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1 **Breastfeeding experiences and support for women who are overweight or**  
2 **obese: A mixed methods systematic review**

3

4 **ABSTRACT**

5 Women who are overweight or obese have increased health risks during and beyond  
6 pregnancy, with consequences for the shorter and longer-term health of their infants.  
7 Exclusive breastfeeding to six months has many benefits for women and their infants.  
8 However, women who are overweight or obese have lower rates of breastfeeding intention,  
9 initiation and duration compared to women with normal weight.

10

11 This systematic review aimed to examine evidence of i) breastfeeding and breastfeeding  
12 support experienced by women who are overweight or obese, ii) perceptions of support  
13 provided by healthcare professionals, peer supporters, partners and family members and iii)  
14 support shown to be effective in increasing breastfeeding initiation and duration among these  
15 women. Sixteen quantitative and qualitative papers were included and critically appraised.  
16 Thematic synthesis was undertaken to obtain findings. Maternal physical and mechanical  
17 barriers such as larger breasts, difficulties of positioning to breastfeed, delayed onset of  
18 lactation, perceived insufficient supply of breast milk, and impact of caesarean birth were  
19 evident. Maternal psychological barriers including low confidence in ability to breastfeed,  
20 negative body image, embarrassment at breastfeeding in public and experiencing stigma of  
21 obesity were also described. Support from healthcare professionals and family members  
22 influenced breastfeeding outcomes. Education for maternity care professionals is needed to  
23 enable them to provide tailored, evidence-based support to women who are overweight or

24 obese who want to breastfeed. Research on healthcare professionals, partners and family  
25 members' experiences and views on supporting women who are overweight or obese to  
26 breastfeed is needed to support development of appropriate interventions.

27

## 28 **KEY WORDS**

29 Breastfeeding, obesity, overweight, body mass index, breastfeeding support, breastfeeding  
30 experiences.

31

## 32 **KEY MESSAGES**

- Physical and psychological barriers to initiate and continue breastfeeding were identified among women who are overweight or obese.
- Appropriate education and training are needed for maternity care professionals on how to improve and tailor support for women with a higher body mass index to breastfeed
- Limited research was found of healthcare professionals, partners' and family members' perspectives on supporting women who are overweight or obese to breastfeed.
- Further robust research, with larger sample sizes, should be prioritised given the increasing burden globally of obesity among women of reproductive age.

33

## 34 **INTRODUCTION**

35

36 Prevalence rates of obesity and overweight among women of reproductive age are increasing.  
37 In the United Kingdom (UK), the proportions of women who were overweight or obese aged  
38 16-24,25-34 and 35-44 were 36%, 44%, and 57% respectively in 2016 (Health and Social Care  
39 Information Centre, 2017). In the United States, 55.8% of women aged between 20-39 years  
40 had a Body Mass Index (BMI)  $\geq 25$  kg/m<sup>2</sup> (Flegal et al., 2012). Overweight and obesity present  
41 health risks during and beyond pregnancy. Women with a pre-pregnancy BMI  $\geq 25$ kg/m<sup>2</sup> are  
42 significantly more likely to require induction of labour, intrapartum intervention or caesarean  
43 section (elective and emergency) (Marchi et al., 2015; Poston et al., 2016; Ovesen et al., 2011;  
44 Sebire et al., 2001). For infants of women who are overweight or obese, there are higher risks  
45 of admission to neonatal units, macrosomia (birthweight >4000g) or birthweight above the  
46 90th centile (large-for-gestational age) (Poston et al., 2016; Marchi et al., 2015; Ruager-  
47 Martin et al., 2010; Ovesen et al., 2011; Sebire et al., 2001), and higher BMI in childhood and  
48 young adulthood (Godfrey et al., 2017).

49

50 As breastfeeding significantly reduces the risk of childhood overweight and obesity and  
51 associated diseases (Horta et al., 2015; Martin et al., 2005), breastfeeding among women  
52 who are overweight or obese and their infants is particularly important. However, women  
53 with higher BMIs are less likely to initiate, continue or exclusively breastfeed than women  
54 who have a 'normal' BMI (BMI between 18.5 – 25.0kg/M<sup>2</sup>) (Wojcicki, 2011; Amir & Donath,  
55 2007; Turcksin et al., 2014; Mäkelä, et al., 2014). Other potential benefits of breastfeeding  
56 for women include support for postnatal weight management (Vinter et al., 2014, Baker et  
57 al 2008), reduced risk of ovarian and breast cancer, and type-2 diabetes (Ip et al., 2007;  
58 Horta et al., 2007; Victora et al., 2016). Exclusively breastfed infants have reduced risk of

59 contracting respiratory, gastrointestinal, and ear infections, in infancy compared to infants  
60 not exposed to same levels of breastfeeding exclusivity or duration (Ip et al., 2007; Eidelman  
61 et al., 2012; Victora et al., 2016). Evidence for breastfeeding support available and  
62 experienced by women who are overweight or obese is limited.

