JOURNAL OF BEHAVIORAL HEALTH, 2023
VOL 12, NO. 3, PAGE 1 – 7

RESEARCH ARTICLE

Open Access

Impact of Perinatal Depressive and Anxiety Symptoms and Infant Temperament on Exclusive Breastfeeding: A Cohort Study in Malaysia

Hashima E Nasreen[1], Jamalludin Ab Rahman[1], Hafizah Binti Pasi[1], Mohd Aznan Md Aris[2], Razman Mohd Rus[1] and Maigun Edhborg[3]

[1]Department of Community Medicine, Faculty of Medicine, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia.
[2]Department of Family Medicine, Faculty of Medicine, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia.
[3]Department of Neurobiology, Care Sciences and Society, Karolinska Institute, SE 141 83 Huddinge, Stockholm, Sweden.

ABSTRACT

Purpose: The purpose of the study was to examine the impact of perinatal depressive and anxiety symptoms and infant temperament at 6 months postpartum on exclusive breastfeeding, and whether maternal depressive and anxiety symptoms at 6 months postpartum are moderators on the association between infant temperament and exclusive breastfeeding.

Methods: We used data from a perinatal mental health cohort study conducted in health clinics in two states of Malaysia. Edinburgh Postnatal Depression Scale (EPDS) and anxiety subscale of Depression, Anxiety and Stress Scale (DASS) were completed by 524 parents at late pregnancy and 6 months postpartum, while the Infant Characteristic Questionnaire and information on exclusive breastfeeding were completed by 524 mothers at 6 months postpartum.

Results: Mothers' postpartum depressive symptoms (PDS) at 6 months were associated with shorter duration of exclusive breastfeeding, but not the postpartum anxiety symptoms (PAS). Mothers with persistent depressive and anxiety symptoms ceased exclusive breastfeeding earliest. Mothers' perceptions of infant temperament and its subscales were negatively associated with exclusive breastfeeding duration only in depressed mothers, but not in non-depressed, anxious, and non-anxious mothers. Therefore, mothers' PDS, not PAS, moderated the association between mothers' perceptions of infant temperament and the duration of exclusive breastfeeding.

Conclusion: The results signify the need to address maternal mental health in early postpartum and healthcare professionals should consider the role of maternal depression when working with mothers who report their infants as temperamentally challenging.

ARTICLE HISTORY

Received Date: 21 Oct 2023
Accepted Date: 25 Nov 2023
Published Date: 03 Dec 2023

KEYWORDS

Depressive symptoms, Anxiety symptoms, Infant temperament, Exclusive breastfeeding, Breastfeeding duration.

Introduction

The World Health Organization recommends exclusive breastfeeding for the first six months of life [1]. Breastfeeding benefits the infants with decreased risk of infectious and gastrointestinal diseases [2], obesity in infancy, and type 2 diabetes as grown-up. The benefits of breastfeeding for mothers are decreased risk of hypertension, and breast and ovarian cancer [3]. Despite the established benefits, the rates of exclusive breastfeeding up to 6 months of age are low in both high and low- and middle-income countries (LMIC) [4].

The global average of exclusive breastfeeding in infants under 6 months is 36% and in LMIC 37% [1]. Risk factors for breastfeeding cessation before six months are maternal young age, single mother, low education, illnesses, smoking [5], concerns about breastmilk supply, latch difficulties [4], and lack of maternal breastfeeding self-efficacy [6]. Recent studies reveal that perinatal depressive and anxiety symptoms also contribute to early breastfeeding cessation [7,8].

The prevalence of antepartum and postpartum depressive symptoms (ADS and PDS) is estimated respectively at 17.3% and 13.1% in Western countries [9], and 25.8% and 19.7% in LMIC [10]. Anxiety symptoms have received less research attention, though the estimated prevalence of antepartum anxiety symptoms (AAS) is 22.9% and postpartum anxiety symptoms (PAS) 15% [11]. Women depressed or anxious

Contact: Hashima E Nasreen, Department of Community Medicine, Faculty of Medicine, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia.

during pregnancy are at increased risk of PDS after cessation of breastfeeding [12]. Further, women with PDS and PAS are less likely to initiate breastfeeding, have more breastfeeding problems, report lower level of breastfeeding self-efficacy and shorter breastfeeding duration than non-depressed and non-anxious mothers [4,13]. Conversely, breastfeeding promotes hormonal processes that protect mothers against PDS, and non-breastfeeding mothers are more likely to report higher levels of depression and anxiety than breastfeeding mothers [14].

