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7 **Body image concerns during pregnancy are associated with a**
8 **shorter breast feeding duration**

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25 **Abstract**

26

27 Objective: Breastfeeding is affected by numerous psycho-social factors. Prenatal
28 concerns such as embarrassment regarding public feeding and the impact of
29 breastfeeding upon breast shape are known to lead to formula use. However,
30 although work has explored the relationship between maternal weight and infant
31 feeding, wider body image concerns have not been examined. The aim of the current
32 study was to explore the association between maternal body image concerns during
33 pregnancy upon intended and actual breastfeeding duration.

34 Design: A two stage self report questionnaire completed during pregnancy and at six
35 months postpartum

36 Setting: Mothers were recruited from local mother and infant groups, nurseries and
37 online mother and infant forums.

38 Participants : One hundred and twenty eight pregnant women completed both
39 stages

40 Measures: Phase One: Completion of a questionnaire exploring body image during
41 pregnancy (concerns about stretch marks, weight gain and appearance) and planned
42 breastfeeding duration during the second/third trimester of pregnancy (body image,
43 weight, intended duration) followed by a second questionnaire measuring actual
44 breastfeeding duration and breastfeeding experiences.

45 Findings: Factor analysis revealed three primary body image concerns; pregnancy
46 body image, prospective postnatal body image and dieting during pregnancy. Higher
47 concerns on all three factors were associated with both intended and actual shorter
48 breastfeeding duration. Amongst mothers who stopped breastfeeding before six
49 months, those with higher body image concerns were more likely to report stopping
50 due to embarrassment or the perceived impact upon their breast shape. The
51 relationship was not explained by maternal weight, although a higher residual
52 weight gain at six months was associated with a shorter breastfeeding duration.

53 Conclusions and implications for practice: Mothers who are affected negatively by

54 changes to their body during pregnancy may be less likely to plan to or initiate
55 breastfeeding potentially due to underlying issues such as embarrassment or
56 perceived impact of feeding upon their appearance. The findings are important to
57 those working with women during pregnancy and the postpartum period in
58 understanding the impact of body image upon intention and ability to initiate and
59 continue breastfeeding.

60

61 Key words: breastfeeding; body image; weight gain; attitudes; public feeding

62 **Key Messages**

63

64 • Body image during pregnancy predicts both intended and actual
65 breastfeeding duration; higher body image concerns are associated with
66 formula use

67

68 • This relationship is not explained by weight alone, although residual higher
69 weight gain at six months postpartum predicts a shorter breastfeeding
70 duration

71

72 • Body image concerns are associated with stopping breastfeeding due to
73 embarrassment and concerns about public feeding

74

75 • Perceptions about breastfeeding and its impact on appearance affect
76 breastfeeding duration

77 **Introduction**

78 The World Health Organisation recommends exclusive breastfeeding for the first six
79 months postpartum (WHO 2003). However, levels of breastfeeding in the UK are
80 low; although 81% of women may initiate breastfeeding at birth, there is a sharp fall
81 in continuation rates with only 55% feeding by six weeks postpartum (McAndrew,
82 Thompson, Fellows, Large, Speed & Renfrew, 2012).

83

84 Low breastfeeding rates can be explained by physical problems (such as pain,
85 difficulty latching the infant on and exhaustion) but are also heavily driven by social
86 and psychological factors. Mothers who lack social and professional support, feel
87 they have little knowledge and confidence and are pressurized by others to stop
88 breastfeeding are all more likely to use formula (Li et al, 2009; Thulier & Mercer,
89 2008; Brown, Raynor & Lee, 2011).

90 How a woman feels about her body has also been associated with breastfeeding.
91 Women who feel embarrassed at breastfeeding in front of others or in public or who
92 dislike the changes they believe breastfeeding may bring to their breasts are less
93 likely to initiate or continue breastfeeding (Haughton, Gregorio & Perez-Escamilla,
94 2010; Alexander, Dowling & Furman, 2010; Wambach & Cohen, 2009; Dyson, Green,
95 Renfrew, McMillan & Woolridge, 2010). Additionally, issues with seeing the breast as
96 sexual rather than something to feed an infant or wanting to reclaim their body for
97 themselves after pregnancy can impede breastfeeding (Drummond & Willis, 2012;
98 Kukla, 2006; Ogbuanu, Probst, Laditka, Liu, Baek & Glover, 2009; Angell, 2006).
99 Finally, breastfeeding has been associated with maternal weight. Mothers who are
100 overweight or obese are less likely to initiate or continue breastfeeding ((Kitsantas &
101 Pawloski, 2009; Hilson, Rasmussen & Kjolhede, 2004).

102 Weight gain (within the recommended range) and changes in body shape and
103 appearance are an expected and healthy element of pregnancy. However, growing
104 numbers of women appear to be concerned about their weight gain and appearance
105 during pregnancy and may be at risk of developing a negative body image (Skouteris,
106 2011). Body image describes the cognitive, affective and behavioural aspects of
107 one's body (Cash, Fleming, Alindogan Steadman & Whitehead, 2002). Negative body

108 image is common during pregnancy (Skouteris, Carr, Wertheim, Paxton, &
109 Duncombe, 2005) and extends to the postnatal period (Clark, Skouteris, Werthei,,
110 Paxton & Milgrom, 2009; Duncombe, Wertheim, Skouteris, Paxton & Kelly, 2008).
111 Women can be distressed by bodily changes in pregnancy, although some report
112 feeling liberated (Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2008; Goodwin,
113 Astbury, & McMekken, 2000). Pregnancy can trigger or intensify negative feelings
114 about the body or disordered eating (Conrad, Schablewski, Schilling, & Liedtke, 2003;

