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Persistent Pregnancy-Related Anxiety Reduces Breastfeeding Exclusiveness and Duration: A Prospective Cohort Study

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Abstract

Objective: Most research has focused on the role of prenatal mental health difficulties on breastfeeding practices, whereas pregnancy-related anxiety (PrA) has been less studied, despite its high prevalence. Identifying new vulnerable subgroups in which the breastfeeding rate remains low is important for health care workers to implement targeted interventions. This study is aimed to explore the association between PrA and breastfeeding practices.
Materials and Methods: A total of 3,033 parent–infant dyads from the Ma'anshan Birth Cohort study were included in this research. PrA was assessed by the PrA questionnaire at the second and third trimesters. Breastfeeding practices including the initiation of breastfeeding, delayed lactation, exclusive breastfeeding (EBF), and the duration of breastfeeding were collected at 1, 4, 6, and 12 months postpartum. The associations between PrA and breastfeeding practices were evaluated by multinomial logistic regression and a multivariable Cox proportional hazards model.
Results: In total, 9.26% (281/3,033) of participants reported PrA in both trimesters, indicative of persistent PrA. Compared with participants who never suffered from PrA, participants with persistent PrA had a higher risk of giving up EBF at 4 and 6 months postpartum, and a shorter duration of breastfeeding. These results remained the same after excluding participants who gave up EBF due to depression postpartum.
Conclusion: Persistent PrA was negatively associated with breastfeeding exclusivity and duration. Addressing PrA might contribute to improved rates of breastfeeding.

Keywords: pregnancy-related anxiety, exclusive breastfeeding, breastfeeding duration, cohort study

Background

The importance of breastfeeding for children's health is well recognized.[1] However, many countries worldwide do not meet the 50% breastfeeding rate recommended by the World Health Organization (WHO).[2] For instance, the median prevalence of exclusive breastfeeding (EBF) at 6 months was only 13% in 21 countries in the WHO European Region, ranging from 1% to 49% (data from 1998 to 2013).[2] According to a survey on factors affecting breastfeeding in China by the China Development Research Foundation, the rate of EBF among 10,223 infants within 6 months of birth is only 29% in 2017.[3]

It was slightly higher than the nationally representative survey of China in 2013 (20.8%),[4] but still lower than the global average of 42% at the same period[5] and far from the

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target of 50% by 2020 proposed by the Chinese government.[6] Identifying new vulnerable subgroups in which the breastfeeding rate remains low is important for the development and implementation of targeted interventions. Previous studies have shown a link between prenatal depression or anxiety and intention to breastfeed and early breastfeeding cessation,[7–10] which suggested the need to focus our attention on subgroups with prenatal mental health problems.

Pregnancy-related anxiety (PrA), a common prenatal mental health problem, is characterized by specific nervousness and fears related to pregnancy, such as fears for their own health and appearance, fear for the health of the baby, fear of childbirth and parenting, and worries about social and financial issues in the context of pregnancy.[11] Of the 1,436 pregnant people in the United States, 10% ($n = 141$) reported high PrA.[10] Our previous study showed that 23% (4,711/20,308) of pregnant participants in China suffered from PrA.[12] Data from nine primary health care centers distributed across Qatar showed that 26.5% of pregnant people had high PrA, much higher than general anxiety (16.4%).[13]

Besides, available data suggest that PrA may be more strongly associated with adverse outcomes than general anxiety or depression, and may predict these outcomes more accurately.[14–17] However, the association between PrA and breastfeeding practice was less reported compared with general anxiety. Existing research with limited sample size suggested that pregnant people with prenatal high PrA are more likely to formula feed[10] and give up on EBF at 6–8 weeks postpartum.[18]

