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Understanding the relationship between breastfeeding and postnatal depression: the role of pain and physical difficulties*

Amy Brown, Jaynie Rance & Paul Bennett

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Correspondence to A. Brown:
e-mail: a.e.brown@swansea.ac.uk

Amy Brown PhD
Associate Professor Public Health
College of Human and Health Sciences,
Swansea University, UK

Jaynie Rance PhD
Associate Professor Public Health
College of Human and Health Sciences,
Swansea University, UK

Paul Bennett PhD
Professor Clinical and Health Psychology
College of Human and Health Sciences,
Swansea University, UK

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Abstract

Aims. To examine the relationship between specific reasons for stopping breastfeeding and depressive symptoms in the postnatal period.

Background. Difficulty breastfeeding has been connected to postnatal depression although it is unclear whether difficulty breastfeeding precedes or succeeds a diagnosis. However, the concept of 'breastfeeding difficulty' is wide and includes biological, psychological and social factors.

Design. A cross-sectional self-report survey.

Methods. Data were collected between December 2012 and February 2013. 217 women with an infant aged 0-6 months who had started breastfeeding at birth but had stopped before 6 months old completed a questionnaire examining breastfeeding duration and reasons for stopping breastfeeding. They further completed a copy of the Edinburgh Postnatal Depression Scale.

Results. A short breastfeeding duration and multiple reasons for stopping breastfeeding were associated with higher depression score. However, in a regression analysis only the specific reasons of stopping breastfeeding for physical difficulty and pain remained predictive of depression score.

Conclusions. Understanding women's specific reasons for stopping breastfeeding rather than breastfeeding duration is critical in understanding women's breastfeeding experience and providing women with emotional support. Issues with pain and physical breastfeeding were most indicative of postnatal depression in comparison to psychosocial reasons highlighting the importance of spending time with new mothers to help them with issues such as latch.

Keywords: breastfeeding, difficulty, formula feeding, health visiting, midwives, pain, postnatal depression

Why is this research or review needed?

- The UK has low levels of breastfeeding with many new mothers stopping breastfeeding in the first few days or weeks.
- Women who stop breastfeeding in the early days may have an increased risk of postnatal depression.
- We do not fully understand the factors that influence development of postnatal depression in relation to breastfeeding.

What are the key findings?

- Breastfeeding experience rather than breastfeeding duration is predictive of depressive symptoms in the postpartum period.
- Specifically mothers who stop breastfeeding due to pain or physical difficulties are at greater risk of depressive symptoms.
- Stopping breastfeeding for psychosocial reasons such as embarrassment was not related to increased risk of depressive symptoms.

How should the findings be used to influence policy/practice/research/education?

- Understanding the relationship between breastfeeding experience and depressive postnatal symptoms is important to support new mothers.
- Enhanced support should be directed towards those mothers who stop breastfeeding for pain or physical difficulties.

Introduction

Although intention to breastfeed is high in the UK, many women stop breastfeeding in the first few days and weeks following birth (McAndrew *et al.* 2012). Reasons for stopping are complex and encompass many biological, psychological and social factors (Brown *et al.* 2011a,b, Oakley *et al.* 2013, Stewart-Knox 2013).

Understanding influences on breastfeeding cessation to increase breastfeeding rates is a global priority for two main reasons. First, formula fed infants are at increased risk of several health problems (Horta *et al.* 2007, Ip *et al.* 2007). Second, the psychological impact on women who struggle to breastfeed can be significant, with an increased risk of postnatal depression (Lee 2007a, Dennis & McQueen 2009). However, understanding the detailed pathways between postnatal depression and the concept of breastfeeding cessation remains unclear. Although research has implicated 'breastfeeding difficulties' as increasing the risk of postnatal depression (Muscat *et al.* 2014), this is a broad concept. Understanding this relationship in more depth is important to providing women with targeted support.

Background

A short breastfeeding duration has been associated with feelings of guilt, shame and anxiety in relation to infant health (Lee 2007a,b, Labbok 2008). At the far end of this spectrum of emotional response, consideration of the relationship between breastfeeding and postnatal depression (PND) is an important and ongoing debate.

