

ORIGINAL ARTICLE

Antenatal breastfeeding intention, confidence and comfort in obese and non-obese primiparous Australian women: associations with breastfeeding duration

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BACKGROUND/OBJECTIVES: Maternal adiposity is known to affect breastfeeding initiation and duration via both antenatal and postnatal factors. This study investigates associations between maternal pregravid body mass index (BMI), breastfeeding duration and antenatal breastfeeding confidence, intention and social comfort among primiparous Australian women.

SUBJECTS/METHODS: Women in their first pregnancy ($n = 462$) were recruited by convenience sampling in Queensland, Australia. Participants responded to an antenatal and six postnatal questionnaires during their infants' first year between June 2010 and March 2012. Maternal pregravid BMI was examined against breastfeeding duration, participants' antenatal infant feeding intentions and measures of breastfeeding confidence and social comfort.

RESULTS: Breastfeeding initiation in this cohort was 97%, but 46% of mothers had ceased breastfeeding at 52 weeks postpartum. Breastfeeding duration differed significantly ($\chi^2(2) = 7.21, P = 0.007$) between normal, overweight and obese women. No differences were found in antenatal intention for feeding type nor intended breastfeeding duration by one-way ANOVA ($F(2,178) = 1.77, P = 0.17$). More than half of the pregnant respondents anticipated social discomfort breastfeeding in public, with obese women significantly more likely to anticipate discomfort breastfeeding in the presence of close female friends, ($\chi^2(1) = 5.53, P = 0.019$).

CONCLUSIONS: This study confirmed the risk of premature cessation of breastfeeding for obese mothers. Interventions during pregnancy that address body image issues in relation to breastfeeding may facilitate breastfeeding success for obese mothers and their infants and accrue short- and long-term health benefits for both.

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INTRODUCTION

Appropriate infant feeding is critical in optimising infant health and well-being, with social, health and economic outcomes that extend through the life span. The Australian Dietary Guidelines recommend exclusive breastfeeding for around 6 months, with the introduction of appropriate complementary foods and continued breastfeeding through the first year of life and beyond. Method of infant feeding is known to influence the trajectory of infant growth,¹ with effects continuing throughout the life span of the individual.² Prolonged breastfeeding has been found to protect against overweight in children^{3,4} and adolescents.⁵

Maternal obesity and breastfeeding duration are both modifiable risk factors for the health of mothers and their infants.^{6,7} Infants born to overweight and obese women accrue health risks antenatally including metabolic disruption,⁸ increased likelihood of caesarean delivery, hypertensive disorders and complications arising from gestational diabetes.^{9–11} Furthermore, women with a high pregravid body mass index (BMI) have been shown to be at higher risk for reduced duration of exclusive and any breastfeeding.^{12,13} The demonstrated lower levels of breastfeeding that these infants receive may compromise optimal nutrition during infancy¹⁴ and disadvantage mothers by influencing postnatal maternal weight retention, metabolic health prior to subsequent pregnancies and obesity-related disease risk through life.¹⁵

Although most mothers have the ability to breastfeed their infants, for overweight and obese women, in addition to biomedical issues, psychological, behavioural and sociocultural factors are thought to be implicated in their shorter breastfeeding duration.¹⁶ Biomedical mechanisms associated with maternal obesity that have the potential for negative impact on breastfeeding duration include increased likelihood of pregnancy complications and caesarean delivery with well-described risks of disruption to the establishment of breastfeeding,¹⁷ and impaired lactogenesis II, thought to be associated with reduced prolactin response to suckling.^{18,19} Behavioural factors that have been suggested to have a part include poor maternal body image, which has been shown to affect both initiation and duration of breastfeeding.^{20–23} Obese women's intentions for the method of infant feeding and for the duration of breastfeeding have been suggested as factors contributing to the disparity.²⁴ Furthermore, obese women's confidence in meeting their own breastfeeding goals and their feelings about breastfeeding in public are thought to differ from those of normal-weight women.²⁵

Given that infants of overweight and obese mothers are themselves most at risk for obesity,²⁶ assisting these mothers to meet their own breastfeeding goals is an important intervention with particular value for this group. This paper, therefore, documents breastfeeding duration for a group of primiparous Australian women categorised by pregravid BMI. It then seeks to

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identify whether relationships between maternal pregravid BMI and measures of antenatal breastfeeding intention, confidence and social comfort might explain some differences in breastfeeding behaviour between groups.

