifery*, 33, 31–33. doi: 10.1016/0091-2182(88)90246-7

Watkinson, M., Murray, C., Simpson, J. (2016) Maternal experiences of embodied emotional sensations during breast feeding: An Interpretative Phenomenological analysis. *Midwifery*, 36, 53–60.

Wojcicki, J.M. (2011) Maternal pre-pregnancy body mass index and initiation and duration of breastfeeding: a review of the literature. *Journal of Women’s Health (Larchmt)*. 20, 3, 341-7. doi: 10.1089/jwh.2010.2248.
World Health Organization. (2009). Baby-friendly hospital initiative. Revised, updated, and expanded for integrated care. Retrieved from: http://www.who.int/nutrition/publications/infantfeeding/bfhi_trainingcourse/en/.

Zanardo, V., Gambina, I., Nicolo, M.E., Giustardi, A., Cavallin, F., Straface, G., Trevisanuto, D. (2014) Body image and breastfeeding practices in obese mothers. Eating & Weight Disorders, 19,1, 89-93. http://dx.doi.org/10.1007/s40519.
### Table 1: Women’s Breastfeeding Status at Time 1 (In hospital) and Time 2 (6-8 Weeks Postnatal)

| FEEDING METHOD          | Exclusive Breastfeeding | Mixed feeding | Exclusive Formula Feeding | $\chi^2$, p |
|-------------------------|-------------------------|---------------|---------------------------|-------------|
| **Time 1**              |                         |               |                           |             |
| n=70 Healthy            | 62 (89%)                | 8 (11%)       | -                         | $\chi^2$ (1) = 5.56, p=.018 |
| n=70 Obese              | 51 (73%)                | 19 (27%)      | -                         |             |
| **TOTAL**               | 113                     | 27            | -                         |             |
| **Time 2**              |                         |               |                           |             |
| n=60 Healthy            | 32 (53%)                | 18 (30%)      | 10 (17%)                  | $\chi^2$ (2) = 5.93, p=.052 |
| n=58 Obese              | 25 (43%)                | 12 (21%)      | 21 (36%)                  |             |
| **TOTAL**               | 57                      | 30            | 31                        |             |
### Table 2: Participant characteristics at Time 1 (In hospital)

| Characteristic                  | Healthy Weight | Obese         | P    |
|--------------------------------|----------------|---------------|------|
|                                | N=70           | N=70          |      |
| **Age (years)**¹               | 32.7 (5.2)     | 31.4 (5.5)    | 0.15 |
| **BMI (kg/m²)**¹               | 22.7 (1.7)     | 35.6 (4.6)    | N/A  |
| **Baby weight (g)**¹           | 3519 (450)     | 3510 (563)    | 0.92 |
| **Parity**²                    |                |               | 0.32 |
| 0                              | 43 (61%)       | 43 (61%)      |      |
| 1-2                            | 26 (37%)       | 23 (32%)      |      |
| 3+                             | 1 (1%)         | 4 (7%)        |      |
| **Delivery**²                  |                |               | 0.009|
| SVD                            | 45 (64%)       | 31 (44%)      |      |
| Instrumental Vaginal           | 14 (20%)       | 12 (17%)      |      |
| CS                             | 11 (16%)       | 17 (39%)      |      |
| **Baby Gender**²               |                |               | 0.61 |
| Male                           | 34 (49%)       | 30 (43%)      |      |
| Female                         | 36 (51%)       | 40 (57%)      |      |
| **Smoke**²                     |                |               | 0.65 |
| No                             | 60 (86%)       | 57 (81%)      |      |
| Ever                           | 10 (14%)       | 13 (19%)      |      |
| **Education**²                 |                |               | 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%)      |      |

Key: ¹ Mean (SD), ² N (%), BMI – Body Mass Index; SVD – Spontaneous Vertex Delivery; CS - Caesarean Section
Table 3: Pearson Correlations between Breastfeeding\(^a\), Education Level, Delivery Method\(^b\), Body Image (MBSRQ) and Psychological Distress at Time 2 (6-8 weeks)

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

\(^a\)Breastfeeding, 1 = no breastmilk; 2 = any breastmilk; \(^b\)Delivery Method 1 = Vaginal, 2 = Caesarean Section
Table 4: Logistic Regression Predicting Breastfeeding at 6-8 weeks from Weight status, Education level, Delivery Method, Body Image (MBSRQ) and Psychological Distress at Time 2 (6-8 weeks)

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

|                             | Score 1 | Score 2 | Score 3 |
|-----------------------------|---------|---------|---------|
| preoccupation               |         |         |         |
| Self-classification          | -.14 (.57) | .06    | .80     |
| Psychological Distress       | -.03 (.05) | .18    | .67     |