Studies about infant characteristics, for example infant temperament related to exclusive breastfeeding have shown mixed results [5]. Infant temperament refers to biological individual differences in reactivity and self-regulation, which is influenced by genetics, experience, and maturation [15]. Research indicates that fussy and difficult infants are breastfed for shorter duration [16]. Conversely, Taut et al. [5] reported that infants perceived as unpredictable by their mothers were breastfed longer than infants perceived as predicted. Similarly, de Lauzon-Guillain et al. [17] suggested that breastfed and mixed-fed (breastmilk and formula) 3 months old infants are more likely to be rated by their mothers to have greater distress, less smiling, and lower soothability than non-breastfeeding mothers.

Although research has paid attention regarding the association between maternal depressive symptoms around childbirth and exclusive breastfeeding, the effect of anxiety symptoms is less explored. Moreover, role of mothers' perception of their infant temperament related to exclusive breastfeeding shows mixed results. As such this study aimed to investigate the impact of perinatal depressive and anxiety symptoms and mothers' perceptions of their infants' temperament at 6 months postpartum on the duration of exclusive breastfeeding. We also assessed whether maternal PDS and PAS at 6 months postpartum are a moderator on the association between mothers' perceptions of infant temperament at 6 months and the duration of exclusive breastfeeding.

Methods

Study design and sample

This study originated from a prospective cohort study aimed to assess the impact of perinatal depressive and anxiety symptoms on infants' growth and development, conducted in Pahang and Selangor states of peninsular Malaysia [18]. In that study, 904 expectant mothers and 587 expectant fathers participated at the third trimester of pregnancy, and were followed-up at childbirth, 2–3 months, and 6 months postpartum. The details about the sample size were described elsewhere [18]. Three hundred and eighty mothers and their infants were lost to follow-up due to multiple pregnancy (n = 3), neonatal and infant death (n = 17), outmigration (n = 188), withdrawn from the study (n = 32) and missing outcome data (n = 140). Thus, 524 (58%) parents and their infants remained in the study at 6 months postpartum. This study used the data from the third trimester of pregnancy, childbirth, and 6 months postpartum. Parents who dropped out from the study were richer, employed (p<0.001) and had a tertiary level of education (p<0.001). Mothers who did not complete the outcome questionnaire had significantly higher depressive symptoms score than the mothers who completed (p = 0.019).

Data collection

Data were collected through self-reported structured questionnaire from March 2016 to August 2017. At the third trimester of pregnancy, data were collected on socioeconomic condition including age, education (primary, secondary, or tertiary) and monthly household income; anthropometrics (height and weight); parity (primipara or multipara); number of children; relationship with spouse (good or poor); social support; and depressive and anxiety symptoms. Infants' sex, birth weight, and mode of delivery (spontaneous vaginal or cesarean section/instrumental) were recorded at birth (within 2–48 h after delivery). At 6 months postpartum, data on depressive and anxiety symptoms, mothers' perceptions of infant temperament, infants' weight, and duration of exclusive breastfeeding were obtained.

Measures

The outcome variable was exclusive breastfeeding, which was defined as only breastfeeding being practiced from birth until 6 months postpartum without any semi-solid or liquid food (except for medication and/or oral rehydration solution). The duration of exclusive breastfeeding was measured in months as self-reported by the participants.

Depressive symptoms were assessed by the Edinburgh Postnatal Depression Scale (EPDS) [19]. The EPDS is a 10-item measure, rated 0–3 on each item and ranging from 0 to 30, which screens depressive symptoms during the previous 7 days. Higher score indicated more depressive symptoms. EPDS has been validated in Malaysia for screening depression for postpartum women with a sensitivity of 72.7% and specificity of 95% at the cutoff score of 11.5 [20]. Thus, the cutoff ≥ 12 was used to group mothers with or without depressive symptoms. The scale showed good reliability with a Cronbach's alpha of 0.76 at late pregnancy and 0.71 at 6 months postpartum. Persistent depressive symptoms were indicated if the participants were depressed both at pregnancy and postpartum.

Anxiety symptoms over the previous week were assessed by the anxiety subscale of validated Malay version of Depression, Anxiety, and Stress Scale (DASS 21) [21]. A cutoff score of ≥ 8 was used to measure the prevalence of anxiety symptoms at late pregnancy and 6 months postpartum. The Cronbach's alpha of the scale was 0.73 at late pregnancy and 0.82 at 6 months postpartum.