MATERIALS AND METHODS

The Feeding Queensland Babies Study is a prospective questionnaire-based birth cohort study of infant feeding attitudes and behaviours among first-time mothers in Queensland, Australia's north-eastern state. Queensland's population of 4.7 million is 19% of the total Australian population of 24 million.²⁷ This report presents longitudinal data collected between June 2010 and March 2012. A description of the Feeding Queensland Babies Study with participant flow diagram has been previously published.²⁸ Recruitment was by convenience sampling. Women were personally approached at a public event for families run over 3 days in Brisbane, the capital city of Queensland (population 2.1 million). Some later recruitment occurred by word of mouth and social and traditional media. Women were initially screened for suitability and invited to participate in a questionnaire-based study for first-time mothers of infant feeding and care. Participants were included in the study if they were generally healthy, in a first (singleton) pregnancy and aged between 18 and 40 years at the time of recruitment. Further specific exclusion was applied in data analysis for specific data types and will be discussed below.

Of the initial 760 women recruited, only 488 were subsequently contactable and returned at least one questionnaire. No demographic information was able to be collected on women who were uncontactable or declined to participate.

Questionnaires

This research used slightly modified questionnaires from the Infant Feeding Practices Study II (IFPSII)²⁹ developed in the United States by the Food and Drug Administration in collaboration with the Centers for Disease Control and Prevention. Questionnaires were adapted for Australian conditions, piloted on young adult women and slightly shortened. Most questionnaires required ~20 min for completion and recorded completion date (paper version) or an electronic date stamp from which infant age at response was calculated. This article reports data from the demographic, antenatal, 2-, 4-, 6-, 9- and 12-month questionnaires.

During their third trimester, participants were mailed the antenatal survey on paper with a stamped addressed envelope and information and consent forms. A demographic questionnaire was emailed to participants during the first year. Five further questionnaires were delivered on paper or online within ± 2 weeks of infants attaining target ages 2, 4, 6, 9 and 12 months.

From the demographic survey, we report maternal age (< 30 years/30+ years), socioeconomic status (high/medium/low), education (< degree/degree or higher), country of birth (Australia/other), language spoken at home (English/other), employment (employed/not employed), marital status (partnered/not partnered) and family income (\$100 000/> \$100 000 per annum). We categorised socioeconomic status at the postcode level using the Socio-Economic Index for Areas, a composite measure of social advantage and disadvantage.³⁰ Maternal pre-pregnant BMI was calculated from weight and height self-reported in the antenatal and 12-month questionnaires.

Infant age at breastfeeding cessation was determined by collating feeding behaviour responses from postnatal surveys. Such questions included: 'Did you ever breastfeed this baby (or feed this baby your expressed breast milk)? (yes/no)'; 'Was your baby breastfed or fed expressed breast milk during the past 7 days? (yes/no)'; 'Have you completely stopped breastfeeding and expressing breast milk for your baby? (yes/no)'; and 'How many weeks old was your baby when you completely stopped breastfeeding and expressing breast milk?'

To determine women's antenatal intention for the method of feeding for their infant, we asked in the Antenatal questionnaire 'What method do you plan to use to feed your new baby in the first few weeks?' Possible responses were 'breastmilk only (baby will not be given formula); formula feed only; both breast and formula feed; don't know yet.' For analysis, these responses were dichotomised to 'breast milk only' and 'other' because of small cell sizes. Maternal antenatal intended breastfeeding duration was examined by asking participants 'How old do you think the baby will be (in months) when you completely stop breastfeeding?' Possible responses were numbers 0, 1, 2, 3 up to 24. We then asked women 'How confident are you that you will be able to breastfeed until the

baby is the age you marked in the last question?', with responses on a Likert scale using 1 to mean 'not at all confident' and 5 to mean 'very confident'.

The Antenatal questionnaire examined women's anticipated social breastfeeding comfort by asking 'How comfortable would you be in the following situations?' (1) Breastfeeding your baby in the presence of close women friends; (2) breastfeeding your baby in the presence of men and women who are close friends; and (3) breastfeeding your baby in the presence of men and women who are not close friends. Responses were on a five-point Likert scale, where 1 represents 'very uncomfortable' and 5 represents 'very comfortable'.

The Behavioural and Social Sciences Ethical Review Committee of The University of Queensland approved the study (#2009001237). Participants received an information sheet and provided written or (implied) electronic informed consent.