115 Body image dissatisfaction during pregnancy can have a negative impact on both
116 mother and baby. It can be linked to unhealthy eating, dieting and purging
117 behaviours (Conti, Abraham, & Taylor, 1998). In turn these behaviours increase the
118 risk of low infant birth weight and premature delivery (Kaiser, 2002; Olafsdottir, et
119 al., 2006) with higher levels of miscarriage (Franko, 2006) and caesarean delivery
120 (Franko et al., 2001) amongst pregnant women with disordered eating. Conversely,
121 poor body image can sometimes be associated with increased weight gain as the
122 woman binges or comfort eats (Devine, Bove, & Olson, 2000; Mumford, Siega-Riz,
123 Herring, & Evenson, 2008; Swann et al., 2009), a factor that has been associated with
124 infant macrosomia , caesarean section and later childhood overweight (Amorim,
125 Rossner, Neovius, Lourenco, & Linne, 2007; Olson, 2008; Siega-Riz et al., 2009;
126 Olson, Strawderman, & Dennison, 2009).

127 However, although the association between breastfeeding and maternal weight and
128 self image related to breastfeeding has been examined, there is little work,
129 particularly in the UK, exploring wider body image concerns during pregnancy such
130 as changing shape and weight gain and breastfeeding duration. Earlier work found
131 that pregnant women with increased concern about their body shape or weight
132 were less likely to intend to breastfeed (Barnes, Stein, Smith & Pollock, 1997).
133 Similarly, a small qualitative study (n = 38) found that body shape concerns were
134 associated with intention to formula feed (Foster et al., 1996). More recently, in
135 Taiwan, pregnant women who rated their pre-pregnancy body image more positively
136 were more likely to plan to breastfeed. Finally, research has suggested that women
137 with anorexia are less likely to breastfeed (Larsson & Andersson-Ellstrom, 2003;
138 Torgersen, Ystrom & Haugen, 2010).

139

140 The aim of the current study was to explore body image concerns in first time
141 pregnant women and examine their association with later breastfeeding initiation
142 and duration.

143

144 **Methodology**

145 ***Participants***

146 Primiparous pregnant women who were in the second or third trimester of
147 pregnancy (13 – 42 weeks) took part in the study. Participants provided demographic
148 background (age, education, marital status, occupation).

149

150 All participants gave informed consent prior to inclusion in the study. Ethics approval
151 was granted by a Department of Psychology Research Ethics Committee. All aspects
152 of this study have been performed in accordance with the ethical standards set out
153 in the 1964 Declaration of Helsinki.

154

155 Participants were recruited through local antenatal classes / mother and baby
156 groups / community centers who encouraged pregnant women to attend and
157 through online pregnancy and mother and baby forums. Women could either
158 complete the questionnaire via a paper copy (used at face to face groups) or online
159 via an online questionnaire designed and hosted using SurveyMonkey.

160

161 ***Questionnaire***

162 Participants completed two questionnaires. The first, in phase one during pregnancy,
163 examined their body image, pre pregnancy weight and height and intended mode of
164 infant feeding at birth and if relevant intended breastfeeding duration. A body image
165 questionnaire was constructed specifically for the study (Table one). Although
166 numerous validated body image questionnaires exist (e.g. The Body Esteem Scale
167 [Franzoi & Shields, 1984], the Body Shape Questionnaire [Cooper, Taylor, Cooper &
168 Fairbum, 1987], body self relations questionnaire [Brown, Cash & Mikulka, 1990])

169 these have not been validated for use in pregnancy. Questions have been raised
170 over their suitability and validity at this time (Fuller-Tyszkiewicz, Skouteris, Watson &
171 Hill, 2012). Furthermore, the study wished to examine specific body image concerns
172 related to pregnancy e.g. weight gain, stretch marks, concerns about appearance of
173 body postnatally rather than more generic concerns. Items were based on current
174 literature examining body image during pregnancy (e.g Skouteris et al, 2005; Clark et
175 al, 2009; Duncombe et al 2008) and discussion with mothers regarding body issues
176 that were associated with breastfeeding [Author A previous work]

177

178 In phase two, the second questionnaire was completed at six months postpartum
179 and examined mode of infant feeding at birth, any breastfeeding duration and if
180 relevant, reasons for breastfeeding cessation. Infants who were born prematurely,
181 who were low birth weight or who had significant health difficulties were excluded
182 from the sample. Participants also provided mode of delivery (caesarean / vaginal
183 birth). The items for breastfeeding cessation questionnaire was based on author A's
184 previous work (add ref after review). Items were based on factors known to affect
185 breastfeeding cessation in the current literature and previous published work
186 (Thulier & Mercer, 2008; Li et al, 2009).

187

188 Mothers provided height and pre pregnancy BMI at phase one and current weight
189 (postnatal weight) at phase two (around 6 months postpartum). Weight and weight
190 change were not the primary measures of the study but were collected and
191 computed to explore whether body image itself, rather than weight was indicative of
192 breastfeeding duration. Although the two are correlated, it is possible to have poor
193 body image at a healthy weight. Moreover, body image is a wider concept than
194 weight alone, particularly during pregnancy where changes to breast shape, skin
195 elasticity and skin (e.g. stretch marks) are common.

196

197 ***Data collection***

198 In phase one, for the face-to-face groups, permission was initially sought from the
199 group leader. The group leader distributed the questionnaire to mothers who
200 returned it to the group in a sealed envelope. For the online version of the

201 questionnaire permission was sought from the host of various online parenting
202 groups (e.g. www.mumsnet.com; www.bounty.com). Details of the questionnaire
203 were then posted online with a link to the online version of the questionnaire. Both
204 questionnaires included a participant information sheet and debrief with details of
205 how to contact the researcher for further details or professional bodies if they had
206 any concerns regarding pregnancy or infant care. Participants gave consent for phase
207 two contact at phase one.

208

209 In phase two participants were either emailed a link to the follow up questionnaire
210 or sent a paper version in the post dependent on indicated preference at phase one.