Infant Characteristic Questionnaire (ICQ) [22] measured mothers' perceptions of infant temperament at 6 months postpartum. The ICQ describes infants' behavior, consists of 24 items, scored 1–7 on each item with higher scores indicating more difficult temperament. The items are grouped into four subscales, including fussy and difficult (nine items), unadaptable (five items), dull (four items) and unpredictable (six items). The ICQ was translated from English to *Bahasa*

Melayu and then back to English by two bilingual public health researchers. Cronbach's alpha for the full scale was 0.94 and between 0.80 and 0.89 on the four subscales.

Statistical analysis

Descriptive analyses were conducted to report sample characteristics and prevalence of exclusive breastfeeding and parental depressive and anxiety symptoms. One-way analysis of variance was used to compare mean score of the duration of exclusive breastfeeding and mother's perceptions of infant temperament (ICQ and its subscales) and chi-square test to compare the proportion of exclusive breastfeeding according to maternal depression and anxiety status.

Series of multiple linear regressions were conducted to examine the impact of perinatal depressive and anxiety symptoms and mothers' perception of infant temperament (ICQ and subscales) on the duration of exclusive breastfeeding, and to investigate the moderating role of maternal depressive and anxiety symptoms on the relationship between mothers' perceptions of infant temperament (ICQ and subscales) and the duration of exclusive breastfeeding. Because of the high multicollinearity between depressive and anxiety symptoms, and between ICQ-subscales, separate models were run for depressive and anxiety symptoms, and for each subscale of ICQ. In the first step, the relationship between depressive and anxiety symptoms and the duration of exclusive breastfeeding was tested. In the second step, the relationship between mothers' perceptions of infant temperament (ICQ and subscales) and the potential moderator, maternal PDS and PAS at 6 months were examined. In the third step, firstly, the relationship between mothers' perception of infant temperament and the duration of exclusive breastfeeding was tested. Secondly, mothers' perceptions of infant temperament and maternal PDS at 6 months (as a potential moderator) were entered simultaneously in the regression model as predictors of the duration of exclusive breastfeeding. In the fourth step, the moderating effects of maternal PDS and PAS at 6 months were tested by conducting the stratified analyses (depressed vs. non-depressed, and anxious vs. non-anxious). A p value of <0.05 was considered for statistical significance.

Results

Sample characteristics

Mothers' mean age was 30.1 (4.8) yrears at the thrid trimester of pregnanacy. Approximately 51% of the particiapnts were from the middle income level with median monthly household income of RM 3,500 (USD 792) and completed tertiary level of education. Thirty-two percent mothers were primiparous and 74% gave birth vaginally. The prevalence of PDS and PAS at 6 months were 9.4% and 9.5%, respectively. One-quarter of mothers reported breastfeeding exclusively until 6 months, while the mean duration of exclusive breasfeeding was 3.3 (1.8) months (Table 1).

Table 1: Description of the sample (in percent unless otherwise specified).

	N = 524
Mother's characteristics	
Age in years [M (SD)]	30.1 (4.8)
Education	
No/primary	3.2
Secondary	45.4
Tertiary	51.3
Height in cm [M (SD)]	155.7 (5.6)
Weight in kg [M (SD)	66.0 (16.4)
Family characteristics	
Parity (primipara)	32.4
Poor relationship with husband	4.0
Family support [M (SD)]	22.8 (3.6)
Baby variables	
Mode of delivery	
Spntaneous vaginal	73.7
Cesarean/instrumental	26.3
Male gender	52.1
Immunization complete	86.6
Weight at 6 months [M (SD)]	6.5 (1.9)
Mental health status	
Mother's antepartum depression	11.8
Mother's antepartum EPDS score [M (SD)]	6.4 (4.4)
Mother's depression at 6m postpartum	9.4
Mother's EPDS score at 6m postpartum [M (SD)]	4.0 (3.9)
Mother's antepartum anxuety	27.3
Mother's anxiety at 6m postpartum	9.5
Father's depression at 6m postpartum	4.1
Pattern of breastfeeding at 6m postpartum	
Exclusive breastfeeding until 6m postpartum	25.8
Duration of exclusive breastfeeding [M (SD)]	3.3 (1.8)

Depressive and anxiety symtopms and exclusive breastfeeding

Of the participants, 432 mothers were not depressed either during antepartum or postpartum period, 43 (8.2%) depressed at antepartum, 30 (5.7%) at 6 months postpartum, and 19 (3.6%) at both time points. The percentage of exclusive breastfeeding until 6 months was sharply declined according to the depression status of the mothers at antepartum and postpartum period, and none of the anxious mothers at 6 months postpartum exclusively breastfed their infants (Figure 1). Moreover, there are significant differences between the groups according to mothers' depression and anxiety status regarding duration of exclussive breastfeeding and mothers' perceptions of infant temperament (ICQ score) as fussy-difficult, unadaptable, dull and unpredictable. In each case, mothers with persistent depression and anxiety had the worst outcome (Table 2).