Data analysis

Summary statistics are reported as frequencies and percentages. Each survey contains missing data because women were retained in the cohort regardless of response history; hence, individual respondents may have answered any one or all of the seven questionnaires. Response numbers are reported for individual questions. Infants delivered more than 30 days premature were excluded from analysis to avoid confounding of breastfeeding duration data by premature cessation of breastfeeding mediated by feeding difficulties associated with infant prematurity. Five-point Likert scale data were dichotomised by separating negative responses from median and positive responses (Likert levels 1, 2/3, 4 and 5).

For Kaplan–Meier survival analysis, we divided maternal antenatal BMI into three groups corresponding to the WHO criteria for overweight and obesity with cutoffs at 25 kg/m² and 30 kg/m² and examined breastfeeding duration across these groups. The Kaplan–Meier technique is able to account for women still breastfeeding their infants either at the close of the study or when they are lost to follow-up. Respondents in this category are said to be 'censored' and are represented as such on the Kaplan–Meier plot. The log-rank test was used to compare breastfeeding duration by BMI category and adjusted for gestational weight gain (GWG).

In examining infant feeding intention, maternal GWG antenatal BMI was dichotomised at 30 kg/m² and compared across response categories of the infant feeding method using the chi-squared (χ^2) test. A one-way analysis of variance was then used to compare women's antenatal intended breastfeeding duration in months for the three categories of maternal antenatal BMI.

We used the χ^2 -test to examine associations between binary categories of maternal BMI and women's reported antenatal confidence in breastfeeding their infant for their intended duration as a binary variable and their social comfort under three specific circumstances also as a binary variable. Results are reported as a χ^2 -value with degrees of freedom and *P*-value.

Data analyses were performed using Microsoft Excel 14.4.7 and IBM SPSS Statistics for Windows (version 22.0; IBM Corp., Armonk, NY, USA).

RESULTS

A total of 462 women returned one or more questionnaires in the Feeding Queensland Babies Study. Selected participant demographic data are reported in Table 1. Pre-pregnant BMI was calculated for 258 women and ranged from 15.7 to 48.4 kg/m² with a mean of 24.9 kg/m² (s.d.=5.5). For the population as a whole, 59.3% had a BMI below 25 kg/m², 24.0% had a BMI in the range 25.0 to 30.0 kg/m² and 16.7% had a BMI > 30.0 kg/m². Both BMI and breastfeeding duration data were available for 195 participants.

Data on breastfeeding duration were available for 371 respondents. Of the 355 infants in this study born after 36 completed weeks of gestation, 347 (97.7%) were breastfed on at least one occasion. Kaplan–Meier plots for breastfeeding duration by maternal pre-pregnant BMI are provided in Figure 1. The log-rank test is a test of equality of survival distributions. It was performed for the three different levels of BMI and showed that there was a significant difference in breastfeeding survival for

Table 1. Social and demographic characteristics of participants in the Feeding Queensland Babies Study

Age (n = 277)	29.3 years (s.d. = 4.53)	
	n	%
Socioeconomic status (n = 277)		
Low	41	16.1
Middle	85	33.3
High	129	50.6
Country of birth (n = 181)		
Australia	142	78.5
Other	39	21.5
Language at home (n = 181)		
English	160	88.4
Other	21	11.6
Marital status (n = 181)		
Partnered	124	68.5
other	57	31.5
Maternal education (n = 181)		
Less than Bachelor's degree	68	37.6
Bachelor's degree or higher	113	62.4
Family income per annum (n = 182)		
< \$100 000	70	38.5
\$100 000 or more	112	61.5

Table 2. Antenatal intended infant feeding method categorised by mothers' pregravid BMI category (n = 155)

Antenatal BMI grouping	BMI < 30.0		BMI > 30.00	
	n	%	n	%
Breastfeed (no formula)	150	96.8	28	90.3
Other than breastfeed	5	3.2	3	9.7

Abbreviation: BMI, body mass index. Formula feed only, mixed feeding and 'don't know' categories have been collapsed because of small cell sizes.

Table 3. Antenatal intended breastfeeding duration in months (0–24) by mothers' pregravid BMI category

	BMI < 30	BMI > 30	Overall
Antenatal intended breastfeeding duration (months)			
Mean	12.5	11.6	12.0
s.d.	4.0	4.9	3.8

Abbreviation: BMI, body mass index.