211

212 **Data Analysis**

213 Data was analysed using SPSS version 16.

214

215 Three weight measures were computed; pre pregnant BMI, postnatal BMI and
216 weight change. Pre pregnant BMI was used to explore the main associations with
217 body image as participants were pregnant at the time of completing the body image
218 questionnaire. Weight change during pregnancy was also used as it was considered a
219 potential measure of how much weight participants were gaining during pregnancy.
220 Postnatal BMI was collected to use as a covariate in the analyses as postnatal BMI is
221 associated with breastfeeding duration (as well as to compute weight gain).
222 Maternal height and pre pregnant / postnatal weight were used to compute pre
223 pregnant /postnatal BMI. Maternal postnatal weight and pre pregnant weight was
224 used to compute weight difference at six months postpartum (e.g. weight gain or
225 loss from pre pregnant weight).

226

227 For the items related to body image, exploratory factor analysis was conducted to
228 determine items groupings. Using SPSS, a principal components factor analysis using
229 varimax rotation was performed, retaining factors with eigenvalues over 1. A
230 threshold of 0.5 was used to determine which variables should be retained. Further
231 analyses performed on split samples of the data for confirmation found similar
232 structures. The factor scores computed were saved as regression scores and used for

233 the data analysis (Tabachnik & Fidell, 2006). Cronbach's alpha was computed for
234 each factor to examine internal consistency of the factors produced.

235

236 Although the items for breastfeeding cessation questionnaire had been used in
237 previous research, exploratory factor analysis was used to group items. This ensured
238 greater reliability of item grouping. The method used was as above. Factors and item
239 groupings reflected previous research. Cronbach's alpha was computed for each
240 factor to check internal validity.

241

242 In addition, although the regression scores were used in the main analyses, for
243 clearer understanding of the descriptive data, factor scores were computed for each
244 of the three body image variables. The mean score for items loading onto each
245 variable was computed for each participant. Likert scales were converted to
246 numbers from one for strongly disagree through to five for strongly agree and mean
247 score calculated for each factor.

248

249 MANCOVA were then used to examine differences in body image scales for women
250 who intended to breast or formula feed at birth and postnatally for feeding method
251 at birth (breast / formula) and any breastfeeding at two, six, twelve and twenty six
252 weeks. Pearson r correlations were used to explore associations between body
253 image and reasons for breastfeeding cessation. Maternal age, education, marital
254 status and occupation were controlled for alongside maternal BMI and birth mode
255 [vaginal/ caesarean].

256

257 **Results**

258 One hundred and twenty eight mothers completed both phases of the
259 questionnaire. The mean age of participants was 29.34 [SD: 5.52] (range 18 – 40).
260 Mean number of years in education was 13.03 [SD: 2.28]. Seventy two (58.2%) were
261 in their second trimester and fifty one (39.8%) in their third trimester. Gestation
262 ranged from 13 to 40 weeks with a mean stage of 24.20 weeks (SD: 8.97). Further
263 details of the sample can be found in table 3.

264

265 Both planned (Pearson's $r = .167$, $p = .030$) and actual breastfeeding duration
266 (Pearson's $r = .210$, $p = .009$) were significantly associated with maternal age.
267 Moreover, the more years experience in education a mother had, the longer she
268 planned (Pearson's $r = .155$, $p = .040$) and did breastfeed (Pearson's $r = .207$, $p =$
269 $.009$).

270

271 No significant difference occurred in any of the body image scales for mothers in
272 trimester two or three in phase one.

273

274 No significant difference occurred in planned or actual breastfeeding duration,
275 maternal pre or postnatal weight, body image or maternal age and education
276 between mothers recruited online or face to face.

277

278 ***Breastfeeding duration***

279

280 Participants indicated whether they planned to breast or formula feed at birth. One
281 hundred and ten participants (85.9%) planned to breastfeed whilst 18 (14.1%)
282 planned to formula feed.

283

284 At six months postpartum, mothers reported feeding mode at birth and any
285 breastfeeding at two, six, twelve and twenty six weeks postpartum. One hundred
286 and two participants breastfed at birth (83.6%) whilst 21 formula fed (16.4%).
287 Breastfeeding duration can be found in table four.

288

289 ***BMI and weight gain***

290 Participants reported pre-pregnant height and weight from which pregnancy BMI
291 was computed. 12 were classed as underweight (9.4%), 58 a normal weight (64.4%)
292 and 31 overweight or obese (24.2%). For postnatal BMI, only five mothers were
293 considered to have an underweight BMI (3.9%), 77 a normal BMI (60.2%) and 46
294 were overweight or obese (35.9%).

295

296 Participant weight change between pre pregnant and postnatal weight was also
297 computed. Although the mean weight change was a gain of 1.3kg (SD: 8.37), a wide
298 range of weight change was seen from a gain of 26 kg to a loss of 20 kg. 53.5% of
299 participants were heavier at six months postpartum compared to their pre pregnant
300 weight, 11.7% the same weight and 34.8% had lost weight. A significant association
301 between pre pregnant weight and weight gain was found (Pearson's $r = -.227$, $p =$
302 $.005$). Mothers who had a lower weight before pregnancy were significantly heavier
303 after pregnancy.

304

305 ***Body Image***

306 Principal components factor analysis was performed on all items examining body
307 image producing 3 factors and explaining 58.07% of the variance (Table 1). Factors
308 were labeled 'pregnancy body image' (thoughts about pregnancy body), 'prospective
309 postnatal body image' (concerns about how body would appear postnatally) and
310 'dieting during pregnancy' (active dieting during pregnancy). All items loaded highly
311 onto a factor. One item 'I worry about stretch marks' loaded highly onto both
312 pregnancy and postnatal factors and was included in each. Regression scores for
313 each factor were computed and used for comparison. Cronbach's alpha was also
314 computed for each factor, ranging from .729 to .782 and is also shown in Table 1.