63

64 This systematic review aimed to examine evidence of i) breastfeeding practices and  
65 breastfeeding support experienced by women who are overweight or obese, ii) perceptions  
66 of support provided by healthcare professionals, peer supporters, partners and family  
67 members and iii) support shown to be effective in increasing breastfeeding initiation and  
68 duration among women with higher BMIs. The review was registered on PROSPERO: xxxxxx

## 69 **METHODS**

70

71 An 'integrated methodology' was adopted (Sandelowski et al., 2006; Joanna Briggs Institute,  
72 2014) in which findings of qualitative and quantitative studies can confirm or refute each  
73 other, with data assimilated into one single synthesis. The review was designed to answer the  
74 following questions:

75

76 • What are perceptions and experiences of breastfeeding intention, initiation and  
77 continuation among women who are overweight or obese,?

78

79 • What are these women's experiences of support for breastfeeding offered by healthcare  
80 professionals, peer supporters and family members during and after pregnancy, including  
81 type and content of support?

82

83 • What types and content of support offered by healthcare professionals, peer supporters  
84 and family members during and after pregnancy increase breastfeeding initiation and  
85 continuation among women who are overweight or obese?

86

87 • What are healthcare professionals', peer supporters' and family members' perceptions of  
88 providing breastfeeding support and how do they perceive their role in this?

89

90

#### 91 **Eligibility criteria**

92 The PICOS (Population/Participants, Interventions/Phenomena of interest,  
93 Comparison/Context, Outcomes, and Study types) framework adapted from Joanna Briggs  
94 Institute (2014) was used to develop the eligibility criteria as follows. **Population/Participants**  
95 Pregnant and postnatal women classed as overweight (BMI  $\geq 25$  kg/m<sup>2</sup>) or obese (BMI  $\geq 30$   
96 kg/m<sup>2</sup>) as defined by study authors, and those who offered breastfeeding support including  
97 partners, family, healthcare professionals, breastfeeding peer supporters and lactation  
98 specialists were included.

#### 99 **Interventions/Phenomena of interest**

100 Studies were included if they explored experiences and perceptions of breastfeeding and  
101 breastfeeding support, evaluations of breastfeeding interventions/support, as well as studies  
102 which considered experiences, perceptions and information/training needs of those who  
103 offered support. Studies targeted at *all* women, irrespective of BMI, were excluded, as were

104 studies where the primary aim was to establish breastfeeding initiation and duration among  
105 women who were overweight or obese which did not present (a) research data on barriers or  
106 facilitators to these or (b) evaluate the intervention/support provided.

### 107 ***Comparison/Context***

108 For experimental/quasi-experimental studies, comparisons could include usual care or a  
109 control group designed as a comparison to the described intervention. For non-experimental  
110 studies, comparisons could include women who were not overweight or obese. Studies  
111 conducted in acute and/or primary care settings, communities or participants' homes were  
112 included.

### 113 ***Outcomes***

114 Outcomes for intervention studies (as defined by study authors) included:

- 115 • Rates of breastfeeding initiation
- 116 • Duration of exclusive breastfeeding
- 117 • Duration of any breastfeeding

118 Other outcomes, including for non-intervention studies included:

- 119 • Women's experiences and perceptions of support for breastfeeding provided by  
120 healthcare professionals, peers and family members
- 121 • Maternal and infant physical and psychological factors that affected women's  
122 breastfeeding outcomes
- 123 • Experiences and views of those who supported women to breastfeed
- 124 • Women's confidence, knowledge, attitudes, and skills

- 125 • Supporters' (including professionals, peers and family members) knowledge, attitudes,  
126 and skills, their information and training needs.
- 127 • Breastfeeding problems
- 128 • Barriers to provision of interventions/support

129

130 **Study types** Experimental (e.g. randomised controlled trials, cluster-randomised trials) and  
131 quasi-experimental studies were considered. For non-intervention studies, qualitative,  
132 quantitative and mixed methods research papers presenting primary data and/or secondary  
133 data analysis using quantitative datasets were included. Reviews, dissertations, opinion  
134 pieces, guidelines and policy papers were excluded. Studies published in English from January  
135 1992 (following the launch of UNICEF's Baby Friendly Initiative), to October 2018 were  
136 included. Intervention studies published since January 2014 were considered as an earlier  
137 review of interventions to increase breastfeeding among women with higher BMIs only  
138 included studies up to 2013 (Babendure et al., 2015).

139

#### 140 **Search strategy**

141 A search of Medline, Embase, Maternity and Infant Care, CINAHL, SCOPUS, PsycInfo, Web of  
142 Science and Cochrane Library was conducted using search terms and Medical Sub-Headings  
143 (MeSH) terms. Searches were undertaken to identify unpublished studies and reports  
144 published in grey literature sources including OpenGrey, and websites of organizations which  
145 support breastfeeding and/or weight management such as WHO, UNICEF, La Leche  
146 International league, and commercial weight management programmes. Reference lists of  
147 selected papers and identified reviews were searched for additional papers.



148 Initial key words and indexed terms included: obesity, overweight, breastfeeding, lactation,  
149 and support. MeSH terms were identified through reading published studies and use of the  
150 MeSH terms lookup tool in the Cochrane Library. Figure 1 shows an example of a full search  
151 strategy for Medline.

152 ----Insert Figure 1 here----

153

#### 154 **Study selection**

155 All identified papers were initially screened for relevance based on title and date published,  
156 and then further assessed by reading the abstract. Full-texts were then retrieved and assessed  
157 against eligibility criteria. Full texts were assessed by xx, xx and xx and verified by xx.