Table 4. Maternal confidence antenatally in achieving stated breastfeeding intention

Antenatal_BMI_grouping	BMI < 30.0		BMI > 30.00		χ^2	P
	n	%	n	%		
Confident	140	92.0	27	90.3	0.15	0.72
Not confident	12	7.9	3	9.7		

Abbreviation: BMI, body mass index.

A total of 274 women responded to questions in the antenatal questionnaire regarding breastfeeding confidence. Results are presented in Table 4. There was no significant difference between obese and non-obese women in confidence in achieving intended breastfeeding goals. Respondents' level of anticipated comfort in breastfeeding their expected infants in three social situations is presented in Table 5. Obese women were significantly more likely to feel uncomfortable than non-obese women in their anticipated level of comfort in breastfeeding their infant only in the presence of close women friends ($\chi^2(1, N = 188) = 5.53, P = 0.019$). No difference in social comfort was found between groups for breastfeeding in the presence of either men and women who are close friends or men and women who are not close friends.

DISCUSSION

This study has confirmed differences in breastfeeding duration between groups of mothers based on pregravid BMI and examined relationships between maternal pregravid BMI and antenatal measures of breastfeeding intention, confidence and social comfort to try to explain this difference. It has found that anticipation of social discomfort associated with breastfeeding, even among close female friends, distinguishes obese women from their normal-weight peers and is associated with significantly shorter breastfeeding duration.

This finding may help explain the consistent disparity in breastfeeding rates for larger women. The current research also provides evidence that processes that may modify the course of lactation have already been established as early as during a women's first pregnancy. It is particularly noteworthy that no

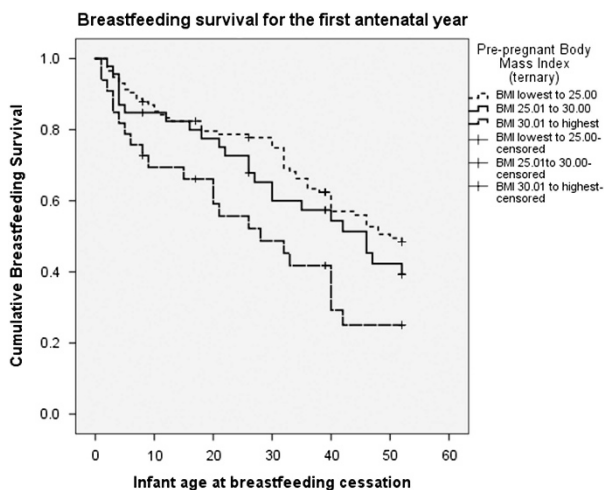


Figure 1. Kaplan–Meier plots of breastfeeding survival by maternal pre-pregnant BMI.

the first antenatal year between mothers for the three categories of BMI ($\chi^2(2) = 7.21, P = 0.007$).

Antenatal intended infant feeding method for pregnant women in this cohort is described in Table 2 by antenatal BMI category. (Formula feed only, mixed feeding and 'don't know' categories have been collapsed because of small cell sizes.) Of the 256 respondents to the antenatal questionnaire, 94.5% intended to exclusively breastfeed their infants at birth, whereas 5.5% were unsure or intended to give formula with or without breastmilk. Respondent's antenatal intended breastfeeding duration (in months) is reported for both categories of maternal antenatal BMI in Table 3. There was no statistically significant difference between obese and non-obese women for intended breastfeeding duration as determined by the one-way analysis of variance ($F(2, 178) = 1.77, P = 0.17$).

Table 5. Antenatal breastfeeding comfort in three social situations for non-obese and obese primiparous women by mothers' pregravid ($n = 255$)

	BMI categories						Total
	< 30		> 30		> 30		
	n	%	n	%	n	%	
<i>Social comfort in breastfeeding infants in the company of:</i>							
<i>(a) Women who are close friends</i>							
Uncomfortable							
Likert levels 1, 2 (negative)	20.0	13.3	6.0	9.7	11.0	25.6	37.0
Comfortable							
Likert levels 3, 4, 5 (positive)	130.0	86.7	56.0	90.3	32.0	74.4	218.0
<i>(b) Men and women who are close friends</i>							
Uncomfortable							
Likert levels 1, 2 (negative)	51	34.0	12	19.4	18	41.9	81.0
Comfortable							
Likert levels 3, 4, 5 (positive)	99	66.0	50	80.6	25	58.1	174.0
<i>(c) Men and women who are not close friends</i>							
Uncomfortable							
Likert levels 1, 2 (negative)	85	56.7	33	53.2	24	55.8	142
Comfortable							
Likert levels 3, 4, 5 (positive)	65	43.3	29	46.8	19	44.2	113