Mothers' preceptions of infant temperament and exclusive brestfeeding: Moderating role of depressive and anxiety symptoms

The first step regression analyses showed that maternal PDS at 6 months was negatively associated with the duration of exclusive breastfeeding inferring that the higher the EPDS score at 6 months postpartum, the shorter the duration of exclusive breastfeeding. However, no association was observed between maternal PAS at 6 months and exclusive breastfeeding duration. Fathers' depressive and anxiety symptoms and infants' height

Table 2: Mean score of exclusive breastfeeding duration and mothers' perceptions of infant temperament according to mothers' depression and anxiety status (N=524).

	Maternal depressive symptoms					Maternal anxiety symptoms				
	No depression n = 432 Mean (SD)	Antepartum depression only n = 43 Mean (SD)	Depression 6m only n = 30 Mean (SD)	Depression ante and 6m n = 19 Mean (SD)	p value	No anxiety n = 355 Mean (SD)	Antepartum anxiety only n = 119 Mean (SD)	Anxiety 6m only n = 26 Mean (SD)	Anxiety ante and 6m n = 24 Mean (SD)	p value
Exclusive breastfeeding months	3.3 (1.8)	3.7 (1.9)	2.4 (1.5)	2.4 (1.2)	.003	3.4 (1.8)	3.3 (1.8)	2.0 (0.3)	2.4 (1.3)	.000
ICQ total score	62.4 (15.9)	65.0 (14.9)	102.9 (30.2)	104.2 (24.8)	.000	62.5 (15.6)	62.6 (16.4)	101.1 (27.4)	106.3 (26.9)	.000
Fussy-difficult	23.8 (6.2)	23.8 (6.0)	39.0 (10.2)	39.1 (9.4)	.000	23.7 (6.2)	23.8 (6.1)	38.7 (9.3)	39.5 (10.1)	.000
Unadaptable	13.9 (4.4)	15.0 (3.5)	21.0 (7.2)	21.6 (5.9)	.000	13.9 (4.2)	14.1 (4.6)	20.7 (6.7)	21.8 (6.2)	.000
Dull	9.5 (3.2)	10.2 (3.0)	16.3 (6.3)	16.7 (5.2)	.000	9.6 (3.2)	9.3 (3.1)	15.4 (5.8)	17.6 (5.5)	.000
Unpredictable	15.3 (4.9)	16.1 (4.9)	26.6 (7.8)	26.7 (6.4)	.000	15.3 (4.9)	15.4 (5.1)	26.2 (7.7)	27.3 (6.5)	.000

Table 3: Association between depressive and anxiety symptoms at 6 months postpartum and duration of exclusive breastfeeding.

	Depression model			Anxiety model		
	β (SE)	95% CI low	up	β (SE)	95% CI low	up
Mother's height	-.11 (.02)*	-.07	-.00	-.10 (.02)*	-.07	-.00
Infant weight at 6m	.17 (.06)**	.06	.29	.15 (.06)**	.04	.28
Father's EPDS score at 6m	.12 (.03)*	.00	.12		–	
Mother's EPDS score at 6m	-.17 (.02)**	-.13	-.03	–	–	
Father's DASS score at 6m	–	–		.16 (.01)**	.01	.05
Mother's DASS score at 6m	–	–		**-.09 (.02)**	**-.09**	**.00**

Models were adjusted for mother's age, education, weight, parity, social support, relationship with husband, number of vaccines for infant's immunization, EPDS (depression model) and DASS (anxiety model) scores during pregnancy.