158

#### 159 **Quality assessment and data extraction**

160 The Critical Appraisal Skills Programme's (CASP) critical appraisal checklists were adapted for  
161 quality assessment of qualitative research, case control and cohort studies. A maximum score  
162 of 10 was allocated for the CASP checklist of qualitative research, 13 for case control studies,  
163 and 14 for cohort studies. In the absence of a suitable CASP checklist for cross-sectional  
164 studies, a checklist for questionnaires and surveys (Greenhalgh et al., 2005) was used, with a  
165 maximum score of 13. Quality assessment was independently conducted by xx, xx, xx and  
166 verified by xx and xx. Any disagreements were resolved through discussion. Studies which  
167 scored less than 8 on relevant appraisal tools were excluded.

168

169 Data were extracted from included studies by xx, xx, xx and xx. Xx and xx verified the extracted  
170 data and corrected where necessary. Two data extraction forms, which were adapted from  
171 the authors' previous published systematic reviews, were used (xxx, 201x; xxx, 201x). One  
172 form is for quantitative studies and the other for qualitative studies. Data extraction for  
173 quantitative studies included aim/objectives, study design, setting, participants,  
174 inclusion/exclusion criteria, outcome measures, intervention, results, additional analysis e.g  
175 sub-groups. Data extraction for qualitative studies included aim/phenomena of interest,  
176 methodology, setting, participants, sampling methods, data collection, data analysis, results.  
177 The key characteristics for each included paper on study aim, study methods, sample, key  
178 findings are presented in Table 1.

179

## 180 **Data synthesis**

181 In line with an 'integrated methodology', quantitative and qualitative data were assimilated  
182 into a single synthesis. Using this approach, studies are grouped for synthesis using findings  
183 which answer the same review questions, rather than by study methods, enabling integration  
184 of findings (Dixon-Woods et al., 2005). Findings from quantitative data were extracted  
185 narratively, 'converted' into themes and integrated with qualitative data. Thematic synthesis  
186 steps adapted from Lucas et al. (2007) and Smith et al. (2012) were adhered to, namely:

- 187 1. Data were extracted from findings of included studies
- 188 2. Extracted data were grouped for each review question and emergent themes identified
- 189 3. A list of themes was presented for each question.
- 190 4. A synthesis of findings was produced.

191 Due to differences in quantitative study designs and outcomes, meta-analysis could not be  
192 performed.

193

## 194 **RESULTS**

### 195 **Selection and quality appraisal**

196 Following the initial systematic search on 2<sup>nd</sup> September 2017, 2,591 publications were  
197 identified (Figure 2). After removing duplicates, 1,518 remained. Titles were screened for  
198 relevance after which 220 abstracts were obtained for further screening by xx and xx.

199 Following title and abstract screening, 51 full texts were retrieved and read by xx and xx.

200 Forty papers were excluded which did not address the review questions. Reference lists of  
201 selected papers and relevant reviews were searched and seven further papers identified.

202 Searches were updated on 23<sup>rd</sup> October 2018 and three additional articles were selected for  
203 quality assessment. Quality assessment was conducted for a total of 21 papers using the  
204 appropriate critical appraisal checklist. Following quality assessment, five papers were  
205 excluded (Katz et al., 2009; Newby and Davies, 2016; Rasmussen et al., 2006; Zanardo et al.,  
206 2014; Lewkowitz et al., 2018) due to poor quality of data presented. Quality assessment  
207 scores of the final included papers are included in Table 1.

208

209 ---- Insert Figure 2 here---

210

211 ----Insert Table 1 here ---

212

213 Sixteen papers were included: six qualitative studies, six prospective cohort studies, one  
214 retrospective cohort study, one case control study and two cross sectional studies. Two  
215 papers (Garner et al., 2017, McKenzie et al., 2018) were from the same study. All papers were  
216 from high income countries; ten from the USA, two from UK, with single papers from France,  
217 New Zealand, Singapore and Sweden. One paper focused on healthcare professionals, all  
218 others explored women's experiences of breastfeeding, perceptions of support offered,  
219 perceptions of body image, breastfeeding practices and views of barriers to breastfeeding.

220

221 Only two papers (Garner et al., 2014; McKenzie et al., 2018) achieved a full CASP score of  
222 10. The other studies had methodological limitations, including exposure variables which  
223 may not have been accurately measured to minimise bias (Jarlenski et al, 2014; Kair &  
224 Colaizy, 2016a, Nommsen-Rivers et al., 2010, Hauff et al., 2014, Hauff and Demerath, 2012,  
225 O'Sullivan et al., 2015). Two qualitative studies (Keely et al., 2015, Garner et al., 2017) were  
226 allocated lower scores as the relationship between researcher and study participants was  
227 not explained.

228

## 229 **FINDINGS**

### 230 **What are perceptions and experiences of breastfeeding intention, initiation and** 231 **continuation among women who are overweight or obese,?**

232 Included studies reported many physical and psychological barriers to breastfeeding among  
233 women with higher BMIs, which are considered in the following sections.