Abbreviation: BMI, body mass index. From Antenatal questionnaire, responses on a five-point Likert scale, split between Likert levels 1, 2 (negative)/3, 4, 5 (positive): (a) How comfortable do you feel breastfeeding your baby in the presence of close women friends? (b) How comfortable do you feel breastfeeding your baby in the presence of men and women who are close friends? (c) How comfortable do you feel breastfeeding your baby in the presence of men and women who are not close friends?

significant differences were observed in mothers grouped by BMI category in infant feeding intention either for feeding type or breastfeeding duration, nor in women's confidence in achieving their own personal breastfeeding goals.

This research has sought to clarify some of the reasons underlying commonly reported differences in breastfeeding duration between normal weight and obese mothers. Given the increasing proportion of women entering their reproductive years overweight and obese, it is important that the reasons for poorer breastfeeding performance so commonly noted in obese women are understood so that their precursors can be addressed. We have confirmed significantly shorter breastfeeding duration among overweight and obese women in this cohort of first-time Australian mothers, in agreement with recent studies among women in Australia and other developed countries.^{31–33} Several recent studies have investigated the differences in the rates of breastfeeding initiation between women based on pregravid BMI groupings.^{33,34} Such analysis, however, was not possible in this research because of the nearly universal (98%) initiation of breastfeeding by mothers in this cohort.

Intended breastfeeding duration

Reduced breastfeeding duration among obese women has been variously attributed to both antenatal and postnatal issues including differences in intention to breastfeed. Analysis of antenatal data from this cohort around intended breastfeeding duration, however, revealed that women's antenatal intention for breastfeeding did not differ significantly for either method of feeding or intended breastfeeding duration, between pregnant women grouped by BMI. This conflicts with earlier studies,^{35,36} including a systematic review³⁷ that found that overweight and obese women intended to breastfeed their infants for a significantly shorter period compared with women in the normal-weight range.

Maternal confidence in achieving stated breastfeeding goals was also not found to differ significantly across maternal pregravid

BMI groupings. Because breastfeeding duration was censored in this study by some women continuing to breastfeed their infants at final contact or completion of the study, it was not possible to ascertain the proportion of mothers for whom breastfeeding duration met or exceeded their own antenatal intention. A measure of the difference between women by BMI category who achieved or failed to achieve antenatal intention would be of some value, as regardless of breastfeeding duration women's ability to meet their own antenatal breastfeeding goals must serve as a very individual measure of success.

There may be a number of mechanisms by which obese women differ from women in the overweight group in regard to their infant feeding behaviour. In our cohort, there was less separation for breastfeeding survival between women in the healthy and overweight ranges than in those with BMI > 30 kg/m². We therefore have compared women by maternal antenatal BMI as a dichotomous group, split into obese and non-obese categories by BMI at 30 kg/m², to identify those aspects of breastfeeding that present difficulties for the largest group of women. It could not be expected that there is a linear relationship between maternal pregravid BMI and issues that affect breastfeeding such as confidence and body image, but rather that a point exists for maternal obesity at which issues affecting breastfeeding are manifest or become somehow insurmountable for larger women. By comparing against the group with BMI > 30 kg/m², we hoped to pick up any differences that were present.

Some studies have reported that concern about the changes in body shape that women experience during pregnancy may influence breastfeeding intention and that these changes may be more pronounced for women who enter pregnancy either overweight or obese.³⁸ Body image issues during pregnancy have been reported to involve both social and psychological issues.³⁹

Comfort in breastfeeding in social situations

Breastfeeding is often seen as a socially awkward practice⁴⁰ in spite of its importance to infants. In this cohort of pregnant

first-time mothers, more than half expressed discomfort anticipating breastfeeding their expected infant in the presence of men and women who were not close friends, whereas more obese women (42%) than non-obese women (27%) felt uncomfortable anticipating breastfeeding when both male and female close friends were present. Even anticipating breastfeeding in the company of only females who were close friends, 26% of obese women reported discomfort, significantly more than the 10% of women of normal weight.