315

316 Using the descriptive mean scores for each factor, body image was explored. Overall,
317 a wide variety of body image was seen amongst women with mean scores of 3.30
318 [SD: 1.45] for pregnancy body image, 3.34 [SD: 1.44] for prospective postnatal body
319 image and 2.55 [SD: 1.41] for dieting during pregnancy. Although dieting during
320 pregnancy was lower than body image concerns, 32.5% of women (N = 43) reported
321 actively limiting their food intake during pregnancy to avoid gaining weight although
322 only sixteen (12.5%) reported they were following a diet during pregnancy.

323

324 ***Body image and BMI***

325 Body image during pregnancy was significantly associated with pre-pregnant BMI.
326 Concerns about pregnancy body image [Pearson's $r = .352$, $p = .000$] and dieting
327 during pregnancy [Pearson's $r = .231$, $p = .005$] were both significantly associated

328 with raised BMI. No significant association was found between prospective postnatal
329 concerns and BMI. Body image concerns were not unique to those with an
330 overweight BMI however. Exploring those with a normal or underweight BMI, 56.1%
331 had a mean score of four or over (signifying agree or strongly agree) for pregnancy
332 body image concerns, 53.0% for prospective postnatal concerns and 23.3% for
333 dieting behavior.

334

335 Weight change was also significantly associated with body image. Mothers who
336 were significantly heavier at six months postpartum than before pregnancy had
337 reported significantly higher pregnancy body image concerns (Pearson's $r = .156$, $p =$
338 $.040$) and dieting behavior (Pearson's $r = .155$, $p = .041$) during pregnancy. No
339 significant association was found with postnatal concerns.

340

341

342 ***Body image, BMI and breastfeeding***

343 Mothers reported both planned breastfeeding duration (during pregnancy) and
344 actual breastfeeding duration (at six months postpartum).

345

346 ***Planned duration***

347 Planned breastfeeding duration was not significantly associated with prenatal BMI or
348 weight change. A MANCOVA was performed to examine differences in body image
349 between those who planned to breast or formula feed at birth. Covariates included
350 maternal age, education, occupation, marital status, prenatal BMI, postnatal BMI
351 and weight change. A significant difference in pregnancy body image [$F(1, 123) =$
352 5.46 , $p = .021$], prospective postnatal body image [$F(1, 123) = 12.21$, $p = .000$] and
353 dieting during pregnancy [$F(1, 123) = 5.67$, $p = .017$] was seen. Mothers who
354 planned to formula feed had higher body image concerns.

355

356 To examine planned breastfeeding duration, formula use from birth was recorded as
357 zero days. Using partial correlations controlling for maternal age, education,
358 occupation, marital status and prenatal BMI, postnatal BMI and weight change,
359 significant associations were found between planned breastfeeding duration and

360 pregnancy body image (Pearson's $r = -.227$, $p = .007$), prospective postnatal body
361 image (Pearson's $r = -.380$, $p = .000$) and dieting during pregnancy (Pearson's $r = -$
362 $.361$, $p = .000$). Mothers with higher body image concerns planned to breastfeed for
363 a shorter duration of time or not at all.

364

365 As all three body image factors were associated with planned breastfeeding
366 duration, a linear regression analysis using the enter method was performed to
367 examine which factors remained predictive of planned breastfeeding duration. The
368 model was significant, explaining 17.9% of the variance [$F(3, 124) = 8.789$, $p = 0.000$].
369 Pregnancy body image ($p = .004$) and dieting during pregnancy ($p = .020$) remained
370 significant. Prospective postnatal body image was however no longer significant ($p =$
371 0.90).

372

373 ***Actual breastfeeding duration***

374 Actual breastfeeding duration was unrelated to pre-pregnant or postnatal BMI.
375 However, mothers who breastfed at birth reported a significantly smaller weight
376 gain compared to mothers who formula fed ($t(125) = .2854$, $p = .005$), which
377 remained significant for any breastfeeding at two ($t(125) = 3.496$, $p = .001$), six (t
378 $(125) = 3.945$, $p = .000$), twelve ($t(125) = 3.351$, $p = .001$) and twenty six weeks (t
379 $(125) = 3.216$, $p = .001$).

380

381 One hundred and two participants breastfed at birth (83.6%) whilst 21 formula fed
382 (16.4%). A MANCOVA was performed controlling for maternal age, education,
383 occupation, marital status and prenatal BMI, postnatal BMI and weight change.
384 Significant differences in feeding method at birth were found for body image
385 including pregnancy body image [$F(1, 123) = 7.201$, $p = .008$], prospective postnatal
386 body image [$F(1, 123) = 17.367$, $p = .000$] and dieting during pregnancy [$F(1, 123) =$
387 7.192 , $p = .008$]. Mothers who formula fed at birth had higher body image concerns
388 during pregnancy.

389

390 Mothers reported breastfeeding duration up to six months. Mothers were computed
391 as breastfeeding at all at two, six, twelve and twenty six weeks. A MANCOVA was

392 used to examine differences in body image by breastfeeding at each of these time
393 points (Table four). Breastfeeding at any stage was associated with significantly
394 lower body image concerns on all three factors during pregnancy.

395

396 Again, as all three body image factors were associated with actual breastfeeding
397 duration, a further linear regression analysis was performed, including the weight
398 change variable. The model was significant, explaining 30.0% of the variance [F (4,
399 124 = 8.447, p = 0.000]. Pregnancy body image (p = .002), dieting during pregnancy
400 (p = .001), prospective body image (p = .010) and weight change (p = 0.015)
401 remained significant.