234

235 *Positioning and attaching to the breast*

236 Quantitative and qualitative studies reported physical barriers including larger breasts, bigger  
237 areolas and additional body tissue, made infant handling and breastfeeding positions such as  
238 cradle or cross cradle, more difficult (Jarlenski et al., 2014; Massov, 2015; Garner et al., 2017;  
239 Claesson et al., 2018). Jarlenski et al (2014) found that significantly more women with obesity  
240 (26.5%) than without obesity (21.0%) ( $p<.05$ ) reported ‘baby had trouble sucking or latching  
241 on’ as a reason for not breastfeeding to six months (Jarlenski et al., 2014).

242 Garner et al’s (2017) qualitative study further found that women with obesity reported  
243 breastfeeding took more time, including preparing to feed, and required more physical  
244 ‘props’, such as pillows, limiting places where they felt able to breastfeed outside of the  
245 home. Finding nursing bras to fit was also identified as a problem for them. Additionally,  
246 Massov (2015) reported women’s concerns that as their breasts were heavy, they were  
247 worried they would suffocate their infant by ‘squishing’ them.

248

249 *Breast problems*

250 In a matched case-control study from France (Mok et al., 2008), a significantly higher  
251 proportion of women with obesity (56.7%) reported physical difficulties with breastfeeding  
252 (i.e. cracked nipples, fatigue or difficulty initiating a breastfeed) in hospital, compared to  
253 normal BMI women (13.3%) ( $p<.05$ ). Kair and Colaizy (2016a) reported findings from a large  
254 retrospective cohort study of women’s reasons for stopping breastfeeding in the USA.  
255 Compared to women with normal weight who breastfed, women with obesity had  
256 significantly *higher* odds of reporting sore, cracked or bleeding nipples (OR=0.70,  
257 95%CI[0.54, 0.91],  $p=.008$ ), and *lower* odds of reporting that they stopped breastfeeding

258 when they felt it was the best time for them to stop (OR=0.69, 95%CI[ 0.49, 0.96], p=.028),  
259 which suggested their desire to breastfeed for a longer duration.

260

### 261 *Delayed onset of lactation and perceived insufficient breast milk*

262 Being overweight or obese was an independent risk factor for delayed onset of lactation  
263 (Nommsen-Rivers et al., 2010), with 'delayed' defined as breasts being "noticeably fuller"  
264 after 72 hours postpartum. Women's perceptions of insufficient breastmilk supply has been  
265 reported as a key factor for stopping breastfeeding (Mok et al., 2008; Jarlenski et al., 2014;  
266 Kair & Colaizy 2016a; Massov 2015; O'Sullivan et al., 2015). For example, Jarlenski et al. (2014)  
267 reported perceptions of low breastmilk supply as a reason for early cessation among women  
268 with and without obesity, with more women with obesity (55.5%) reporting this than women  
269 without obesity (48.3%) (p<.05). "Did not have enough milk" was the second most common  
270 reason provided in both groups, but significantly more women with obesity (51.3%) reported  
271 this than women without obesity (45.0%) (p<.05). The women in Massov's (2015) study  
272 described perceived insufficient breast milk supply as a reason for switching to formula  
273 feeding. Claesson et al.'s (2018) qualitative study described how women thought that having  
274 larger breasts might impair milk production. O'Sullivan et al. (2015) found that obesity  
275 negatively affected exclusive breastfeeding, and the association was significantly mediated  
276 by the perception of 'insufficient milk' supply..

277

### 278 *Impact of caesarean birth*

279 Having a caesarean birth was identified as a specific barrier for women with obesity to  
280 breastfeed (Keely et al., 2015; Garner et al., 2014; Garner et al., 2017). Women who had a  
281 caesarean birth considered that anaesthetic drugs made it harder for them to think and react  
282 properly in the post-operative period, and that caesarean birth delayed skin to skin care,  
283 presenting a barrier to breastfeeding initiation (Keely et al., 2015). Women's limited mobility  
284 following a caesarean birth was reported as a perceived barrier to breastfeeding by clinicians  
285 interviewed by Garner et al. (2014), and experiences of poor post-caesarean health and  
286 recovery (such as developing severe infections) were described as barriers by women with  
287 obesity (Garner et al., 2017).

#### 288 *Attitudes and low confidence in ability to breastfeed*

289 Hauff et al (2014) showed maternal BMI was significantly associated with maternal confidence in  
290 achieving breastfeeding duration goals ( $p < .0001$ ). A higher proportion of women with obesity (10.3%)  
291 rated they were 'not confident' in their ability to breastfeed for as long as planned, compared to  
292 women with overweight BMIs (8.8%) or normal BMIs (5.4%). Women who were not confident they  
293 would achieve their breastfeeding goals were significantly more likely to stop breastfeeding earlier  
294 than women who were confident (HR: 2.50 95%CI [2.07, 3.02]). However, maternal attitudes and  
295 beliefs towards breastfeeding were not significantly different among women with normal, overweight  
296 or obese BMIs ( $p = .40$ ). Similarly, Lau et al (2017) found that attitudes to breastfeeding were  
297 comparable among women with normal and overweight/obese BMIs ( $p = .851$ ) in their study.