Although a successful breastfeeding experience can be protective against PND (Kendall-Tackett *et al.* 2011, Ystrom 2012), stopping breastfeeding in the early days, has been associated with an increased risk of PND diagnosis or increased depressive symptomology (Paulson *et al.* 2006, Hasselmann *et al.* 2008, Dennis & McQueen 2009, Dørheim *et al.* 2009).

Finding breastfeeding to be difficult is a common feature in studies exploring the nature of PND and breastfeeding (Muscat *et al.* 2014). However, 'difficulty' is rarely quantitatively examined and unpacked. We know that women report finding breastfeeding difficult and stop breastfeeding for many reasons including physical difficulties, pain, social pressures, inconvenience, embarrassment, body image or feeling that they cannot access support (Thulier & Mercer 2009, Li *et al.* 2008, Brown *et al.* 2011a,b). However, research often subsumes these reasons into the issue of 'breastfeeding difficulty'. It is plausible that certain experiences raise the risk of PND more than others.

Aims

The aim of this study was, therefore, to exploring the relationship between postnatal depression and breastfeeding duration examining specific reasons for stopping breastfeeding as predictors of PND, rather than duration alone or non-specific difficulties.

Design

A cross-sectional self-report survey.

Sample/participants

The findings presented are from part of a larger study ($n = 505$) exploring predictors of breastfeeding duration during pregnancy and the postnatal period. Presented here

are data from mothers who initiated breastfeeding at birth but had stopped at the time of completing the questionnaire.

Mothers with an infant aged 0-6 months completed a questionnaire exploring infant feeding experiences. Inclusion criteria for this specific analysis were mothers who had initiated breastfeeding at birth but were no longer breastfeeding. Exclusion criteria for the main study included a low birth weight (<2500 g), premature birth (<37 weeks), multiple birth, maternal inability to consent and significant infant or maternal health issues.

Mothers were recruited via local mother and baby groups based in South West Wales (UK) and through online parenting forums based in the UK. For the groups, paper copies of the questionnaire were distributed and returned via the group leader. Questionnaire information letters had details of how to contact the researcher for further information if required. For the online groups, study adverts were also placed on specific research request boards on parenting forums based in the UK (e.g. www.mumsnet.com; www.bounty.com) with an online link to complete the questionnaire via survey monkey. All participants gave the first three letters of their postcode to confirm UK identity. Details were given for how to contact the researcher if needed. Participants completing the questionnaire online could request a paper copy from the researcher and those completing via local groups could request details of the online questionnaire.

Data collection

Data were collected during a 3 month period from December 2012–February 2013. Mothers reported maternal demographic background (age, education, profession, marital status). Postnatal depression was examined via the Edinburgh Postnatal Depression Scale (Cox *et al.* 1987).

Breastfeeding data were collected by asking mothers to report infant feeding mode at birth and whether they were currently breastfeeding. Those who had initiated breastfeeding at birth but were no longer breastfeeding were included in this analysis. These mothers completed a questionnaire indicating reasons for breastfeeding cessation using a questionnaire developed by Author A. This questionnaire examines biological, psychological and social reasons for breastfeeding cessation and has been used in several studies showing good internal validity (Brown *et al.* 2011a,b, Brown & Jordan 2013, Brown *et al.* 2015). Items were originally derived from interviews with new mothers and current literature examining breastfeeding cessation (e.g. Thulier & Mercer 2009, Li *et al.* 2008). Participants responded to items using a five-point likert scale (strongly agree to strongly disagree).

Time since stopping breastfeeding (between cessation and questionnaire completion) was also calculated.

Ethical considerations

A University Department of Psychology Research Ethics Committee granted ethical approval for this study. All aspects of this study have been performed in accordance with the 1964 Declaration of Helsinki for ethical standards.

All participants gave informed consent prior to inclusion in the study. Study information was attached to both online and paper copies and participants completing online had to tick a box to confirm they had read study information and consented to the questionnaire. Paper copies had a tick box consent section. Participant study information and debrief information were also provided on written and online versions of the questionnaire with details of how to contact the researcher if more information was needed.

All participants were given instruction to contact their relevant health professional if completing the questionnaire had raised any questions or issues with regard to caring for their baby or their own well-being.