402

403 **Stopping breastfeeding**

404 Participants who initiated breastfeeding at birth but stopped before six months
405 postpartum completed a further series of questions examining why they stopped
406 breastfeeding. Principle components analysis was performed on these items
407 producing eight factors that explained 83.97% of the variance.

408

409 Factors were labeled 'difficult' (lack of milk, exhausting), painful (pain, infection),
410 inconvenient (interfering with maternal lifestyle, placing greater responsibility on the
411 mother than formula feeding), body image (dislike of appearance of breasts),
412 embarrassment (did not like feeding in front of others or in public), pressure from
413 others (pressure to stop from family, partner), lack of support (poor professional
414 support) and medical reasons. Three items did not load onto any factor and were
415 excluded from the analysis (Other people made negative comments, I wasn't well
416 and I couldn't socialize).

417

418 Regression scores for each factor were computed and used for comparison.
419 Cronbach's alpha was also computed for each factor, ranging from 0.71 to 0.95 and
420 is also shown in Table 1.

421

422 Pearson's partial correlations were used to explore association between
423 breastfeeding duration and reasons for stopping (Table 5). Significant associations

424 were found between body image during pregnancy and stopping because
425 breastfeeding was difficult or painful. Women with higher pregnancy body image
426 concerns were significantly more likely to find breastfeeding difficult or painful.
427 Additionally, significant correlations were found between prospective postnatal
428 concerns and stopping because of public feeding and body image. Women with
429 higher postnatal body image concerns were significantly more likely to stop because
430 of a dislike of public feeding and higher concerns about the impact of breastfeeding
431 on their body.

432

433 No significant correlations were found between reasons for stopping breastfeeding
434 and dieting.

435

436

437 **Discussion**

438 This study explores the association between maternal body image during pregnancy
439 and breastfeeding intention and duration. Although previous research has
440 highlighted the influence of maternal weight during pregnancy and specific concerns
441 related to breast appearance / identity and the postnatal period upon infant feeding,
442 little research has considered the impact of wider maternal body image. Data
443 showed that higher body image concerns were associated with both intention to use
444 and actual use of formula from birth and intended or actual shorter breastfeeding
445 duration. Notably these concerns were not limited to women who were overweight,
446 and actual BMI was unrelated to breastfeeding initiation and duration. The findings
447 have important application for those working with women during pregnancy and the
448 postnatal period both in terms of considering the overall issue of maternal body
449 image and the impact upon breastfeeding duration.

450

451 The research considered three separate aspects of body image during pregnancy:
452 pregnancy body image concerns, prospective concerns for postnatal appearance and
453 dieting behavior. All three behaviors were predictive of breastfeeding intention,
454 initiation and breastfeeding duration. Higher concerns on each factor were
455 associated with intended and actual formula use from birth and decreased likelihood

456 of planned or actual breastfeeding at two, six, twelve and twenty six weeks. Body
457 image was predictive of breastfeeding independently of wider maternal background
458 including demographic factors, birth mode and weight. The regression analysis
459 showed that all three elements remained predictive.

460

461 Previous research has shown that issues related to body image can discourage
462 women from breastfeeding. Mothers who feel embarrassed breastfeeding in public
463 (Khoury, Moazzem, Jarjoura, Carothers & Hinton, 2005), worry about the
464 appearance of breastfeeding on their breasts (Wambach & Cohen, 2009) or want to
465 reclaim their body for themselves (Earle, 2002) are less likely to breastfeed. Issues
466 such as leaking breasts (Lewallen et al. 2006), difficulty adapting to thinking of the
467 breast other than a sexual object (Brown, Raynor & Lee, 2011) and conflict with a
468 partner who doesn't like her breastfeeding (Thulier & Mercer, 2008), can all reduce
469 breastfeeding intention and duration. This study extends the research to show that
470 wider body image issues related to pregnancy and changing shape and appearance,
471 rather than those only centered around changes in breast appearance and use can
472 affect whether a mother intends to, or does, initiate or continue breastfeeding.

473

474 Body image during pregnancy (pregnancy, prospective postnatal and dieting during
475 pregnancy) was notably linked to both intended and actual breastfeeding duration.
476 Mothers with higher body image concern more likely to intend to use formula from
477 birth or to breastfeed for a shorter duration as well as actually do so. This suggests
478 that perceptions about breastfeeding are driving feeding choices rather than actual
479 negative experiences such as finding it embarrassing to feed in front of others.
480 Indeed, these perceptions may be preventing women from attempting to breastfeed
481 in the first place, rather than experiencing it for themselves. This fits well with
482 previous research showing that first time pregnant women hold many negative
483 perceptions about breastfeeding such as that it is embarrassing, inconvenient or
484 difficult based on information passed from friends or family (Rojjanasrirat & Sousa,
485 2010).

486

487 The question arises as to why body image concerns during pregnancy impact upon
488 the intention and decision to breastfeed. It is likely that issues such as not wanting to
489 feed in public, concerns about the appearance of the breast or wanting to regain
490 their body for themselves (Khoury et al, 2005; Wambach & Cohen, 2009; Lewallen et
491 al. 2006) apply to those with body dissatisfaction. However, this study looked at
492 body image factors not specifically related to breastfeeding.

493

494 Maternal weight did not explain the relationship and was indeed included as a
495 measure primarily to distinguish between weight and body image. It appeared that
496 maternal thoughts and evaluations of their body shape and appearance during
497 pregnancy were associated with breastfeeding duration rather than their weight per
498 se. Previous research has shown that mothers who are overweight are less likely to
499 breastfeed or to do so for only a short duration (Kitsantas & Pawloski, 2009; Hilson,
500 Rasmussen & Kjolhede, 2004). However although BMI was associated with body
501 image the findings showed body dissatisfaction was not limited to overweight
502 women, and in fact BMI was not associated with breastfeeding duration. Instead,
503 how a mother felt about her changing appearance and concerns about weight gain
504 predicted breastfeeding duration independently of her weight. However, notably,
505 the variable of 'weight change' during pregnancy was significant. Mothers who
506 gained the greatest amount of weight were less likely to plan or actually breastfeed.
507 This suggests that it might be changes in body shape, appearance and image that are
508 important rather than weight itself. Greater weight gain or retention may negatively
509 affect body image satisfaction, in turn affecting breastfeeding duration.