298

#### 299 *Body image*

300 Two studies (Hauff & Demerath, 2012; Swanson et al., 2017) investigated the relationships  
301 between women's perceptions of body image and breastfeeding. Hauff & Demerath (2012)  
302 found that women who were overweight or obese were significantly more likely to report not

303 feeling body confident (50%, n=38) at four months postnatally, compared with 28.5% (n=45)  
304 of women with normal BMIs ( $p=.001$ ), and feeling body confident was significantly associated  
305 with both exclusive ( $p<.001$ ) and any breastfeeding ( $p<.001$ ) at 4-months postpartum.  
306 Women's lack of body comfort/confidence was found to significantly mediate the relationship  
307 between maternal obesity and reduced duration of any breastfeeding. Swanson et al., (2017)  
308 reported that women's perceptions of their body image was relatively low for all women in  
309 the postpartum period, but women with obesity were found to have significantly lower body  
310 satisfaction at 6-8weeks postpartum than healthy weight comparisons ( $p=.03$ ). Body  
311 satisfaction was found to significantly mediate the relationship ( $p=.002$ ) between weight  
312 status and any breastfeeding at 6-8weeks.

313

#### 314 *Breastfeeding in public*

315 Embarrassment about breastfeeding in public was a key issue affecting breastfeeding  
316 behaviour (Mok et al., 2008; Massov, 2015; Keely et al., 2015; Claesson et al., 2018; McKenzie  
317 et al., 2018). Mok et al. (2008) reported that at one month postpartum, a higher proportion  
318 of women with obesity (47%, n=20) reported feeling uncomfortable when breastfeeding in  
319 the presence of others than women with normal weight (26%, n=13), but this was not  
320 statistically significant. However, at three months postpartum, significantly more women  
321 with obesity (42%) continued to report this, compared to women with normal body weight  
322 (13%) ( $p<.01$ ).

323

324 A woman in the study by Massov (2015) directly attributed lack of breastfeeding success due  
325 to her inability to be discreet when breastfeeding in public as her breasts were so large: 'Yes,



326 *me personally, I'm just too self-conscious to, because they're so big, to actually get them out*  
327 *in public'* (Massov 2015, p.26). Keely et al. (2015) reported feeding in public was a source of  
328 anxiety for women, and women who decided to bottle feed felt comforted at not having to  
329 reveal their bodies. The open postnatal ward environment with a constant stream of visitors  
330 offered little privacy. The women who had a caesarean birth and required longer in-patient  
331 stay, found breastfeeding distressing due to a lack of privacy when sharing a room with other  
332 women, their partners and visitors. Problems with privacy persisted at home, due to well-  
333 intentioned frequent visits from family members and friends, as women faced the same  
334 potential for embarrassment at having to expose their bodies in front of them (Keely et al.,  
335 2015). Nevertheless, for some women the awkwardness of breastfeeding around others  
336 could reduce over time: *'now that [infant] can just latch on and eat, I don't feel nearly as self-*  
337 *conscious* (McKenzie et al., 2018, p.764).

338

### 339 *Stigma associated with obesity*

340 Hauff and Demerath (2012) reported stigma of obesity as a direct cause of poorer  
341 breastfeeding behaviours, including reduced duration. Kair and Colaizy (2016b) suggested  
342 that women who were overweight or obese were less likely to receive pro-breastfeeding  
343 support in hospital than women with normal weight as a consequence of obesity stigma  
344 among hospital staff.

345

346 **What are experiences of support for breastfeeding offered by healthcare professionals,**  
347 **peer supporters and family members during and after pregnancy among women who are**  
348 **overweight or obese, including type and content of support?**

349

350 Studies of support for breastfeeding described women's positive and negative experiences of  
351 support offered and received.

352 *Social knowledge and support*

353 Hauff et al. (2014) found a significant association between maternal BMI status and social  
354 knowledge of breastfeeding i.e. how many of women's friends or relatives had previous  
355 breastfeeding experience. Women with obesity were less likely to know any women with  
356 previous breastfeeding experience (18.7%) or knew only 1-2 women with previous  
357 experience (23.6%), when compared to women with overweight BMIs (13.7% and 21.7%  
358 respectively) or normal BMIs (11.4% and 20.9% respectively). Women in Keely et al.'s (2015)  
359 study commented that their partners did not understand the frequency with which infants  
360 required feeding, and expressed concerns that infants were not receiving adequate breast  
361 milk '*I don't think [my husband] quite understood about the breastfeeding – that it is normal*  
362 *every half an hour and it is normal for [the baby] to cry.'* (p.536).

363

364

365 *Healthcare professionals' attitudes and practices*

366 Kair and Colaizy (2016b) found the amount of breastfeeding support offered by health  
367 professionals differed according to women's BMI category. Compared to women with normal  
368 BMIs, in unadjusted models, women with obesity had lower odds of a staff member offering  
369 them information about breastfeeding (OR=0.71. 95% CI [0.57,0.89], p=.002), a staff member  
370 helping them to breastfeed (OR=0.69,95% CI [0.61,0.78], p<.001), breastfeeding within an

371 hour of the birth (OR=0.55, 95% CI [0.49,0.62], p<.001), being offered a telephone number for  
372 breastfeeding help (OR=0.65, 95% CI [0.57,0.74], p<.001), rooming in with their baby  
373 (OR=0.84. 95% CI [0.73,0.97], p=.02) or being informed to breastfeed on demand (OR=0.66,  
374 95% CI [0.58,0.75], p<.001). All associations remained significant after adjusting for multiple  
375 covariates, except the association for 'rooming in'. Jarlenski et al. (2014) found no differences  
376 between women with and without obesity in reporting that their physicians (p=.93) and other  
377 healthcare professionals (p=.51) supported/favoured exclusive breastfeeding.