Data analysis

Data were analysed using SPSS version 20. The EPDS was scored as per instructions. As the EPDS is not intended to be diagnostic of PND, but instead indicative of a need for further clinical assessment (Beck 2001) a decision was made to use the EPDS score in analyses rather than grouping mothers into PND/No PND. Moreover, a large number of women experience a range of depressive symptomology in the postnatal period that falls short of, or is never diagnosed, as PND. Using the continuous score would allow the full range of scores to be examined rather than a woman scoring '11' being labelled as no PND and a woman scoring '12' as having PND (as per suggestion by Cox *et al.* 1987) that a score of 12 should be a cut-off point indicative of PND).

For the items related to reasons for breastfeeding cessation, exploratory factor analysis was conducted to determine items groupings. Using SPSS, a principal components factor analysis using varimax rotation was performed, retaining factors with eigenvalues over 1. A threshold of 0·5 was used to determine which variables should be retained. Further analyses performed on split samples of the data for confirmation found similar structures. The factor scores computed were saved as regression scores and used for the data analysis (Tabachnick & Fidell 2006). Cronbach's alpha was computed for each factor to

examine internal consistency of the factors produced. Although the items for reasons for breastfeeding cessation questionnaire had been used in previous research [insert references post review], exploratory factor analysis was used to group items. This ensured greater reliability of item grouping. The method used was as above. Factors and item groupings reflected previous research. Cronbach's alpha was computed for each factor to check internal validity. Items, loadings and factors can be found in Table 1.

Partial correlations were used to explore relationships between breastfeeding duration, time since stopping breastfeeding, reasons for stopping breastfeeding and postnatal depression score. Maternal age and education were controlled for throughout analyses.

Reliability and validity

Symptoms of postnatal depression were examined using the Edinburgh Postnatal Depression scale, which is a validated

Table 1 Items and factor structure of questionnaire examining reasons for stopping breastfeeding.

	Body image	Embarrassed	Physical Difficulty	Pain	Lifestyle	Pressure	Support	Medical
Breastfeeding was ruining my breasts	**0·65**	0·12	0·08	0·12	0·20	0·11	0·11	0·14
I wasn't losing weight	**0·73**	0·17	0·18	0·20	0·18	−0·14	0·15	−0·01
My breasts kept leaking	**0·62**	0·22	0·12	0·11	0·12	0·05	0·22	0·05
I wanted my body back for me	**0·62**	0·32	0·11	0·19	−0·08	0·01	−0·06	−0·22
I didn't like feeding in public	0·16	**0·84**	0·20	0·18	0·10	−0·07	−0·04	0·05
I didn't like feeding in front of others	0·19	**0·85**	0·29	0·16	0·01	0·05	0·03	0·06
I was stuck in the house breast feeding	0·22	**0·72**	0·03	0·15	0·15	0·06	0·04	0·11
I didn't know anyone else who breast fed	0·04	**0·56**	0·32	0·22	0·11	0·22	0·29	0·12
The baby wouldn't latch on properly	0·22	0·27	**0·71**	0·20	0·11	0·27	0·22	−0·11
The baby was feeding all the time	0·21	0·25	**0·75**	0·21	0·06	0·15	−0·05	0·15
My baby wasn't gaining enough weight	−0·09	0·07	**0·69**	0·22	0·02	0·22	0·29	−0·11
I didn't have enough milk	−0·02	0·01	**0·62**	0·09	0·14	0·19	0·11	−0·02
Baby didn't want to breastfeed anymore	−0·04	0·12	**0·67**	0·23	0·26	0·29	0·16	0·01
It was too painful	0·04	0·19	0·11	**0·78**	0·27	0·22	0·09	0·11
My nipples were cracked	0·01	0·08	0·21	**0·62**	0·19	0·34	0·22	0·03
I got mastitis, thrush or another similar problem	0·03	0·04	0·26	**0·68**	0·04	0·33	0·12	0·01
It was too difficult	−0·02	0·15	0·20	**0·77**	0·21	0·15	0·24	0·03
I never knew when the baby was going to feed	0·11	0·04	0·10	0·22	**0·72**	0·23	0·05	0·14
I didn't like being responsible for all the feeds	0·03	0·24	0·19	0·14	**0·67**	0·26	0·15	0·22
I couldn't keep track of milk intake	0·30	0·23	0·12	0·13	**0·70**	0·20	0·13	0·21
I couldn't leave the baby	0·02	−0·05	0·14	−0·04	**0·61**	−0·11	−0·03	−0·05
I couldn't go out and socialize	0·12	0·16	0·24	0·06	**0·68**	0·18	0·21	0·06
I wanted a more predictable routine	−0·02	0·04	0·14	0·12	**0·70**	0·18	0·19	0·13
My partner wanted me to stop	0·15	0·35	0·10	0·22	0·10	**0·79**	0·41	0·03
My mother wanted me to stop	0·09	0·32	0·17	0·31	0·19	**0·82**	0·34	0·12
Friends wanted me to stop	0·13	0·26	0·12	0·16	−0·04	**0·76**	0·39	0·05
Other people made negative comments	−0·24	0·17	0·02	0·15	−0·11	**0·75**	0·25	0·07
Other people felt excluded	0·14	0·20	0·26	0·10	0·03	**0·62**	0·35	0·03
I couldn't get any help with problems	0·17	0·12	0·12	−0·15	0·23	0·12	**0·80**	0·11
I didn't have enough support	0·34	0·33	0·12	0·08	0·21	0·12	**0·76**	0·18
I couldn't get any professional advice	0·28	0·12	0·24	0·23	0·21	0·19	**0·60**	0·32
I was exhausted	0·30	0·18	0·42	0·23	0·05	−0·13	**0·58**	0·22
I wasn't well	0·38	0·32	0·36	0·05	0·12	0·12	0·12	**0·54**
The baby wasn't well	0·22	0·28	0·25	0·17	0·04	0·10	0·08	**0·68**
I was taking medication	0·15	0·39	0·14	0·21	0·09	−0·09	0·22	**0·66**
A health professional advised me to stop	0·12	0·18	0·11	0·12	0·22	0·02	0·14	**0·78**
Percentage of variance explained	15·28	10·66	4·79	4·74	4·16	4·02	3·42	3·20
Cronbach's alpha	0·79	0·76	0·70	0·69	0·63	0·78	0·72	0·62