510

511 Data regarding reasons for breastfeeding cessation might explain the findings. Body
512 image was also linked to reasons for stopping breastfeeding. Specifically two
513 patterns emerged in the data. Firstly, concerns about how her body would appear
514 postnatally were linked to stopping breastfeeding because of concerns about the
515 impact of breastfeeding on her breasts and embarrassment at feeding in front of
516 others. This fits well with previous findings that show these factors to be common
517 reasons for stopping breastfeeding (Thulier & Mercer, 2008; Brown, Raynor & Lee,
518 2011; Wambach & Cohen, 2009). If a mother has higher body image concerns it is

519 likely she is more aware of herself in front of others (Grogan, 2007). She may worry
520 that others are paying her high levels of attention, which may exacerbate anxiety
521 over public feeding. Likewise, women with negative body image are more likely to be
522 self critical and have lower self esteem (Fanzoi, Vasquez, Sparapani, Frost, Martin &
523 Aebly, 2012) which may exacerbate how she feels about any postnatal changes to
524 her body. Mothers with eating disorders report higher levels of social anxiety and
525 self awareness (Godart, Flament, Perderau & Jeammet, 2002).

526

527 However, women who held high body image concerns about their pregnancy
528 appearance during pregnancy were more likely to stop breastfeeding because they
529 found it difficult or painful. This finding is less expected and understandable than the
530 link between postnatal image and stopping for reasons of embarrassment / public
531 feeding but the pattern in factors of both difficulty and pain being significant
532 suggests an underlying contributor. It could be that body image concerns during
533 pregnancy and prospective postnatal concerns are very different issues. Pregnancy is
534 a time of expected changes in weight and appearance and women can feel liberated
535 at this time (Loth, Bauer, Wall, Berge & Neumark-Sztainer, 2011). Indeed, many
536 women report worrying less about their appearance and choosing to relax their diet
537 at this time (Nash, 2013). Conversely, levels of postnatal body dissatisfaction are
538 very common. Women feel under increasing pressure to lose weight and regain their
539 pre pregnancy appearance (Riley, 2011). The current findings showed that although
540 pregnancy body image concerns were related to BMI, prospective postnatal
541 concerns were not, suggesting postnatal concerns may be more common regardless
542 of weight. Additionally, in the regression analysis, prospective postnatal concerns did
543 not remain a significant predictor of breastfeeding duration implying it has a weaker
544 link with breastfeeding. Thus, although levels of body dissatisfaction during
545 pregnancy are growing (Skouteris et al, 2005), perhaps concerns at this time are
546 indicative of other issues such as anxiety or low self-esteem that may make
547 breastfeeding more difficult.

548

549 For example, maternal mental health may play a role. Body image dissatisfaction
550 during pregnancy has also been associated with increased risk of depression during

551 pregnancy and the postpartum period (Downs, DiNallo & Kirner, 2008). Postnatal
552 depression is linked to finding breastfeeding more painful and difficult (Field, 2010).
553 Moreover body image dissatisfaction has been linked to increased general anxiety
554 (Etu & Gray, 2010). Women who are anxious about breastfeeding are more likely to
555 find it difficult, worry that their infant is not getting enough milk or to feel unable to
556 solve problems if they arise (Brown, 2013; Li et al, 2008; Sachs, Dykes & Carter,
557 2006). Similarly, poor confidence and self-efficacy, which are significantly lower in
558 those with body dissatisfaction (Grabe & Hyde, 2009), are linked to finding
559 breastfeeding more difficult and subsequently a shorter breastfeeding duration
560 (Forster et al, 2006; Brown, Raynor & Lee, 2011).

561

562 Alternatively, a woman's wider personality may play a role. Introversion is associated
563 with body dissatisfaction (Swami, Hadji-Michael & Furnham, 2008). Indeed, women
564 who are more introverted are more likely to find breastfeeding difficult (Brown,
565 2013). Perfectionist traits are also common amongst those with body image
566 concerns (Boone, Soenens & Braet, 2011) and may lead women to find breastfeeding
567 more difficult (O'Brien, 2007). Body image concerns may also be indicative of social
568 anxiety, a disorder which is higher amongst those with body image concerns (Cash,
569 Theriault & Annis, 2004) with anxiety known to make breastfeeding more difficult
570 (O'Brien, Buikstra & Hegney, 2008).

571

572 Women may also project their own body image and weight insecurities onto their
573 infant. Research has shown that mothers with body image concerns and restrained
574 eating are more likely to try and restrict their child's intake of food (Duke, Bryson,
575 Hammer & Agras, 2004) as early as the weaning period (Brown & Lee, 2011). One
576 study showed that eating disordered women are more likely to try and breastfeed
577 their infant to a strict routine, becoming distressed if their infant wanted to feed
578 more frequently (Evans & Grange, 1995). Controlling feeds during breastfeeding has
579 been associated with finding breastfeeding more difficult and breastfeeding
580 cessation (Brown, Raynor & Lee, 2011b).