378

379 Women found it helpful to receive regular home contacts with healthcare professionals. Keely  
380 et al. (2015) reported feedback from one woman who felt that the regular home contacts she  
381 received from a clinical assistant were vital to establishing a good breastfeeding routine.  
382 Women's self-confidence increased when health professionals paid attention to them and  
383 that they were treated as an individual rather than an individual with obesity '*they looked into*  
384 *my eyes and saw me as I was. Nobody focused on what I looked like...*' (Claesson et al., 2018:7).  
385 However, some women received judgemental and disempowering support from healthcare  
386 professionals. Massov (2015) reported one woman with obesity who experienced 'rough and  
387 aggressive' treatment: '*I remember the midwife coming in and almost angry that I was upset*  
388 *because I was having trouble doing it...*' (p.27). Another woman reported her experience of  
389 midwifery support as disempowering, as rather than showing her how to attach her baby to  
390 the breast, she felt midwives '*were taking over*' (p.27). Lacking support from health  
391 professionals was found to be a reason for stopping breastfeeding (Claesson et al.'s 2018).

392

393

394 **What types and content of support offered by healthcare professionals, peer supporters**  
395 **and family members during and after pregnancy increase breastfeeding initiation and**  
396 **continuation among women who are overweight or obese?**

397

398 *Type and content of support from healthcare professionals*

399 Jarlenski et al. (2014) found an association between healthcare professionals' support/favour  
400 for/of exclusive breastfeeding and overall breastfeeding initiation and duration. In the overall  
401 sample, after adjusting for covariates, healthcare professionals' support/favour (defined as  
402 'physicians' and 'non-physicians') for/of exclusive breastfeeding was associated with an 8.5%  
403 increased probability of breastfeeding initiation (95% CI [6.3-10.7],  $p < .01$  and a 13.2%  
404 increase in probability of continuing breastfeeding to 6 months or longer (95% CI [9.1,17.3],  
405  $p < .01$ ), independent of whether women were with or without obesity.

406

407 *Type and content of support from partners, family members and friends*

408 The influence of partners, family members and friends on breastfeeding outcomes was  
409 explored by Mok et al. (2008) and Keely et al. (2015). Mok et al. (2008) reported that a  
410 woman's choice of how to feed her infant was influenced by feeding practices of close family  
411 members, as well as her partner's opinion.

412 Keely et al (2015) confirmed that close family were an important source of practical support  
413 and influence on decisions to continue breastfeeding, especially if a relative had previously  
414 successfully breastfed. Conversely, a woman's partner could influence a woman's decision to  
415 introduce formula milk, often in response to breastfeeding problems: 'He kept saying, 'Just ...

416 *if it's that sore ... just stop, because it's not the end of the world'. He was like, 'There's no point*  
417 *torturing yourself for it' (p.536).*

418

419 **What are healthcare professionals', peer supporters' and family members' perceptions of**  
420 **providing breastfeeding support and how do they perceive their role in this?**

421

422 Only one paper presented perspectives of relevant healthcare professionals (Garner et al.,  
423 2014). Some described multiple challenges, with women's care described as "*hugely time-*  
424 *consuming*" (p.506) due to obesity-related comorbidities, women's more limited mobility,  
425 increased physical effort and need for more frequent breastfeeding assistance: "*We dread*  
426 *those patients*" because "*it's so hard to take care of them*" (p.507). They perceived women's  
427 lack of confidence as major psychosocial barriers to breastfeeding, and large breasts as a  
428 major physical challenge. Healthcare professionals described awareness of obesity stigma and  
429 efforts to be sensitive including "*using gentle language and asking permission to touch*"  
430 (p.507). Nevertheless, it was clear that obesity caused embarrassment in the  
431 patient/healthcare professional relationship, with implicit stigma in the way professionals  
432 communicated with women with obesity or responded to their questions (Garner et al.,  
433 2014). They claimed to treat all women the same way but breastfeeding discussions with  
434 women with obesity were frequently not a priority. They considered that more education on  
435 how to support women with obesity to breastfeed was required, and highlighted care could  
436 be improved by better preparing women for breastfeeding during pregnancy, including  
437 positions for breastfeeding. Possible benefits of providing postnatal home contacts were also

438 mentioned. No studies were identified which had specifically described peer supporters,  
439 family members or partners' perceptions.

440

441

442

## 443 **DISCUSSION**

444 This review examined both qualitative and quantitative evidence of breastfeeding practices  
445 and breastfeeding support experienced by women who are overweight or obese, their  
446 perceptions of support they received and what type of support impacted on breastfeeding  
447 initiation and duration. The perceptions of those who supported women to breastfeed were  
448 also considered. Sixteen papers were included, all from high income countries. Only two  
449 studies (Garner et al., 2014, McKenzie et al., 2018) achieved a full quality assessment (e.g.  
450 CASP) score. Findings highlighted that breastfeeding support for women with higher BMIs is  
451 a complex, multi-factorial issue which if women's needs are to be met, has to take account of  
452 physical, physiological and psychological challenges and system factors including postnatal  
453 ward environment and clinical education.