Body image dissatisfaction related to obesity has been reported in women with high pregravid BMI⁴¹ and Hauff and Demerath⁴² have recently reported its detrimental effect on breastfeeding duration in primiparous women related to a lack of comfort and confidence in their own bodies. It may be that very few primiparous women when surveyed during the antenatal period would anticipate feeling comfortable breastfeeding their expected infant in the presence of any individuals not of their acquaintance. The least confronting and socially risky scenario for public breastfeeding when viewed from the relative innocence of the antenatal period is of breastfeeding in the presence of close female friends. It is in this context that we identified a difference between obese and non-obese groups.

Body image is a construct of perceptions and attitudes towards one's own body held by an individual.⁴³ Although it is generally thought to be stable over time, body image is multi-faceted and particularly relates to physical appearance. Body image may be a particular concern for some women during pregnancy⁴⁴ because of the rapid and profound alterations in body shape with which it is associated.³⁹ Body image concerns among breastfeeding mothers have been shown to affect breastfeeding behaviour, resulting in shorter breastfeeding duration.³⁸ Our research identifies markers of this behaviour right back at the antenatal stage, by identifying a higher level of concern about public breastfeeding among women with higher BMI.

If anticipating embarrassment at public breastfeeding can be used as a predictor of shorter breastfeeding duration in obese women, addressing and modifying these feelings and providing strategic skills and behavioural support to better approach and deal with them may be beneficial. There is a need, therefore, to fully understand the psychological factors that influence overweight and obese women to feel less comfortable breastfeeding in the presence of friends, even those close to them. In addition to addressing maternal adiposity during the peri-conceptual period, interventions that target pregnant women should address their comfort and confidence in breastfeeding in public situations. A society-wide response to this problem would inspire the normalising of female breasts in their functional role, as distinct from their decorative or sexual context.

Identification of this relationship between antenatal social discomfort for breastfeeding among overweight and obese women may suggest a place for specific training in clinical communication for health professionals involved in maternal perinatal care to assist them to discuss body image concerns with women and mitigate body dissatisfaction.⁴⁵ Investigation of reasons for the more rapid decline in breastfeeding among obese women is an important public health issue that may uncover modifiable factors as a means to intervene to assist obese women to reach their breastfeeding goals. Although duration of any breastfeeding is an important public health target for the community at large, it has particular importance for management of obesity at a population level, in light of the capacity of breastfeeding to mediate adiposity in both mothers and their infants.

Strengths and limitations

The prospective nature of this research in which anticipated infant feeding behaviour was examined during first pregnancy is a

particular strength of this study, as accuracy of maternal recall of feeding behaviours declines with time.⁴⁶ This study assumes that maternally reported pregravid BMI and GWG are accurate; however, inaccuracies in self-reporting may add uncertainty to the conclusions drawn. The prospective nature of the research suggests that these details are likely to be accurately recalled, and participants are most willing to accurately report height and weight within a confidential and an anonymous questionnaire. Although several studies have shown that adults commonly over-report their height and under-report their weight,⁴⁷ accuracy of reporting has been shown to be generally adequate for distinguishing normal weight from overweight and obese adults.⁴⁸

This research does not claim findings representative of all Australian women. Better educated and relatively affluent women are over-represented in the sample, limiting the generalisability of the findings and making it possible that any conclusions drawn in fact represent a 'best-case' scenario as compared with a less well-educated and affluent cohort.

Future research should use validated tools to test the findings of this research by investigating feelings of breastfeeding comfort and discomfort in various social contexts among new mothers, and relationships with maternal BMI and GWG.

CONCLUSION

This study confirmed the risk of premature cessation of breastfeeding among obese mothers. We found no differences by pregravid BMI in antenatal intention for the type of infant feeding, anticipated duration of any breastfeeding or confidence in achieving antenatal breastfeeding goals. During first pregnancy, more than half of all the respondents report anticipation of social discomfort breastfeeding in public; however, obese women were significantly more likely to report discomfort anticipating breastfeeding their infants in the presence of close female friends. Such discomfort may moderate their breastfeeding behaviour in ways that lead to shorter breastfeeding duration.

This study adds to our understanding of factors that may moderate breastfeeding behaviour in overweight and obese women. Future research should seek to clarify the drivers of social discomfort for overweight and obese women with a view to equipping healthcare professionals to provide them with timely support. Interventions during pregnancy that address body image issues and overcome personal social and psychological obstacles in relation to breastfeeding may facilitate breastfeeding success and accrue short- and long-term health benefits for both mothers and their infants.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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