Table 1 shows regression scores for each item and how they load onto each factor produced. Items in bold signify items which group strongly on each factor.

Table 2 Demographic background of participants.

Indicator	Group	*N*	%
Age in years	≤19	3	1·4
	20-24	15	6·9
	25-29	48	22·1
	30-34	79	36·4
	35≥	72	33·2
Education	School	44	20·3
	College	48	22·1
	Higher	66	30·4
	Postgraduate	59	27·2
Marital status	Married	139	64·1
	Cohabiting	71	32·7
	Single	7	3·3
Maternal occupation	Professional/managerial	66	29·5
	Skilled	64	30·4
	Unskilled	51	23·5
	Stay at home mother	36	16·6
Total participants		217	100

and widely used tool (Cox *et al.* 1987). Items in the breastfeeding questionnaire were based on recurring themes in the current literature (Li *et al.* 2008, Thulier & Mercer 2009) and preliminary qualitative interviews exploring influences on mothers' decisions to breast or formula feed (Brown *et al.* 2011a,b). Factor analysis was used to compute factors and Cronbach's alpha was used to examine internal consistency of the factors produced.

Results

Mothers in a sample ($N = 217$) of 502 had initiated breastfeeding at birth, had stopped breastfeeding at the time of measurement and had full data. Mean age was 32·09 (SD 4·88) (range 22-44) with a mean number of years in education of 15·1 (SD 3·96) (range 12-20). For further demographic details please see Table 1.

Mean EPDS score was 7·26 (SD 3·94) [range 1-18]. Using a cut-off point of a score of 12 or higher as indicative of postnatal depression (Cox *et al.*1987), 32 mothers scored in this region (14·7%). Mean duration of breastfeeding was 4·19 weeks (SD 4·33) with a range from 1 to 20 weeks. One hundred and sixty-five mothers (76·0%) stopped within the first 8 weeks postpartum. A significant negative correlation was found between duration of breastfeeding and EPDS score (Pearson's $r = -0{\cdot}267$, $P < 0{\cdot}001$). The longer a mother breastfed, the lower the EPDS score. No significant correlation was found between length since stopping breastfeeding and EPDS score (Pearson's $r = 0{\cdot}106$, $P = 0{\cdot}060$).

Table 3 Association between reasons for stopping breastfeeding, breastfeeding duration and EPDS score.

