



Infant temperament and perinatal depressive and anxiety symptoms in Mexican women



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ABSTRACT

Aim: This study explores the association between infant temperament at six months postpartum and pre- and postpartum depressive and anxiety symptoms. The association between infant temperament and stressful life events is also evaluated.

Method: A total of 210 Mexican women were assessed during pregnancy (gestational age 32.39 ± 4.01) and at six months postpartum. The instruments used were: *Patient Health Questionnaire* (PHQ-9), the Anxiety Subscale of the *Hopkins Symptoms Checklist* (SCL-90R), a short form of *Stressful Life Events* and The *Infant Characteristics Questionnaire*, when infants were six months old.

Results: Although a mother's emotional state during pregnancy (depressive and anxiety symptoms and stressful life events) was not associated with difficult infant temperament, it was associated with depressive and anxious symptomatology during the postpartum period. Mothers with prenatal depressive symptoms who remained depressed and mothers who only had depression symptoms during the postpartum period reported having more difficult infants. Likewise, mothers with prenatal anxiety symptoms who maintained anxiety symptoms postpartum and mothers with anxiety symptoms during the postpartum period alone reported having more difficult infants. Comorbidity was found between depressive and anxious postnatal symptomatology in its association with difficult infant temperament.

Conclusion: In this study, postpartum depressive and anxiety symptoms played an important role in shaping difficult infant temperament. Comorbidity between the two conditions warrants clinical attention and additional research, since it is related to maternal perception of difficult infant temperament. Psychological interventions are required, since these women may require assistance with emotional adaptation in the transition to motherhood.

Introduction

Temperament is described as individual differences in the regulation of emotional expression that are present from birth and remain relatively stable across development, constituting the basis of the subsequent personality [1]. Difficult infant temperament is characterized by intense negative emotional behavior, such as fussiness, crying, sleep problems, unpredictability and unadaptability [2]. It has been related to difficulties in the early mother-infant relationship [3] and the development of behavioral problems in infants [4,5].

Difficult infant temperament has been related to maternal mental health during pregnancy [6]. According to some authors, the prenatal maternal psychological state influences fetal development through alterations in maternal physiology, which may impact on the infant's

behavior [6]. For example, Babineau et al. [7] found that maternal depressive symptoms at 24–36 weeks gestation and 5-HTTLPR genotype interacted to predict early childhood dysregulation assessed by maternal report from three to 36 months of age. Davis et al. [8] reported that higher levels of maternal cortisol at 30–32 weeks of pregnancy and prenatal depressive symptoms were predictors of more negative infant reactivity (assessed by maternal report) at two months postpartum. Moreover, stress during pregnancy was an accurate predictor of fearful temperament and anxiety in infants. Lastly, in this study, prenatal anxiety symptoms were associated with maternal reports of negative infant reactivity but were not a significant predictor. In a multicultural sample, van der Wal et al. [9] found that women with high levels of prenatal depressive symptoms and pregnancy-related anxiety were at an increased risk (1.93-fold and 1.69-fold, respectively) of having an

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infant who cried excessively (infant crying was assessed by the question: *How many hours per day [of 24 h] on average has your baby cried in the past week?*) at three months of age. In a clinical sample, Werner et al. [10] found that women with a prenatal diagnosis of depression or anxiety had an almost fourfold risk of having an infant with greater crying reactivity (evaluated through laboratory observation techniques) at four months. Nevertheless, it is important to note that some studies have failed to support the association between difficult infant temperament and prenatal depressive and/or anxiety symptoms [11]. A review of prenatal maternal health and the development of infant temperament, which included 34 studies, found no conclusive data on the association between difficult infant temperament and prenatal depression and anxiety [11].

The emotional state of the mother in the early postpartum period has also been associated with difficult infant temperament [12,13]. However, the cause and effect of these associations has been the subject of debate. For some authors, difficult infant temperament is a risk factor for the development of postpartum depression [14], while others have suggested that the maternal psychological state during the postpartum period alters the mother's perception of her infant's mood and behavior [15]. Mothers with postpartum depressive symptoms tend to have more negative perceptions of their infants' behavior; feel less confident about their maternal efficacy and be less satisfied with the experience of motherhood [16]. This position has been strongly supported by studies in which the child's temperament has been evaluated through laboratory observations using different informants, in which it has been found that maternal reports only slightly coincide with the reports of trained external observers [17]. It has been suggested that this lack of coincidence could be associated with maternal characteristics. For example, Leerkes and Crockenberg [18] found that depressive symptoms moderated the degree of agreement between reports by the mother and an external evaluator (through a laboratory technique) on infant novelty stress. Thus, mothers with depression symptoms showed difficulty identifying signs of distress in their infants.