Pregnant people experiencing PrA have lower rates of breastfeeding and are likely a vulnerable subgroup. First, they are more likely to formula feed because of increased fears related to pregnancy, such as work or financial issues. Second, they are more likely to choose a cesarean section,[19] which has been negatively correlated with breastfeeding, as found in a systematic review and meta-analysis.[20] Last but not least, many pregnant people with PrA worry excessively about the risks of childbirth and the health of their children because of their lack of accurate medical knowledge. For example, lacking accurate information about breastfeeding is associated with cessation of breastfeeding. We see this with the perception of insufficient milk production and not being aware of all of the health benefits of breastfeeding.[21,22]

PrA represents a different entity that is not completely encompassed by other common mental health problems, such as generalized anxiety or depression.[23,24] It is necessary to individually assess the impact of PrA on breastfeeding. China has its own cultural background, its one child policy, implemented in China from 1980 to 2015, which provides unique conditions for exploring the relationship between PrA and breastfeeding practices. In this study, we aimed to explore the long-term effects of PrA on breastfeeding practices in a relatively large Chinese cohort.

Materials and Methods

Participants

The participants of this study were from the Ma'anshan Birth Cohort (MABC). This cohort recruited a total of 3,474 pregnant people who decided to give birth at the Maternal and Child Health Care Center of Ma'anshan in Anhui province, China, from May 2013 to September 2014. Detailed information about the MABC study has been published previously.[25] As shown in the subject flow diagram (Fig. 1), 201 participants with ectopic pregnancy, abortion, stillbirth, or multiple pregnancies were excluded.

Of the 3,273 participants who had a single live birth, 240 were not eligible due to missing data on anxiety, delivery, or breastfeeding. Therefore, a total of 3,033 participants with single live births were included in our study. The study was approved by the Biomedicine Ethical Committee of Anhui Medical University (no. 2013119). Written informed consent was obtained from all participants.

Pregnancy-related anxiety

PrA symptoms during the second and third trimesters were assessed using the PrA questionnaire (Supplementary Table S1), which is proven to have good psychometric properties.[26] This questionnaire included 13 items across 3 dimensions: ''fears related to something such as the health, appearance or job of pregnant woman's own'' (6 items), ''Fears related to the health of the foetus'' (5 items), and ''fear of childbirth'' (2 items). The responses for each item were ranked on a 4-point scale ranging from ''never worry'' to ''always worry'' (1 = never worry, 4 = always worry).

A total score of 24 or higher is defined as having PrA symptoms.[12] Subjects were divided into four groups according to whether they presented PrA symptoms in the second and the third trimesters of pregnancy: never suffered group, symptom improvement group, late-onset group, and persistent anxiety group.

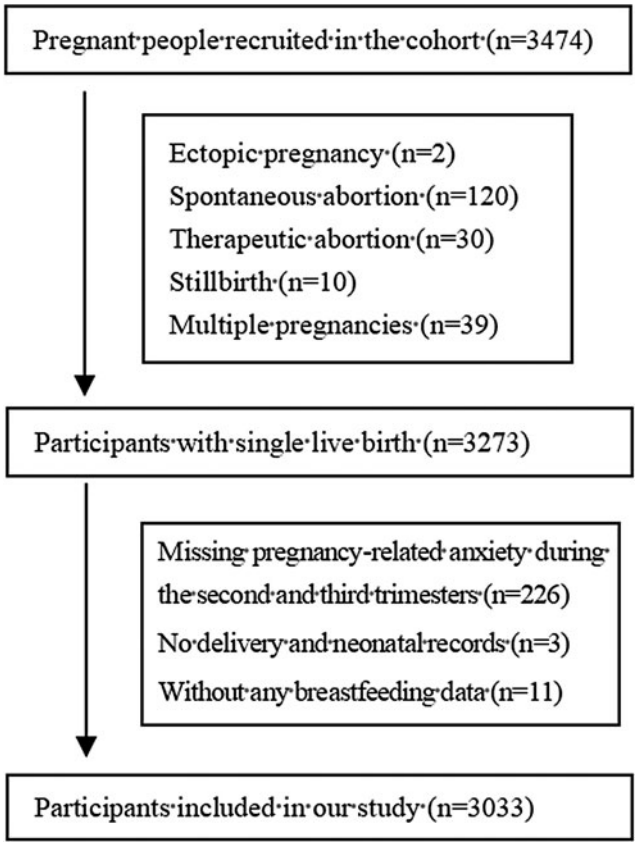

FIG. 1. Flow diagram showing the selection of subjects from the MABC. MABC, Ma'anshan Birth Cohort.