	Breastfeeding duration	EPDS
Difficult	$r = -0{\cdot}401$, $P < 0{\cdot}001$	$r = 0{\cdot}295$, $P < 0{\cdot}001$
Pain	$r = -0{\cdot}177$, $P = 0{\cdot}004$	$r = 0{\cdot}239$, $P < 0{\cdot}001$
Inconvenient	$r = 0{\cdot}202$, $P = 0{\cdot}002$	$r = -0{\cdot}146$, $P = 0{\cdot}016$
Embarrassment	$r = -0{\cdot}143$, $P = 0{\cdot}015$	$r = 0{\cdot}038$, $P = 0{\cdot}290$
Body image	$r = -0{\cdot}001$, $P = 0{\cdot}485$	$r = 0{\cdot}059$, $P = 0{\cdot}195$
Pressure from others	$r = 0{\cdot}154$, $P = 0{\cdot}012$	$r = 0{\cdot}200$, $P = 0{\cdot}002$
Lack of support	$r = -0{\cdot}225$, $P < 0{\cdot}001$	$r = 0{\cdot}208$, $P = 0{\cdot}001$
Medical reasons	$r = 0{\cdot}007$, $P = 0{\cdot}485$	$r = -0{\cdot}083$, $P = 0{\cdot}113$

Partial correlations controlling for maternal age and education.

Reasons for stopping breastfeeding

Principal components analysis was performed on items exploring breastfeeding cessation producing eight factors that explained 82·41% of the variance. Factors were labelled 'physical difficulty' (e.g. lack of milk, exhausting), pain (e.g. pain, infection), inconvenient (e.g. interfering with maternal lifestyle, placing greater responsibility on the mother than formula feeding), body image (e.g. dislike of appearance of breasts), embarrassment (e.g. did not like feeding in front of others or in public), pressure from others (e.g. pressure to stop from family, partner), lack of support (e.g. poor professional support, partner did not support) and medical reasons. Two items did not load onto any factor and were excluded from the analysis (I wasn't well; I couldn't socialize). Regression scores for each factor were computed and used for comparison. Cronbach's alpha was also computed for each factor, ranging from 0·75-0·90.

The relationship between breastfeeding duration and reasons for stopping breastfeeding was explored using partial correlations controlling for maternal age and education (Table 3). Significant negative associations were seen between age of stopping breastfeeding and reports of physical difficulty, pain, lack of support, embarrassment and pressure from others to stop. The earlier a mother stopped the higher her score on these factors. A significant positive correlation was found between breastfeeding duration and inconvenience; mothers with a longer breastfeeding duration were significantly more likely to report this factor. No significant association was found between length of breastfeeding and embarrassment, body image and medical reasons scores.

Partial correlations controlling for maternal age and education also showed that EPDS score was significantly positively correlated with physical difficulty, pain, lack of support and pressure from others to stop, independently of

breastfeeding duration and readiness to stop breastfeeding. The higher the agreement with these factors, the higher the EPDS score. A significant negative correlation was seen between EPDS score and stopping due to inconvenience. No significant association was seen between body image, embarrassment or medical reasons and EPDS score (Table 3).

Predicting postnatal depression score

To examine the main predictors of postnatal depression a linear regression analysis using the enter method was performed. EPDS score was placed as the response variable and reasons for breastfeeding cessation and breastfeeding duration as explanatory variables. The model explained 18·3% of the variance, [$F(8, 208) = 5{\cdot}839$, $P < 0{\cdot}001$]. The only reasons that remained predictive were intention ($P < 0{\cdot}001$), physical difficulty ($P = 0{\cdot}001$) and pain ($P = 0{\cdot}007$). Thus, breastfeeding duration itself did not predict PND score.

Discussion

This study examined the relationship between postnatal depression and breastfeeding cessation, specifically exploring reasons for breastfeeding cessation as affecting risk of depression. The data showed that although the earlier mothers stopped breastfeeding, the higher their postnatal depression score, this could be explained by experience of breastfeeding. Specifically stopping breastfeeding for reasons of physical difficulties or pain were associated with a higher EPDS score, rather than breastfeeding duration itself. The findings have important implications for those both supporting new mothers to breastfeed and working with mothers with postnatal depression.