*p<.05

**p<.01

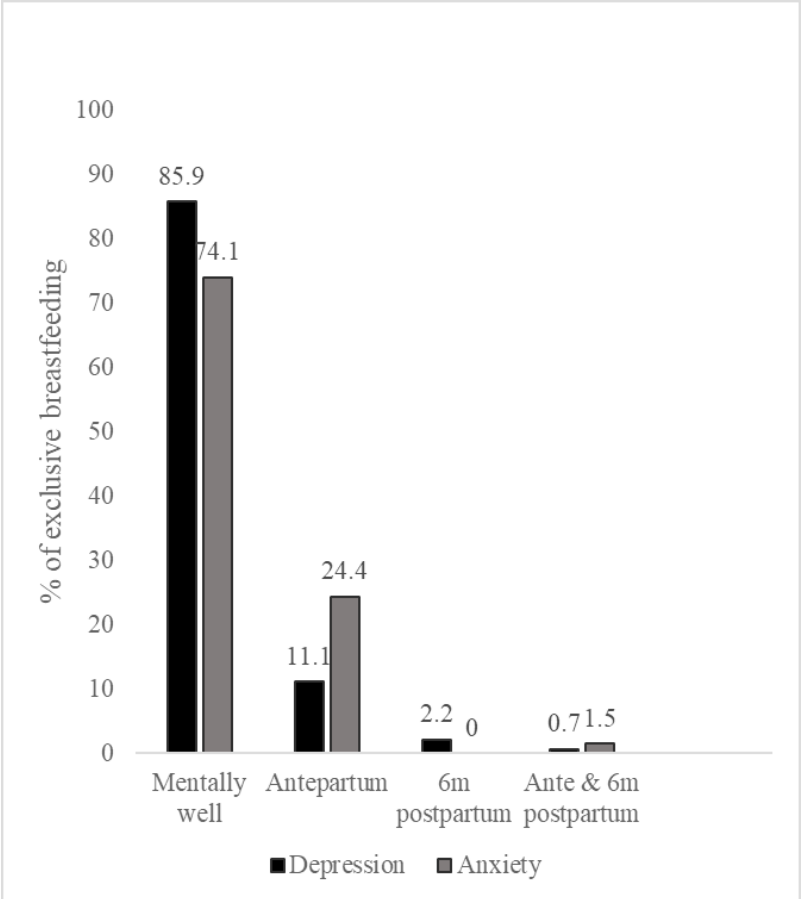

Figure 1: Percentage of exclusive breastfeeding until 6 months according to mothers' depression and anxiety status (N = 524).

Table 4: Association between different types of ICQ and duration of exclusive breastfeeding by mothers' depressive and anxiety status at 6 months postpartum.

	Full sample			Depressed at 6m			Non-depressed at 6m			Anxious at 6m			Non-anxious at 6m		
	β (SE)	95% CI low	up	β (SE)	95% CI low	up	β (SE)	95% CI low	up	β (SE)	95% CI low	up	β (SE)	95% CI low	up
ICQ total	-.08 (.00)	-.02	.00	-.69 (.01)**	-.05	-.02	.06 (.01)	-.01	.02	-.23 (.01)	-.03	.01	.08 (.01)	-.00	.02
Fussy-difficult	-.08 (.01)	-.04	.01	-.68 (.03)**	-.16	-.04	.04 (.02)	-.02	.04	-.26 (.02)	-.07	.02	.07 (.02)	-.01	.05
Unadaptable	-.04 (.02)	-.05	.02	-.53 (.04)*	-.20	-.03	.07 (.02)	-.01	.07	-.19 (.03)	-.09	.04	.08 (.02)	-.01	.08
Dull	-.02 (.02)	-.05	.04	-.74 (.04)**	-.26	-.09	.12 (.03)*	.01	.13	-.20 (.04)	-.13	.06	.13 (.03)*	.01	.13
Unpredictable	-.12 (.02)*	-.06	-.01	-.71 (.03)***	-.21	-.08	-.01 (.02)	-.03	.04	-.21 (.03)	-.09	.03	.01 (.02)	-.03	.04

All regression analyses were adjusted for mother's age, education, height, weight, parity, social support, relationship with husband, number of vaccines for infant's immunization, and husband's EPDS score at 6 months postpartum (depression model) and husband's DASS score at 6 months postpartum (anxiety model).

*p<.05

**p<.01

***p<.001

at 6 months postpartum were positively associated with the duration of exclusive breastfeeding (Table 3). Maternal antepartum depressive and anxiety symptoms were not associated with the shorter exclusive breastfeeding.