581

582 Finally, experience of motherhood and perceptions of infant temperament may play
583 a role. Motherhood is a huge change to a woman's life and one where her time is
584 largely controlled by the infant. If a woman is used to being quite controlling with
585 herself and her body, she may struggle with an infant who appears not to follow set
586 routines. Mothers who want a strict routine for their infant are more likely to
587 formula feed as it allows greater maternal control (Brown & Lee, 2012). Linked to
588 this, mothers may view their infant temperament differently. Mothers who are
589 anxious (Austin, Hadzi-Pavlovic, Leader, Saint & Parker, 2005), depressed (McGratj,
590 Records & Rice, 2008) or lacking in self efficacy (Anzman-Frasca, Stifter, Paul & Birch,
591 2013) are more likely to perceive their infants to be difficult, as are women with
592 eating disorders (Zerwas, Von Holle Torgesen, Reichborn-Kjennerud, Stoltenberg &
593 Bulik, 2012). Mothers who perceive their infants to have a difficult temperament are
594 more likely to report feeding difficulties (Farrow & Blissett, 2006), introduce formula
595 (Niegel, Ystrom, Hagtvvet & Vollrath, 2008) and start complementary feeding before
596 six months to soothe their infant (Wasser et al, 2011).

597

598 These possible explanations are however speculative. Further research is needed to
599 examine the wider factors that might moderate the relationship between pregnancy
600 body dissatisfaction and breastfeeding and how the role of weight gain influences
601 this. However the findings have important implications for those working to support
602 pregnant women and new mothers. Two main issues arise from the data; body
603 image concerns during pregnancy amongst normal weight women and the impact
604 upon breastfeeding duration. Appropriate levels of weight gain and body changes
605 during pregnancy are considered to be healthy and important aspects of
606 pregnancy. The risk arises that women who become concerned about their
607 changing appearance may try and limit weight gain which can increase the risk of
608 low birth weight and preterm birth (Viswathan et al, 2008; Kothari, Wendt, Liggins,
609 Overton, & Carmen Sweezy, 2011). Although interventions to prevent excessive
610 weight gain during pregnancy are growing, there may be women at risk of not
611 gaining enough weight.

612

613 Midwives are already encouraged to talk about healthy eating and weight gain from
614 an obesity perspective due to known links with infant macrosomia , caesarean
615 section and later childhood overweight (Amorim, Rossner, Neovius, Lourenco, &
616 Linne, 2007; Olson, 2008; Siega-Riz et al., 2009; Olson, Strawderman, & Dennison,
617 2009). However, body image is not routinely considered in antenatal care (Leddy,
618 Jones, Morgan & Schulkin, 2009). Current UK clinical recommendations advise
619 against routine repeated weighing of women during pregnancy (NICE, 2008; NICE,
620 2010). These findings support this stance, suggesting that drawing attention to a
621 woman's changing shape in a negative way might increase body image
622 dissatisfaction and impact upon, amongst other things, breastfeeding duration. The
623 findings that weight change, rather than BMI itself, are also linked to breastfeeding
624 duration further support this, suggesting that women with a healthy BMI but poor
625 body image satisfaction may be overly concerned about their weight and
626 appearance. Although weight gain restriction may be safe amongst overweight and
627 obese pregnant women (Claesson, Brynhildsen, Cedergren, Jeppsson, Sydsjo &
628 Josefsson, 2009), too little weight gain during pregnancy has been associated with
629 risk of low birth weight and preterm birth (Viswathan et al, 2008; Kothari, Wendt,
630 Liggins, Overton, & Carmen Sweezy, 2011). Talking positively and realistically to
631 women about their changing shape, the importance of healthy weight gain and
632 concepts of sensible weight loss after the birth may be more productive.

633

634 Secondly, the link between body image and breastfeeding is important. Women
635 who feel uncomfortable about their changing shape, who try to limit weight gain or
636 who have concerns about the appearance of their body after pregnancy may be less
637 likely to breastfeed, or struggle to do so if they initiate. Discussion during pregnancy
638 about how they feel about their changing shape and function of their breasts
639 (outside of simple weight gain) and issues such as feeding in public feeding and
640 considering strategies to overcome such issues may encourage or enable further
641 breastfeeding.

642

643 The research does have its limitations. The sample size was relatively small and self
644 selecting. Although a wide range of participants did take part, mothers were older

645 and more educated than average. Also, although levels of breastfeeding initiation
646 were similar to population norms, a higher proportion of mothers breastfed for at
647 least six months (ref). Care should be taken in generalizing the findings to a wider
648 population. Further research should explore the issue in a wider population based
649 sample.

650 In addition, online adverts were utilized as part of the recruitment process. This may
651 be criticized for increasing sample bias; internet users may be a well educated and
652 proactive group (Drentea & Moren-Cross 2005). However internet recruitment is
653 growing in popularity in health research (e.g. Alcade & Cristina, 2011; Hamilton,
654 White & Cuddihy, 2012; Ferguson & Hansen, 2012) as it allows access to a targeted
655 sample in a cheap and effective way (Koo & Skinner, 2005). It is particularly useful in
656 recruiting pregnant and new mothers due to high use of internet forums amongst
657 this sample (Hall & Irvine 2008, Plantin & Daneback 2009). Such forums are now
658 typically used by a wide spread of demographic groups (Sarkadi & Bremberg 2005;
659 Quan-Haase et al. 2002).

660 Thirdly, the study used a body image questionnaire developed for the purpose of the
661 study. This could be criticized for lacking validity. However, although a number of
662 validated questionnaires exist for examining body image, these have had limited use
663 amongst pregnant samples. Data suggests that using measures intended for non
664 pregnant women may be inaccurate and prone to bias (Fuller-Tyszkiewicz, Skouteris,
665 Watson & Hill, 2012). In addition, these questionnaires did not explore the specific
666 issues of body image that arise during pregnancy such as changing shape,
667 appearance of breasts and stretch marks. Items were based on existing literature
668 examining body image during pregnancy and that of factors affecting breastfeeding
669 duration (Thulier & Mercer, 2008; Lie et al, 2009; Brown et al, 2011). Finally, factor
670 analysis was used to group items, producing logical factor groupings and Cronbach's
671 alpha showed good validity.