Pain and physical difficulty breastfeeding are common reasons for breastfeeding cessation (Atchan *et al.* 2011, Kronborg *et al.* 2014, Li *et al.* 2008). It is not difficult to see how these experiences themselves can increase risk of postnatal depression. Pain is associated generally with increased risk of depression (Kroenke *et al.* 2011) and breastfeeding pain has been associated with increased risk of PND (Watkins *et al.* 2011). If an infant is having physical difficulty breastfeeding (e.g. they are lethargic, have a poor suck or latch to the breast), the mother's breastfeeding experience will itself be more complicated. A poor latch leads to more frequent and longer feeds (Edmunds *et al.* 2011), increasing risk of exhaustion in the mother which combined with poorer weight could lead to anxiety about infant well-being (Brown *et al.* 2011b). In turn both lack of sleep and anxiety for the infant are associated with increased risk of postnatal depression (O'Hara 2009).

Second, finding breastfeeding painful and difficult will likely be at odds with how mothers perceive their breastfeeding experience will be. Mothers often report that they believed that breastfeeding would be straightforward and then when they encountered difficulties they felt guilty, let down and upset by the experience, feeling that they have failed (Labbok 2008, Lee 2008, Odom *et al.* 2013). These feelings themselves may increase risk of PND (Tamminen 1988, Edhborg *et al.* 2005, Galler *et al.* 2006).

Moreover, mothers experiencing physical difficulties and pain are not stopping for reasons that in part benefit them, e.g. because they find breastfeeding inconvenient or because they feel embarrassed and would therefore feel more confident or content using a bottle. Instead they feel that they need to stop breastfeeding because the experience is too distressing, rather than seeing stopping as benefitting themselves in some way (albeit the pain and discomfort stopping). This was evidenced by the lower EPDS scores in the initial analysis amongst mothers choosing to stop for social reasons – potentially mothers in this group see a benefit to stopping breastfeeding.

It is also possible of course that mothers with PND perceive breastfeeding as more physically difficult or painful. First, experiencing PND, or milder depressive symptomology, can mean that mothers find breastfeeding (or infant care in general) more difficult (O'Hara 2009). Mothers with postnatal depression are more likely to perceive their infant as crying excessively and find it more difficult to regulate infant behaviour (Gonidakis *et al.* 2008). They may also attribute their emotions to their breastfeeding difficulties, when in fact other factors are at play (Shakespeare *et al.* 2004).

Depressive symptoms may also increase the risk of breastfeeding being more difficult or painful. Mothers with depression may have poorer interactions with their newborn such as lower touching, sensitivity and skin to skin (Field 2010, Bigelow *et al.* 2012) that in turn increases risk of breastfeeding difficulties. For example Hart *et al.* (2011) found that mothers with depressive symptoms were less sensitive in their touch and positioning of the newborn on the breast and subsequently reported poorer latch, lower milk intake and lower weight gain.

Notably, no significant relationship was found between time since stopping breastfeeding and EPDS score. Duration predicted depressive symptoms regardless of the time that had passed. It could of course be that the length of duration since stopping breastfeeding was not long enough for depression to subside or for women to have 'accepted' their

breastfeeding decision. Or, it could be that depressive symptoms remain for significant period after stopping. Conversely, it could be that wider experiences of motherhood are leading to both breastfeeding cessation and depressive symptoms and these do no ease until later infancy or childhood. Further longitudinal work is needed to see how these relationships develop.

Educating mothers (and wider family members) as to what normal patterns of breastfeeding are like may play an important role in reducing both breastfeeding difficulties and emotional distress. Breastfed babies feed more frequently and irregularly than formula fed babies due to the ease of digestion of breast milk and need for frequent feeds to build milk supply (Daly & Hartmann 1995). However, mothers, particularly those who are higher in anxiety, can perceive this as a lack of milk and need for formula or that their baby needs to be taught to go longer between feeds and try to space out their babies feeds, which results in low milk supply and stopping breastfeeding (Brown *et al.* 2011b). The factor of physical difficulties contained many items related to this, e.g. 'I didn't have enough milk' and 'my baby fed too frequently'. Perhaps, if mothers (and those around them) understood and expected normal patterns of breastfeeding they would find their breastfeeding experience less challenging and in turn risk of postnatal depression would be lowered.