In the second step, PDS at 6 months was positively associated with mothers' perceptions of infant temperament indicated by the total ICQ score (β = 0.48, SE = 0.21, *p* = .000) and its subscales - fussy-difficult (β = 0.49, SE = 0.08, *p* = .000), unadaptable (β = 0.33, SE = 0.05, *p* = .000), dull (β = 0.44, SE = 0.04, *p* = .000) and unpredictable (β = 0.47, SE = 0.06, *p* = .000). Similar significant associations were observed between maternal PAS at 6 months and perceptions of difficult infant temperament.

In the third step, except for unpredictable, mothers' perceptions of infant temperament were not associated with the duration of exclusive breastfeeding (Table 4). However, when PDS at 6 months was added to the model, the effect of mothers perceived infant temperament appeared to be modified and negatively associated with the duration of exclusive breastfeeding (β = -0.10, SE = 0.01, *p* = .036).

In the fourth step, the stratification models showed that mothers' perceptions of infant temperament (ICQ total), as fussy-difficult, unadaptable, dull and unpredictable were strongly and negatively associated with the duration of exclusive breastfeeding in depressed mothers, but not in non-depressed mothers. It suggested that mothers' perception of infant temperament and its subscales were significant correlates of shorter duration of exclusive breastfeeding if mothers had higher PDS scores at 6 months. Therefore, maternal PDS at 6 months moderated the association between mothers' perception of infant temperament as fussy-difficult, unadaptable, dull and unpredictable and the duration of exclusive breastfeeding. Conversely, PAS at 6 months was not appeared as a moderator since the total ICQ score and its subscales were not the significant correlates of exclusive breastfeeding duration in both anxious and non-anxious mothers. Mothers' perception of infant temperament as dull was found to be positively associated with the duration of exclusive breastfeeding in non-depressed and non-anxious mothers. This indicated that if the non-depressed and non-anxious mothers perceived their infants as dull i.e., less active, and unsocial than other children, they exclusively breastfed their infants for longer duration (Table 4).

Discussion

The results in this study indicate maternal PDS at 6 months was associated with shorter exclusive breastfeeding and that mothers with persistent depressive symptoms ceased the exclusive breastfeeding earliest. This is supported by numerous studies which conclude the relationship between maternal PDS and negative breastfeeding outcomes with shorter exclusive breastfeeding [8,23], earlier transition to partial breastfeeding [24] and complimentary feeding with solid food [25]. However, despite negative association between PAS and less breastfeeding exclusivity in the existing literature, PAS at 6 months was not identified as a predictor for early cessation of exclusive breastfeeding in this study. In line with our results, Akman et al. [26] reported that anxiety did not differ between mothers who breastfed exclusively up to four months and those who did not, and Cooke et al. [27] found no association between PAS and breastfeeding duration. Different measurements and different follow-up times may limit the comparability of findings about anxiety and depression [13,28]. Although PDS studies predominately use the EPDS [19], different measures of PAS across studies may explain the mixed results of anxiety among studies. Moreover, high comorbidity between anxiety and depressive symptoms may lead to that high anxious mothers are labeled as depressed. Neither ADS nor AAS predict shorter breastfeeding duration in this study agreed with Ahlquist-Björkroth et al. [29] and Hoff et al. [13], but contrary to Yström [12], Castro and Figueiredo [7] and Cato et al. [23].

Associations were identified between maternal PDS and PAS and perceived difficult infant temperament and numerous studies have found PDS and PAS to be good predictors for perceived difficult infant temperament [16,30]. However, except for unpredictable, mothers' perceptions of their infants' temperament were not associated with exclusive breastfeeding in the full sample. Nevertheless, the stratified analyses identified maternal PDS as an effect-modifier, which interacts with all temperament dimensions and produces a strong negative effect on exclusive breastfeeding duration. Mothers' negative cognitions due to their depressive symptoms

could result in feelings of low self-confidence, which reinforce perceived breastfeeding difficulties, reduce mothers' ability to accurately interpret infant cues, and early cessation [31]. Blyth et al. [6] hypothesized that mothers with low self-confidence stop breastfeeding when confronted with difficulties, while mothers with high self-confidence persist breastfeeding despite difficulties. Conversely, two recent studies reported that mothers who breastfed exclusively perceived their infants more temperamentally difficult than mothers who stopped exclusive breastfeeding before 6 months [32] or bottle-feed [17].