Table 1. Characteristics of the Included Participants ($n = 3,033$) from the Ma'anshan Birth Cohort Study According to Pregnancy-Related Anxiety During Pregnancy

	Pregnancy-related anxiety				
	Never suffered group (%)	*Symptom improvement group (%)*	*Late-onset group (%)*	*Persistent anxiety group (%)*	p
Total number	2,381	256	115	281	
Participant's age (years)					**0.005**
<25	27.8	32.8	35.7	37.4	
25–35	69.7	66.4	62.6	61.2	
≥35	2.6	0.8	1.7	1.4	
Education					**0.000**
Bachelor degree or above	28.4	23.8	27.8	15.7	
Junior college	32.0	32.0	27.8	27.8	
Senior high school or equal	21.5	21.9	20.9	31.0	
Junior high school or below	18.1	22.3	23.5	25.6	
Monthly household income (RMB)					0.126
<2,500	25.5	25.0	27.8	32.4	
2,500–3,999	43.2	42.6	43.5	43.8	
≥4,000	31.4	32.4	28.7	23.8	
Parity					**0.002**
Primiparous	87.9	93.8	94.8	91.8	
Multiparous	12.1	6.3	5.2	8.2	
Cigarette smoking					**0.000**
Never	97.1	90.2	97.4	89.7	
Former/current	2.9	9.8	2.6	10.3	
Alcohol drinking					**0.002**
Yes	7.1	13.3	9.6	10.3	
No	92.9	86.7	90.4	89.7	
Prepregnancy BMI group, kg/m^2					0.767
BMI <18.5 (underweight)	22.8	20.9	25.5	24.4	
18.5 ≤ BMI <24 (normal weight)	66.7	68.4	65.5	62.2	
24 ≤ BMI <28 (overweight)	8.7	8.7	6.4	11.6	
BMI ≥28 (obese)	1.8	2.0	2.7	1.8	
Gestational diabetes					1.000
Yes	12.5	12.5	12.2	12.5	
No	87.5	87.5	87.8	87.5	
Pregnancy-induced hypertension					0.376
Yes	95.8	94.4	95.6	97.5	
No	4.2	5.6	4.4	2.5	
Infant gender					0.958
Male	50.8	51.2	48.7	49.8	
Female	49.2	48.8	51.3	50.2	
Preterm birth					0.166
Yes	3.4	3.1	0.0	2.1	
No	96.6	96.9	100.0	97.9	
Birth weight (g)					0.643
<2,500	1.6	1.7	0	2.5	
2,500–3,999	90.6	90.6	93.0	88.2	
≥4,000	7.7	7.8	7.0	9.3	
Mode of delivery					**0.039**
Vaginal	50.5	49.4	50.4	41.4	
Cesarean	49.5	50.6	49.6	58.6	

BMI, body mass index; RMB, renminbi.

Breastfeeding

Breastfeeding information was collected by self-administered questionnaires under the supervision of graduate students at the Maternal and Child Health Care Center of Ma'anshan. At 1 month after delivery, participants were asked two questions, the time when colostrum appeared and their current feeding patterns. If the timing of colostrum appearance was >3 days after delivery, it would be defined as delayed lactogenesis II.[27] At 1, 2, 3, 4, 5, 6, and 12 months follow-up, the frequency of EBF and/or any breastfeeding (ABF) and the reason for stopping EBF were obtained. At 12 months postpartum follow-up, participants were asked to report the weaning age (months).

Noninitiation of breastfeeding was defined as no breastfeeding at all postpartum. According to the WHO definition[28] and China's current situation (that almost all infants will be fed with water), EBF was defined as infants being exclusively breastfed, also allowing water, oral rehydration salts, drops, and syrups (vitamins, minerals, medicines), but nothing else.