454

### 455 *Physical and physiological challenges*

456 The findings of this current review echo many of the physical and physiological challenges  
457 identified by Babendure et al. (2015). Babendure et al. (2015) investigated factors that  
458 reduced breastfeeding incidence, duration and exclusivity and evaluated interventions to  
459 increase breastfeeding among women with obesity (BMI  $\geq 30$  kg/m<sup>2</sup>). Our review, which also

460 included studies of women who were overweight (BMI  $\geq$  25 kg/m<sup>2</sup>), provides additional  
461 qualitative evidence to better place findings into context of the type of support and  
462 environment of care which could benefit women with higher BMIs. Physical challenges such  
463 as women having larger breasts and difficulties with attaching their babies to the breast  
464 impacted on their breastfeeding success (Massov, 2015; Jarlenski et al, 2014; Garner et al.,  
465 2017, Claesson et al., 2018). This, combined with lack of practical support from healthcare  
466 providers (Garner et al 2014; Kair & Colaizy 2015b; Claesson et al., 2018), highlights an  
467 important gap in how women are informed about positions to commence feeding.

468

469 As chances of spontaneous vaginal birth diminish with increasing BMI (Leddy et al., 2008,  
470 Nilses et al., 2017), clinician training to provide tailored breastfeeding support in hospital and  
471 at home should be a priority for all maternity care providers. Poor support generally for  
472 breastfeeding following caesarean birth was highlighted in a recent systematic review (Beake  
473 et al., 2017). The current review contributes further evidence, that women with high BMIs  
474 who have caesarean births not only have problems with mechanical aspects of breastfeeding  
475 but consequences of post-operative recovery in hospital environments where clinicians may  
476 be unable – or unwilling - to offer the support and advice they need, or protect their privacy.  
477 Tailored support could also prevent women from developing sore, cracked nipples, which  
478 were more common among higher BMI women (e.g. Kair & Colaizy, 2016a).

479

480 Several studies (Mok et al., 2008; Jarlenski et al., 2014; Kair & Colaizy, 2016a; Massov, 2015;  
481 O’Sullivan et al., 2015; Claesson et al.,2018) reported that women who were overweight or  
482 obese were more likely to report insufficient breastmilk as a reason for early cessation of  
483 breastfeeding than women with normal BMIs. This is one of the most commonly reported

484 reasons for early cessation generally in high income country settings, including Australia, UK  
485 and Canada (Health and Social Care Information Centre 2012; Newby & Davies 2016; Brown  
486 et al., 2014), and may be an indicator of other reasons for stopping breastfeeding, as  
487 insufficient milk of itself is unlikely if women are breastfeeding effectively. However, the  
488 included studies did not fully explore this reason or define what ‘insufficient breastmilk’  
489 actually meant. Reasons for stopping breastfeeding are likely to be complex, and ‘insufficient  
490 milk’ may seem to be a more socially acceptable reason that women feel able to report. The  
491 issue of insufficient milk warrants further investigation among all breastfeeding women, but  
492 particularly for women with higher BMIs. It is not known to what extent perceived lack of  
493 breast milk in these women reflects physiological reasons (for example, differences in adipose  
494 tissue), compounded by poor infant sucking due to mechanical barriers, such as poor latching  
495 and positioning on large breasts, and/or a consequence of inadequate postnatal support and  
496 information.

497 There is evidence that women in some cases do experience delayed onset of lactation (DoL).  
498 DoL was explored in one included paper which found BMI, larger infant birthweight and older  
499 maternal age were associated with DoL (Nommsen-Rivers et al., 2010). Obesity as a predictor  
500 of delayed lactogenesis II (the onset of copious milk production) was found in in a later study  
501 by Preusting et al.(2017), and although not a focus of this review, further research into better  
502 understanding reasons for DoL are urgently needed. Medical complications such as caesarean  
503 birth or prolonged labour could inhibit oxytocin, a crucial hormone triggering lactation onset,  
504 with a potential link between lactogenesis and decreased insulin production. Further  
505 investigation into physiological differences which may exist because of higher BMIs and/or  
506 mode of birth is needed. In the interim, tailored, timely and individualised breastfeeding



507 support, including advice on expressing/pumping breastmilk, should be offered to women  
508 with higher BMIs to prevent potential DoL particularly following a caesarean birth.

509

510 *Psychosocial challenges*

511 As in Lyons et al.'s (2018) review of the association between psychological factors and  
512 breastfeeding behaviour, psychosocial barriers to breastfeeding were also identified from  
513 women's perspectives, most notably women's perceived poor body image (Hauff &  
514 Demerath, 2012; Mok et al., 2008; Massov, 2015; Keely et al., 2015; Swanson et al., 2017).  
515 Body image appears to be an important factor if considering challenges to increase  
516 breastfeeding initiation and duration among women with higher BMIs (Hauff & Demerath  
517 2012; Swanson et al., 2017). Embarrassment at breastfeeding in public influenced some  
518 women to choose formula feeding (Massov, 2015; Keely et al., 2015; Hauff & Demerath, 2012;  
519 Claesson et al., 2018; McKenzie, 2018). In Western societies, where there is a media obsession  
520 with post-birth bodies of celebrities, women who are overweight or obese may be even less  
521 keen to expose parts of their body to breastfeed in front of others (Hauff & Demerath, 2012)  
522 due to stigma about their body image. As images of women breastfeeding are unlikely to  
523 include women with higher BMIs, 'normalising' breastfeeding among these groups may be  
524 difficult to achieve. This highlights that clinicians need to prioritise timing and content of  
525 support offered which addresses stigma or embarrassment they or the woman may feel.