The infants' weight at 6 months impacts directly on the duration of exclusive breastfeeding i.e., the heavier the infant, the longer the breastfeeding duration. This is agreed with the prior study by Richard et al. [24], who suggested that mothers alter their feeding practice according to how they perceived their infants to grow. Infants' birth weight and the degree to which their mothers perceived them to smile, and laugh are found to be key predictors of when the infants will be introducing to solid food. We found that non-depressed and non-anxious mothers who perceived their infants as dull i.e., less active, with less smile and laugh were more likely to breastfeed exclusively for a longer period. Results also show that higher paternal depression and anxiety scores are associated with longer exclusive breastfeeding. It could be explained that paternal PDS and PAS are associated with families with lower income, unemployment, financial worries [33], compared to families with non-depressed/anxious fathers. Higher socio-economic status and food security are associated with earlier transition to partial breastfeeding [24].

Limitations of the study are the self-reported measurement of depressive and anxiety symptoms instead of clinical diagnosis and assessment of infant temperament and exclusive breastfeeding duration instead of objective observation. The ICQ used in the study was not validated for mothers in Malaysia, thus we used the original factor structure of Bates et al. [22]. Translation, back translation, and pre-testing of the instrument in postpartum mothers in health clinics other than the study sites helped to use culturally appropriate language, thus minimize the errors. There is a chance of selection bias resulting from high attrition rate, which can be a threat to the internal validity of the estimates in this study.

Conclusion

Maternal PDS at 6 months was associated with early cessation of exclusive breastfeeding and moderated the relationship between mothers' perception of her infant temperament and duration of exclusive breastfeeding, but not maternal PAS. Although the negative association between maternal PDS and exclusive breastfeeding are well confirmed, the role of PAS and infant temperament on exclusive breastfeeding are still ambiguous and future research is needed.

Acknowledgements

The authors thank all clinic nurses and staff involved in helping the data collection. The authors also express gratitude to the women and men who participated in the study for generously giving their time and energy and providing personal details to the interviews.

References

1. Victora CG, Bahl R, Barros AJ, Franca GV, Horton S, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016; 387(10017): 475-490.
2. Kramer MS, Kakuma R. The Optimal Duration of Exclusive Breastfeeding: A Systematic Review. Adv Exp Med Biol. 2004.
3. Chowdhury R, Sinha B, Sankar MJ, Taneja S, Bhandari N, et al. Breastfeeding and maternal health outcomes: a systematic review andmeta-analysis. Acta Paediatr. 2015; 104(467): 96-113.
4. Hornby PP, Gurka HK, Conanway MR, Kellains AL. Reasons for early cessation of breastfeeding among women with low income. Breastfeed Med. 2019; 14(6): 375-381.
5. Taut C, Kelly A, Zgaga L. The Association Between Infant Temperament and Breastfeeding Duration: A Cross-Sectional Study. Breastfeed Med. 2016; 11(3): 111-118.
6. Blyth R, Creedy DK, Moyle W, Pratt J, de Vries SM, et al. Effect of maternal confidence om breastfeeding duration: An application of breastfeeding self-efficacy theory. Birth. 2002; 29(4): 278-284.
7. Castro C, Figueiredo B. Breastfeeding and depression: A systematic review of the literature. J Affect Disord. 2015; 171: 142-154.
8. Coo S, Garcı´a MI, Mira A, Valde´s V. The Role of Perinatal Anxiety and Depression in Breastfeeding Practice. Breastfeed Med. 2020; 15(8): 495-500.
9. Underwood L, Waldie K, D'Souza S, Peterson ER, Morton S. A review of longitudinal studies on antenatal and postnatal depression. ArchWomens Ment Health. 2016; 19(5): 711-720.
10. Gelaye B, Rondon M, Araya R, Williams MA. Epidemiology of maternal depression, risk factors, and child outcomes in low-income and middle-income countries. Lancet Psychiatr. 2016; 3(10): 973-982.
11. Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. Br J Psychiatr. 2016; 210(5): 315-323.
12. Yström E. Breastfeeding cessation and symptoms of anxiety and depression: a longitudinal cohort study. BMC Pregnancy Childbirth. 2012; 12: 36.
13. Hoff CE, Movva N, Rosen Vollmar AK, Pérez-Escamilla R. Impact of maternal anxiety on breastfeeding outcomes: A systematic review. Adv Nutr. 2019; 10(5): 816-826.
14. Mikšic S, Ugleši´ B, Jakab J, Holik D, Milostic A, et al. Positive Effect of Breastfeeding on Child Development, Anxiety, and Postpartum Depression. Int J Environ Res Public Health. 2020; 17(8): 2725.
15. Chess S, Thomas A. Temperament: Theory and Practice. Routledge. 2013
16. Niegel S, Ystrom E, Hagtvet KA, Vollrath ME. Difficult temperament, breastfeeding, and their mutual prospective effects: the Norwegian Mother and Child Cohort Study. J Dev Behav Pediatr. 2008; 29(6): 458-462.
17. de Lauzon-Guillain B, Wijndaele K, Clark M, Acerini CL, Hughes IA, et al. Breastfeeding and Infant Temperament at Age Three Months. PLoS ONE. 2012; 7(1): e29326.
18. Nasreen HE, Rahman JA, Rus RM, Kartiwi M, Sutan R, et al. Prevalence and determinants of antepartum depressive and