Confounding factors

The characteristics of birthing parents (e.g., participant's age, education, prepregnancy body mass index (BMI), cigarette smoking, alcohol intake, parity, gestational diabetes, and pregnancy-induced hypertension), infants (e.g., gender, preterm birth, birth weight, and mode of delivery), and monthly household income were obtained by self-administered questionnaires or medical records.

Statistical methods

The characteristics of the included participants are calculated by chi-square test. Multinomial logistic regression was conducted to examine the unadjusted or adjusted odds ratio (OR) and 95% confidence interval (95% CI) between PrA and breastfeeding initiation, delayed lactation, and EBF at 1, 2, 3, 4, 5, and 6 months postpartum. Hazard ratios (HRs) between PrA and breastfeeding maintenance at 12 months postpartum, after controlling for potential confounding variables, were calculated using the multivariable Cox proportional hazards model.

For right censored data, *status* equals zero, *time* equals missing time (month) minus inclusion time (month). To verify the stability of the results, sensitivity analysis was performed among participants ($n = 3{,}007$), excluding those who reported "I gave up exclusive breastfeeding because of my depressed mood."

Results

Characteristics

In total, 3,033 parent–infant dyads were included in our analysis. The rate of breastfeeding initiation was 89.0%, the rate of delayed lactation was 8.6%, and the rates of EBF at 1, 4, and 6 months postpartum were 53.5%, 49.4%, and 11.3%, respectively. The rate of ABF at 12 months postpartum was 27.1%.

Of the 3,033 pregnant people, 281 (9.26%) met the criteria for the persistent anxiety group, 115 (3.79%) as the late-onset group, 256 (8.44%) as the symptom improvement group, and the remaining 2,381 (78.50%) as the never suffered group.

Table 2. The Relationship of Pregnancy-Related Anxiety with Breastfeeding Initiation, Delayed Lactation, and Sustained Exclusive Breastfeeding at 1, 4, and 6 Months Postpartum

	Breastfeeding initiation		Delayed lactation		1 month EBF		4 months EBF		6 months EBF	
Pregnancy-related anxiety	*OR (95%CI)*	p	*OR (95%CI)*	p	*OR (95%CI)*	p	*OR (95%CI)*	p	*OR (95%CI)*	p
Crude model										
Never suffered group										
Symptom improvement group	1.01 (0.66–1.53)	0.980	0.93 (0.57–1.50)	0.755	1.23 (0.96–1.59)	0.106	1.07 (0.82–1.40)	0.606	1.15 (0.75–1.76)	0.521
Late-onset group	1.41 (0.82–2.43)	0.220	0.83 (0.40–1.72)	0.608	1.10 (0.75–1.62)	0.630	1.36 (0.92–2.00)	0.123	1.99 (0.92–4.32)	0.083
Persistent anxiety group	**1.46 (1.02–2.09)**	**0.037**	1.46 (0.99–2.16)	0.058	1.30 (1.00–1.69)	0.053	**1.46 (1.13–1.88)**	**0.004**	**1.61 (1.01–2.55)**	**0.045**
Adjusted model[a]										
Never suffered group										
Symptom improvement group	0.83 (0.52–1.32)	0.429	0.88 (0.53–1.46)	0.612	**1.34 (1.01–1.77)**	**0.041**[b]	1.08 (0.82–1.43)	0.582	1.19 (0.76–1.85)	0.456
Late-onset group	1.49 (0.83–2.65)	0.178	0.82 (0.37–1.80)	0.619	1.08 (0.72–1.64)	0.704	1.36 (0.90–2.05)	0.149	2.22 (0.96–5.13)	0.062
Persistent anxiety group	1.16 (0.78–1.73)	0.452	1.29 (0.84–1.98)	0.243	1.22 (0.93–1.61)	0.149	**1.38 (1.05–1.82)**	**0.021**[b]	**1.86 (1.11–3.12)**	**0.019**[b]

[a]Adjustment for covariates of participant's age, education level, monthly household income, parity, cigarette smoking, alcohol drinking, prepregnancy BMI, gestational diabetes, pregnancy-induced hypertension, fetal gender, preterm birth, birth weight, and mode of delivery.