526

527 It is possible that women who could benefit from tailored support for breastfeeding are  
528 reluctant to seek help because of concerns about the stigma of their weight; a similar situation  
529 to perinatal mental health where women have described being reluctant to report mental

530 health problems because of being perceived as 'bad mothers' (Moore et al., 2016). Attention  
531 needs to be given to the education of maternity care professionals, including strategies on  
532 how to avoid stigmatising women, development of effective communication skills, and  
533 evidence of why breastfeeding is so important for maternal and infant health. Research into  
534 how education on obesity can be best provided and supported by those on pre and post-  
535 registration clinical training programmes in higher education institutions is needed (Olander  
536 & Scammell. 2015).

537

538 Women's attitudes and confidence in their ability to breastfeed was also important (Hauff et  
539 al 2014). Intervention studies aiming to improve breastfeeding rates among women with  
540 obesity by increasing self-efficacy (aka confidence) were unsuccessful (Chapman et al.,  
541 2013), and it is clear that interventions that address the multi-faceted challenges of  
542 breastfeeding as identified in this review are needed.

543

#### 544 *Impact and success of support offered*

545 Another aim of the current review was to consider the impact and success of support offered  
546 to women who were overweight or obese by healthcare professionals, peer supporters and  
547 family members. The beneficial effect of positive support was described (Keely et al., 2015;  
548 Claesson et al.,2018) as was the effect of negative support (Massov, 2015; Claesson et  
549 al.,2018). The findings highlight that support has to be tailored to women's individual needs.  
550 Women with higher BMIs were less likely to seek support despite experiencing greater  
551 breastfeeding problems (Mok et al., 2008). If negative attitudes are encountered, the  
552 likelihood of seeking the health support they need is likely to reduce further. In terms of

553 practical support, advice that larger beds and chairs be used postnatally to help women who  
554 are overweight or obese find a comfortable, successful breastfeeding position could be  
555 considered (Jevitt et al., 2007), as could use of breastfeeding support plans tailored to  
556 individual women's needs.

557

558

559 Women's partners may reaffirm perceptions of insufficient breast milk supply through a  
560 desire to support a woman who is anxious or upset and actively encourage her to stop  
561 breastfeeding (Keely et al., 2015). Partner support is crucial to women's decisions about  
562 infant feeding (Littman et al., 1994), and involvement of partners in antenatal discussions on  
563 infant feeding could reduce well-intentioned but negative influences. No research was  
564 identified for inclusion in this review which addressed partners' and family's views, an  
565 important evidence 'gap' in terms of supporting women with higher BMIs. .

566

567 Women with high BMIs received insufficient breastfeeding information and support (Massov  
568 2015; Keely et al., 2015; Kair and Colaizy, 2016b; Claesson et al., 2018). Too few interventions  
569 have been developed, implemented and evaluated on support for breastfeeding among  
570 women with medically complex pregnancies, and no intervention studies published since  
571 2014 were identified for inclusion in this review. A Cochrane review of interventions to  
572 support breastfeeding in healthy breastfeeding women and healthy term babies (which  
573 excluded women with overweight or obesity) found that when breastfeeding support was  
574 offered, duration and exclusivity of breastfeeding increased (McFadden et al., 2017).

575

576

577

578 **STRENGTHS AND LIMITATIONS**

579 The current review included experiences and perceptions of women with BMIs  $\geq 25$  kg/m<sup>2</sup>,  
580 those who supported them, and updated searches for relevant intervention studies published  
581 since 2014. However, no new intervention studies met the review's inclusion and quality  
582 assessment criteria. We were also unable to identify and include any studies which had  
583 investigated family members' and breastfeeding peer supporters' experiences and  
584 perceptions. Only one study (Garner et al., 2014) which explored perspectives from  
585 healthcare professionals was included.

586

587 Most of the studies included had methodological limitations meaning some caution has to  
588 be applied to findings. Furthermore, findings may not be generalisable for several reasons. In  
589 majority of the included studies, women's BMIs were classified according to self-reported  
590 weight and height which may not be as accurate as measured by study teams. Exclusion of  
591 non-English language studies may have introduced selection bias. Nine papers were from the  
592 USA, a potential limitation given differences in populations, cultural attitudes to  
593 breastfeeding, settings and context of care.

594

595 **CONCLUSION**

596 This review highlights the importance of planned, tailored support during and beyond  
597 pregnancy to enable women who are overweight or obese to commence and continue to  
598 breastfeed successfully and overcome barriers they encounter. Unless women with high BMIs  
599 can access timely, tailored and consistent support from maternity care professionals and their  
600 peers, uptake and duration of exclusive breastfeeding may continue to be lower to the  
601 continued detriment of maternal and infant health. That some healthcare professionals  
602 resented the extra support and time needed by women with higher BMIs needs to be urgently  
603 addressed by healthcare institutes and higher education institutions. The weakness of the  
604 evidence base highlights that further robust research, with large sample sizes, should be  
605 prioritised given the increasing burden of obesity among women of reproductive age  
606 worldwide.

607

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