It could also be that there are underlying physical issues that contribute to pain and difficulty breastfeeding and EPDS score. A difficult birth can increase risk of postnatal depression (Elmir *et al.* 2010, Fenwick *et al.* 2013) and is also associated with shorter breastfeeding duration (Willis & Livingstone 1995, Smith 2007) and physical difficulties breastfeeding (Brown & Jordan 2013). Simultaneously, a difficult birth is associated with decreased maternal confidence (Taylor & Johnson 2013) and concern for infant growth and milk intake (Kendall-Tackett 2014). Mothers who have a caesarean section may feel that they have not been able to birth 'naturally' and thus will now be unable to feed their baby 'naturally' (Dennis & McQueen 2009). Residual pain from the birth can also prevent a mother from sleeping properly, which further increases risk of postnatal depression (Dørheim *et al.* 2009). It is unsurprising that mothers who have a difficult birth may both find breastfeeding more difficult and be at increased risk of PND.

Underlying psychological factors may also play a role. High maternal trait anxiety and introversion (Brown 2014) and low maternal self-efficacy, self-belief and confidence (Nichols *et al.* 2007, McQueen *et al.* 2011) are all associated with increased breastfeeding difficulties and a shorter duration. Similarly, low maternal self-efficacy (Leahy-Warren *et al.* 2012), high anxiety (Austin *et al.* 2007) and higher trait introversion and anxiety (Verkerk *et al.* 2005) are associated with an increased risk of postnatal depression. These underlying traits may lead some women to find new motherhood in general more difficult, predisposing them to greater risk of breastfeeding difficulties and PND. These traits may also prevent mothers from seeking the support they do need if issues arise. Introverts are lee likely to seek support from others (Williams & Galliher 2006) and more likely to feel that they do not have the ability to cope with a situation (Vollrath 2001) whilst anxiety has been linked with increased pessimism (Williams 1992) and lower self-efficacy (Ebstrup *et al.* 2011).

The findings of this study therefore have implications for those working to support mothers through birth, breastfeeding and the postnatal period. They highlight the importance of supporting mothers with issues such as ensuring the infant is latched onto the breast correctly and educating mothers as to normal breastfeeding patterns and signs of milk sufficiency. Ensuring good, continued professional support for the mother through the postnatal period and encouraging the mother to make use of social support networks and breastfeeding peer support groups is important in reducing risk of PND.

Limitations

The study does have its limitations. Participants were self-selecting and older, more educated with a higher percentage of professional occupations than average (ONS 2011). Levels of breastfeeding were typically higher than UK average, (McAndrew *et al.* 2012) suggesting that mothers more interested in infant feeding practices may have taken part, but this is often the case in survey research (Jordan & Morgan 2011). Although, a range of demographic groups did participate, care should be taken, however, in generalizing to a wider population.

A further limitation is the use of the EPDS to measure postnatal depression. The measure does not diagnose postpartum depression (as this would require a psychiatric interview) but it is the most commonly used assessment tool to examine depressive symptomology in postpartum women (Beck 2001). A typical cut-off score of >12 is suggested to indicate postnatal depression which correlates well (up to 96%) with psychiatric interview results (Cox *et al.* 1987, Harris *et al.* 1989, Murray & Carothers 1990). Typically the scale is also used at 6 weeks postpartum but has shown good reliability at 1 week postpartum, correlating well with depression score at 4 and 8 weeks (Dennis 2004).

Recruitment also used online methods of data collection. Although this method is now popular in health and social science research (e.g. Alcalde 2011, Ferguson & Hansen 2012, Hamilton *et al*. 2012), it may lead to a bias towards older, more educated women, proactive participants (Drentea & Moren-Cross 2005). However, pregnant and new mothers are a well-known user group of Internet forums (Plantin & Danebeck 2009). Use tends to be inclusive of demographic groups (Sarkadi & Bremberg 2005) and allows cost effective access to a targeted sample (Koo & Skinner 2005).

Conclusion

This study highlights the importance in considering the importance of women's breastfeeding experience rather than simply breastfeeding duration itself in considering how breastfeeding and PND risk may occur. Specific support needs to be directed towards helping mothers experiencing pain and/or physical difficulties both from the perspective of prolonging breastfeeding experience but also supporting maternal well-being.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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