[b]*p*-value <0.05 in the sensitivity analysis that was performed among participants ($n = 3{,}007$) who gave up breastfeeding for reasons other than depression postpartum.

BMI, body mass index; CI, confidence interval; EBF, exclusive breastfeeding; OR, odds ratio.

Compared with the never suffered group, the participants with PrA were significantly younger, less educated, smoked more, and drank more before childbirth. In addition, most of them were primiparas and chose cesarean. No significant difference was observed between these four groups in the characteristics of prepregnancy BMI, family monthly income, gestational diabetes, pregnancy-induced hypertension, preterm birth, low birth weight, and fetal gender (Table 1).

Association between PrA and EBF

Multinomial logistic regression analysis showed that compared with the never suffered group, the participants with persistent PrA had a higher risk for noninitiation of breastfeeding (OR = 1.46, 95% CI [1.02–2.09], $p = 0.037$), stopping EBF at 4 months (OR = 1.46, 95% CI [1.13–1.88], $p = 0.004$) and 6 months (OR = 1.61, 95% CI [1.01–2.55], $p = 0.045$). After controlling for confounding factors or under sensitivity analysis, only the correlation between PrA and EBF remained significant (Table 2). The rates of breastfeeding practice in each PrA group are detailed in Supplementary Table S2.

Association between PrA and breastfeeding duration

In the multivariable Cox proportional hazard regression model, the adjusted hazard ratio value for weaning was 1.01 (95% CI [0.85–1.21], $p = 0.902$) for the symptom improvement group, 1.26 (95% CI [0.98–1.62], $p = 0.069$) for the late-onset group, and 1.19 (95% CI [1.01–1.41], $p = 0.041$) for the persistent anxiety group when compared with the never suffered group. The results for the persistent anxiety group remained significant under sensitivity analysis (Table 3).

Discussion

This relatively large cohort study arrived at two novel conclusions. First, persistent PrA, rather than short-term or late-onset PrA during pregnancy, was associated with reduced breastfeeding exclusiveness and duration in the 12 months postpartum. Second, PrA during pregnancy in all groups did not appear to be associated with a failure to initiate breastfeeding or delayed lactation. Similar findings have been reported for the relationship between prenatal general anxiety and breastfeeding. Specifically, high levels of prenatal general anxiety were related to a reduction in both breastfeeding intention and breastfeeding exclusivity, but prenatal general anxiety was not related to breastfeeding initiation or breastfeeding in any quantity.[29]

The duration of anxiety symptoms during pregnancy seems to be an important factor in the discussion of anxiety severity and harmfulness. As stated in the *DSM-5*, the 6-month duration is a general guideline to differentiate developmentally normative anxiety from clinically significant anxiety.[30] According to a book on PrA, persistent PrA that interferes with daily functioning may indicate an anxiety disorder.[31] In our research, late-onset PrA and short-term PrA may be developmentally normative anxiety, as they had no negative impact on postpartum breastfeeding practices.

However, PrA symptoms during both trimesters were probably clinically significant anxiety, and these participants likely experienced anxiety or depression after delivery.[32] Postpartum anxiety and depression have been confirmed to be significantly associated with breastfeeding outcomes in many studies.[33–35]

To our knowledge, three small-sample cohort studies on PrA and breastfeeding from different countries have been published to date.[10,18,36] Among them, one study from the United States (1,436 pregnant people) and one from Germany (330 pregnant people) investigated the relationship between PrA and breastfeeding initiation, and came to the same negative conclusion.[10,36] This German research also investigated the association between PrA and breastfeeding maintenance in the first 4 months after delivery, and yielded positive results.[36]

Another study from Canada (412 pregnant people) investigated the association between PrA and EBF status at 6–8 weeks postpartum, and reached a positive conclusion.[18] The study from the United States also showed that high PrA in early pregnancy is significantly related to reduced prenatal plans for breastfeeding.[10] These findings are consistent with the results of our study.