672 In conclusion, higher body image concerns during pregnancy were associated with
673 formula use from birth or shorter breastfeeding duration. Weight gain during
674 pregnancy may play an important role in this. Issues with embarrassment, changing

675 appearance of breasts and finding breastfeeding more difficult were more common
676 amongst those with higher body image concerns. The findings are important to
677 those working with women both during pregnancy and in the postpartum period to
678 understanding the impact of body image upon intention and ability to initiate and
679 continue breastfeeding.

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885 **Table One: Items and factor structure of questionnaire examining body**
 886 **image during pregnancy**

	Pregnancy body image	Prospective postnatal body image	Dieting during pregnancy
Pregnancy makes me feel less attractive	.408		
I worry that my partner finds me unattractive during pregnancy	.790		
I am worried about the effect of pregnancy on the appearance of my breasts	.588		
I compare my body negatively to other pregnant women	.603		
I feel that I am gaining/or have gained too much weight	.588		
I worry about losing the weight after pregnancy	.470		
I worry about stretch marks	.727	.780	
I worry what my body will look like after pregnancy		.796	
I worry that my partner will find me unattractive after pregnancy		.782	
I worry what my breasts will look like after pregnancy		.725	
I have dieted during pregnancy to avoid gaining too much weight			.800
I have tried to limit my weight gain during pregnancy			.758
Other peoples comments about my pregnant body have upset me			.696
% of variance explained	35.840	11.640	10.594
Cronbach's alpha	.729	.781	.782

887 Table one shows regression scores for each item and how they load onto each factor produced.

888

889 **Table Two: Items and factor structure of questionnaire examining reasons**
 890 **for stopping breastfeeding:**

	Difficulty	Body image	Public Feeding	Pain	Inconvenient	Pressure from others	Lack of support	Medical
The baby wouldn't latch on properly	.703							
The baby was feeding all the time	.826							
My baby wasn't gaining enough weight	.757							
I didn't have enough milk	.618							
Baby didn't want to breastfeed anymore	.617							
I was exhausted	.722							
Breastfeeding was ruining my breasts		.419						
I felt unattractive		.804						
My breasts kept leaking		.784						
I wanted my body back for me		.830						
I didn't like feeding in public			.866					
I didn't like feeding in front of others			.910					
I was stuck in the house breast feeding			.674					
It was too painful				.853				
My nipples were cracked				.712				
I got mastitis, thrush or another problem				.747				
It was too difficult				.730				
I never knew when the baby was going to feed					.809			
I didn't like being responsible for all the feeds					.604			
I couldn't keep track of milk intake					.760			
I couldn't leave the baby					.458			
I wanted a more predictable routine					.633			
My partner wanted me to stop						.671		
My mother wanted me to stop						.695		
Friends wanted me to stop						.639		
I didn't know anyone else who breastfed						.652		
Other people felt excluded						.633		
I couldn't get any help with problems							.788	
I didn't have enough support							.631	
I couldn't get any professional advice							.821	
The baby wasn't well								.824
I was taking medication								.844
A health professional advised me to stop								.821
I couldn't breastfeed								.847
Percentage of variance explained	36.975	11.035	7.783	7.341	5.579	5.075	5.320	4.818
Cronbach's alpha	.705	.784	.906	.770	.869	.923	.892	.849

891 Table one shows regression scores for each item and how they load onto each factor produced.

892 Items in bold signify items which group strongly on each factor

893

894

895 **Table three. Sample distribution by Demographic Factors**

Indicator	Group	N	%
Age	≤ 19	4	3.1
	20 – 24	21	16.4
	25 – 29	25	19.5
	30 – 34	52	40.6
	35 ≥	26	20.3
Education	School	30	23.4
	College	27	21.1
	Higher	48	32.8
	Postgraduate	29	22.7
Marital Status	Married	89	69.5
	Cohabiting	27	21.1
	Partner	9	7.0
	Single	3	2.3
Maternal occupation	Professional & managerial	69	53.9
	Skilled	23	18.0
	Unskilled	20	15.6
	No job	16	12.5

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901 **Table Four: Differences in pregnancy body image by infant feeding group at two,**
902 **six, twelve and twenty six weeks postpartum**

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Time point	Breast (N)	Formula (N)	Pregnancy body image	Prospective postnatal body image	Dieting during pregnancy
Two weeks	102	26	F(1, 124) = 7.92, p = .006	F(1, 124) = 10.68, p = .001	F(1, 124) = 7.90, p = .006
Six weeks	87	41	F(1, 124) = 4.03, p = .046	F(1, 124) = 18.17, p = .000	F(1, 124) = 21.67, p = .000
Twelve weeks	62	66	F(1, 124) = 4.10, p = .045	F(1, 124) = 11.30, p = .001	F(1, 124) = 15.98, p = .000
Twenty six weeks	48	80	F(1, 124) = 7.51, p = .007	F(1, 124) = 26.31, p = .000	F(1, 124) = 24.99, p = .000

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906 **Table Five: Association between maternal body image and reasons for stopping**
 907 **breastfeeding**
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	Pregnancy body image	Prospective postnatal concerns	Dieting during pregnancy
Difficulty	.323 (.017)*	-.157 (.158)	.088 (.287)
Pain	.292 (.029)*	-.008 (.480)	-.089 (.286)
Body Image	.001 (.499)	.602 (.000)**	.122 (.218)
Public Feeding	-.088 (.287)	.345 (.012)*	.046 (.385)
Inconvenient	.083 (.299)	.159 (.154)	.025 (.437)
Pressure from others	.105 (.252)	-.073 (.320)	-.016 (.460)
Lack of support	.137 (.191)	.024 (.439)	-.028 (.428)
Medical	-.198 (.101)	-.193 (.107)	-.165 (.145)

910 Shaded areas denote significant correlations: * = $p < 0.05$, ** = $p < 0.001$