anxiety symptoms in expectant mothers and fathers: results from a perinatal psychiatric morbidity cohort study in the east and west coasts of Malaysia. BMC Psychiatr. 2018; 18: 195.

19. Cox J, Holden JM, Sagovsky R. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatr. 1987; 150(6): 782-786.

20. Azidah AK, Nordin R, Ismail SB, Yaacob MJ, Mustapha WMRW. Validation of Malay version of Edinburgh Postnatal Depression Scale. Asia Pacific J Fam Med. 2004; 3: 9-18.

21. Ramli M, Mohd AF, Zaini Z. Translation, validation and psychometric properties of Bahasa Malaysia version of the depression, anxiety and stress scale (DASS). Asian J Psychiatr. 2007; 8: 82-89.

22. Bates JE, Freeland C, Lounsbury ML. Measurement of infant difficultness. Child Dev. 1979; 50(3): 794-803.

23. Cato K, Sylvén SM, Georgakis MK, Kollia N, Rubertsson C, et al. Antenatal depressive symptoms and early initiation of breastfeeding in association with exclusive breastfeeding six weeks postpartum: a longitudinal population-based study. BMC Pregnancy and Childbirth. 2019; 19(1): 49.

24. Richard SA, McCormick BJJ, Murray-Kolb LE, Patil CL, Chandyo RK, et al. Characteristics associated with the transition to partial breastfeeding prior to 6 months of age: Data from seven sites in a birth cohort study. Matern Child Nutr. 2021; 17(3): e13166.

25. Wasser H, Bentley M, Borja J, Goldman BD, Thompson A, et al. Infants perceived as "fussy'' are more likely to receive complementary foods before 4 months. Pediatr. 2011; 127(2): 229-237.

26. Akman I, Kuscu MK, Yurdakul Z, Ozdemir N, Solakoglu M, et al. Breastfeeding duration and postpartum psychological adjustment: role of maternal attachment styles. J Paediatr Child Health. 2008; 44(6): 369-373.

27. Cooke M, Schmied V, Sheehan A. An exploration of the relationship between postnatal distress and maternal role attainment, breast feeding problems and breastfeeding cessation in Australia. Midwifery. 2007; 23: 66-76.

28. Fallon V, Groves R, Grovener HJC, Bennett KM, Harrold JA. Postpartum Anxiety and Infant-Feeding Outcomes: A Systematic Review. J Human Lact. 2016; 32(4): 740-758.

29. Ahlqvist–Björkroth S, Vaarno J, Junttila N, Pajulo M, Raih H, et al. Initiation and exclusivity of breastfeeding: association with mothers' and fathers' prenatal and postnatal depression and marital distress. Acta Obstet Gynecol Scand. 2016; 95(4): 396-404.

30. Jover M, Colomer J, Carot JM, Larsson C, Bobes MT, et al. Maternal Anxiety following Delivery, Early Infant Temperament and Mother´s Confidence in Caregiving. Span J Psychol. 2014; 17: 1-12.

31. Dennis CL, McQueen K. The relationship between infant feeding outcomes and postpartum depression: A qualitative systematic review. Pediatrics. 2009; 123(4): e736-e751.

32. Grumi S, Capelli E, Giacchero R, Anceresi G, Fullone E, et al. Exclusive breastfeeding and maternal postnatal anxiety contributed to infants' temperament issues at 6 months of age. Acta Paediatr. 2022; 111(7): 1380-1382.

33. Carlberg M, Edhborg M, Lindberg L. Paternal perinatal depression assessed by the Edinburgh Postnatal Depression Scale and the Gotland Male Depression Scale: Prevalence and Possible Risk Factors. Am J Mens Health. 2018; 12(4): 720-729.