*Nagelkerke R²*
Table 5: Logistic Regression Models investigating Body image variables (Time 2) as mediators of the relationship between weight status and breastfeeding at 6-8 weeks

| Body Image          | B (SE)     | Wald (p)  | Exp B  | BCa 95% CI Lower | BCa 95% CI Upper |
|---------------------|------------|-----------|--------|-----------------|-----------------|
|                     |            |           |        |                 |                 |
| Appearance evaluation |           |           |        |                 |                 |
| Model 1             |            |           |        |                 |                 |
| Weight status       | 1.08 (.44) | 5.91 (.015)| 2.90  | 1.23            | 7.01            |
| Model 2             |            |           |        |                 |                 |
| Weight status       | .83 (.47)  | 3.08 (.08) | 2.31  | .91             | 5.86            |
| Appearance Evaluation |        |           |        |                 |                 |
|                      | .47 (.35)  | 1.86 (.17) | 1.60  | .81             | 3.18            |
| Appearance orientation |        |           |        |                 |                 |
| Model 1             |            |           |        |                 |                 |
| Weight status       | 1.02 (.44) | 5.36 (.02) | 2.78  | 1.17            | 6.72            |
| Model 2             |            |           |        |                 |                 |
| 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            |
| Body satisfaction    |            |           |        |                 |                 |
| Model 1             |            |           |        |                 |                 |
| Weight status       | .99 (.44)  | 5.01 (.025)| 2.73  | 1.13            | 6.45            |
| Model 2             |            |           |        |                 |                 |
| Weight status       | .32 (.50)  | .42 (.52)  | 1.38  | .52             | 3.65            |
| Overweight preoccupation |        |           |        |                 |                 |
|                     | 1.40 (.45) | 9.79 (.002)| 4.07  | 1.69            | 9.81            |
### Body Image and Breastfeeding Maintenance

| Model 1 | Weight status | 1.00 (.45) | 5.01 (.03) | 2.74 | 1.13 | 6.61 |
|---------|----------------|-------------|-------------|------|------|------|
| Model 2 | Weight status | .69 (.49)   | 1.99 (.16) | 1.99 | .76  | 5.21 |
|          | Overweight     | -.49 (.30)  | 2.57 (.11) | .61  | .34  | 1.12 |
|          | preoccupation  |             |             |      |      |      |
| **Self-**| **classification** |             |             |      |      |      |
| Model 1 | Weight status | 1.07 (.44)  | 5.84 (.02) | 2.91 | 1.22 | 6.97 |
| Model 2 | Weight status | .61 (.66)   | .84 (.35)   | 1.84 | .50  | 6.77 |
|          | Self-          | .41 (.44)   | .86 (.35)   | 1.50 | .64  | 3.53 |
|          | classification |             |             |      |      |      |
Table 6: Means, Group Comparisons, and Normative Comparisons for Multidimensional Body-Self Relations Questionnaire (MBSRQ) Items, and Psychological Distress (GHQ), Comparing Healthy Weight and Obese Women at Time 1 (After Childbirth) and Time 2 (6-8 weeks postnatal).

|                      | Time 1      | Time 2      | Effect | $F$, $p$ (1,114) | Partial Eta$^2$ | Norm$^a$ | $P^2$ |
|----------------------|-------------|-------------|--------|------------------|-----------------|----------|-------|
| **Appearance Evaluation$^1$** |             |             |        |                  |                 |          |       |
| Healthy Weight       | 3.48 (.44)  | 3.11 (.64)  | Time   | 29.21, p<.001    | .21             | 3.4 (.87) | p<.001 |
| Obese                | 2.75 (.60)  | 2.57 (.63)  |        |                  |                 |          |       |
| Weight Status        |             |             |        | 42.51, p<.0001   | .27             |          |       |
| **Appearance Orientation$^1$** |             |             |        |                  |                 |          |       |
| Healthy Weight       | 2.16 (.46)  | 2.09 (.41)  | Time   | 3.09, p=.08      | .03             | 3.9 (.60) | p<.001 |
| Obese                | 2.07 (.44)  | 2.07 (.41)  |        |                  |                 |          |       |
| Weight Status        |             |             |        | .62, p=.43       | .005            |          |       |
| **Body satisfaction$^1$** |             |             |        |                  |                 |          |       |
| Healthy Weight       | 3.71 (.32)  | 3.41 (.54)  | Time   | 25.30, p<.001    | .18             | 3.2 (.07) | p=.07  |
| Obese                | 2.94 (.56)  | 2.80 (.50)  |        |                  |                 |          |       |
| Weight Status        |             |             |        | 74.09, p<.0001   | .39             |          |       |
| **Overweight preoccupation$^1$** |             |             |        |                  |                 |          |       |
| Healthy Weight       | 2.12 (.70)  | 2.26 (.70)  | Time   | 14.28, p<.001    | .12             | 3.0 (.96) | p<.001 |
| Obese                | 2.74 (.78)  | 2.93 (.76)  |        |                  |                 |          |       |
| Weight Status        |             |             |        | 23.25, p<.0001   | .39             |          |       |
|                          | 3.02 (.34) | 4.32 (.51) | 3.17 (.38) | 4.31 (.56) | Time       | 3.46, p=.07 | .02       | 3.6 (.73) | p=.09     |
|--------------------------|------------|------------|------------|------------|------------|-------------|-----------|-----------|-----------|
| Self - Classification¹   |            |            |            |            | **Weight** | 263.48, p<.0001 | .70       | -         | -         |
|                          |            |            |            |            | **Status** |             |           |           |           |
| Psychological Distress (GHQ)¹ | 11.05(4.5) | 13.09(4.8) | 11.98 (5.3) | 12.42 (6.0) | **Time**   | .06, p=.90 | .01       | 11.16 (5.4) | p=.24     |
|                          |            |            |            |            | **Weight** | 1.66, p=.20 | .02       | -         | -         |
|                          |            |            |            |            | **Status** |             |           |           |           |

¹Mean (SD); ²One sample t-tests for whole sample Time 1 and Time 2
³Norms from Cash (2002); Comparison data from van Bussell et al. (2006)