There are two mechanisms by which anxiety affects breastfeeding: biological and psychobehavioural.[37] The biological mechanism has been suggested to involve abnormal oxytocin signaling and dysregulation of the hypothalamic–pituitary–adrenal axis reactivity among participants with mood symptoms.[34] The psychobehavioral explanation is that anxiety diminishes maternal self-efficacy, negatively impacting parent–infant interactions and breastfeeding.[38] Existing research on PrA and breastfeeding,[10,18,36] together with our findings, suggests that although PrA may not have a significant impact on lactation function, it may affect breastfeeding self-efficacy.

Table 3. Adjusted Hazard Ratios of Weaning During the First 12 Months of Life Among Pregnancy-Related Anxiety Groups Calculated by the Cox Proportional Hazards Model

	Total samples (n = *3,033*)			*Sensitivity analysis* (n = *3,007*)		
	HR[a]	*95% CI*	p	*HR*[b]	*95% CI*	p
Never suffered from group	1.00			1.00		
Symptom improvement group	1.01	**0.85–1.21**	0.902	1.02	0.85–1.21	0.847
Late-onset group	1.26	0.98–1.62	0.069	1.28	0.99–1.64	0.059
Persistent anxiety group	**1.19**	**1.01–1.41**	**0.041**	**1.19**	**1.01–1.41**	**0.043**

Positive results ($p < 0.05$) are in bold.

[a]Controlling for participant's age, education level, monthly household income, parity, cigarette smoking, alcohol drinking, prepregnancy BMI, gestational diabetes, pregnancy-induced hypertension, fetal gender, preterm birth, birth weight, and mode of delivery.

[b]Two hundred and sixty-two participants who gave up breastfeeding due to poor postpartum mood were excluded.

BMI, body mass index; CI, confidence interval; HR, hazard ratio.

Psychological factors, such as belief in the nutritional adequacy and sufficiency of breast milk and belief in infant feeding preferences, are related to breastfeeding self-efficacy and breastfeeding behaviors.[39] It is, therefore, recommended that current care should provide accurate information for pregnant people with particular beliefs, especially for pregnant people with PrA symptoms.[40]

Despite the relatively large sample size and long-term follow-up, our study has some limitations. First, we did not evaluate postpartum anxiety or depression using scales with psychometric properties. Excluding participants who gave up breastfeeding due to self-report postpartum depression does not completely and accurately control the influence of postpartum anxiety or depression on breastfeeding. However, prenatal anxiety predicts behavioral and emotional problems in children independent of postnatal depression, as found in the Avon Longitudinal Study of Parents and Children.[41]

Second, the results are not generalizable for China because the cohort was conducted in only one city, Ma'anshan. Located in east China, it covers an area of 4,049 square kilometers and has a resident population of 2,159,900. The breastfeeding rates in Ma'anshan city are similar to those reported in a 2013 Chinese nationally representative survey.[4] Finally, this study did not collect information about the people's beliefs and prenatal intentions for breastfeeding. We are not sure whether reduced breastfeeding self-efficacy is an intermediate factor in PrA affecting the sustainability of postpartum breastfeeding. Thus, the mechanisms underlying early termination of breastfeeding in pregnant people with PrA need to be explored further.

Conclusion

This prospective research found that persistent PrA during pregnancy has a negative impact on breastfeeding exclusiveness and duration in the first 12 months of the infant's life. Given the global prevalence of PrA in pregnant people,[10,12,13] our data suggest that maternal and child health care workers and pediatricians need to pay particular attention to pregnant people suffering from PrA symptoms and implement early interventions, such as improving their self-efficacy of breastfeeding.

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No competing financial interests exist.

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Supplementary Material

Supplementary Table S1
Supplementary Table S2

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