In a longitudinal study, McGrath et al. [15] showed that women with prenatal depressive symptoms who maintained depressive symptoms during the postpartum period described their infants as being more temperamentally difficult (infant temperament was assessed by maternal report) at two and six months of age as compared with non-depressed perinatal women. For these authors, postpartum depressive symptoms may negatively affect women's perceptual accuracy when evaluating their infants. Thus, an extremely active child may be perceived as difficult by their mother if she is also suffering postpartum depression [15]. In a recent study, Martini et al. [13] found a strong association between difficult infant temperament and maternal anxiety. These authors suggest that excessive infant crying and feeding problems (both regulated through a diagnostic interview for problems of regulation: Baby-DIPS) may be related to interactional deficits on the part of anxious mothers, who perceive their infants as difficult during soothing or feeding situations.

On the other hand, recent studies have suggested that stressful life events experienced by the mother during the perinatal period could play an important role in the child's temperament [19,20]. Prenatal stress produces metabolic changes in the womb environment, which may directly or indirectly affect fetal development [21]. Huizink et al. [22] found that maternal perceived stress accounted for 8.2% of the variance in difficult infant behavior at three months assessed by maternal report and direct infant observation. In a systematic review, Van den Bergh et al. [19] found that maternal psychological distress was related to difficult infant temperament, particularly negative affectivity (fear, discomfort, anger, intense reactions, and slowness in adapting to new situations). Recently, Bush et al. [23] found that mothers who perceived themselves as more stressed during pregnancy and postpartum reported that their infants were more temperamental with fewer self-regulation skills (both evaluated through the maternal report).

Despite the fact that there is a negative effect of difficult infant temperament on the mother-infant relationship and subsequent development [5], the relationship between infant temperament and both depressive and anxiety symptoms during the perinatal period is still rarely studied, particularly in middle- and low-income countries, thereby limiting the possibility of comparing findings from different cultural groups. Several authors underscore the need to study infant temperament in different cultural groups, since this could shed light on cross-cultural differences in the development of temperament [11,24,25]. Likewise, it is necessary to continue exploring the role of stressful life events in infant temperament, particularly in populations with greater exposure to stressors, such as women from middle- and low-income countries.

Against this background, the aims of this study were to: (a) evaluate the association between infant temperament at six months postpartum, with pre and postpartum depressive and anxiety symptoms and the influence of stressful life events in a sample of Mexican women; (b) determine whether there are differences in difficult infant temperament ratings between women who were depressed during pregnancy and/or at six months postpartum and non-depressed perinatal women. The study also sought (c) to determine whether there are differences in difficult infant temperament ratings between women who were anxious during pregnancy or/and at 6 months postpartum and non-anxious perinatal women.

Our hypotheses were that prenatal depressive and anxiety symptoms and stressful life events would be associated with maternal reports of difficult infant temperament at the age of six months; and that mothers who maintained depressive and anxiety symptoms during postpartum would perceive their infants as being more temperamentally difficult than non-depressed and non-anxious perinatal ones.

Method

Sample

A total of 694 pregnant women were approached during the study period [authors' names removed for blind review], of whom 445 met the eligibility criteria; 280 agreed to participate and were interviewed during pregnancy. Of this total, 210 (75%) completed the study and were included in this secondary data analysis (Fig. 1). They were assessed during pregnancy (average gestational age 32.39, SD = 4.01; range = 26–40) and at six months postpartum. Women who dropped out were significantly younger ($X = 27.3$, $SD = 5.5$ vs $X = 29.5$, $SD = 6.3$; $t = 2.5$, $p \leq 0.01$), had completed fewer years of schooling ($M = 11.7$, $SD = 3.8$ vs. $M = 13.0$, $SD = 3.8$; $t = 2.4$, $p \leq 0.01$) and reported more prenatal depressive symptoms ($PHQ-9 \geq 10$) (31.4% vs. 16.7%, $\chi^2 = 7.05$, $p \leq 0.01$). Women were approached in the waiting rooms of two institutions in Mexico City: (1) a hospital providing comprehensive medical care for state workers, and (2) a community health care center offering prenatal and other types of medical care for the local population. The inclusion criteria were: (1) ≥ 20 years; (2) ≥ 26 weeks' pregnant; (3) having no symptoms of bipolar disorders; and (4) living in the metropolitan area of Mexico City.

Measures

Sociodemographic and obstetric data included age, educational attainment, monthly family income, marital status, paid work in the past six months, number of children, whether the current pregnancy was unplanned/unwanted and gender of the infant.

Infant temperament was measured using the Infant Characteristics Questionnaire (ICQ) [2]. The ICQ contains 24 items, from which four temperament factors were drawn. In this study, we used twelve items from the Fussy/Difficult factor. Previous studies have also evaluated difficult infant temperament through the items in the Fussy/Difficult factor ICQ [27]. Mothers rated their infants' behavior on the basis of

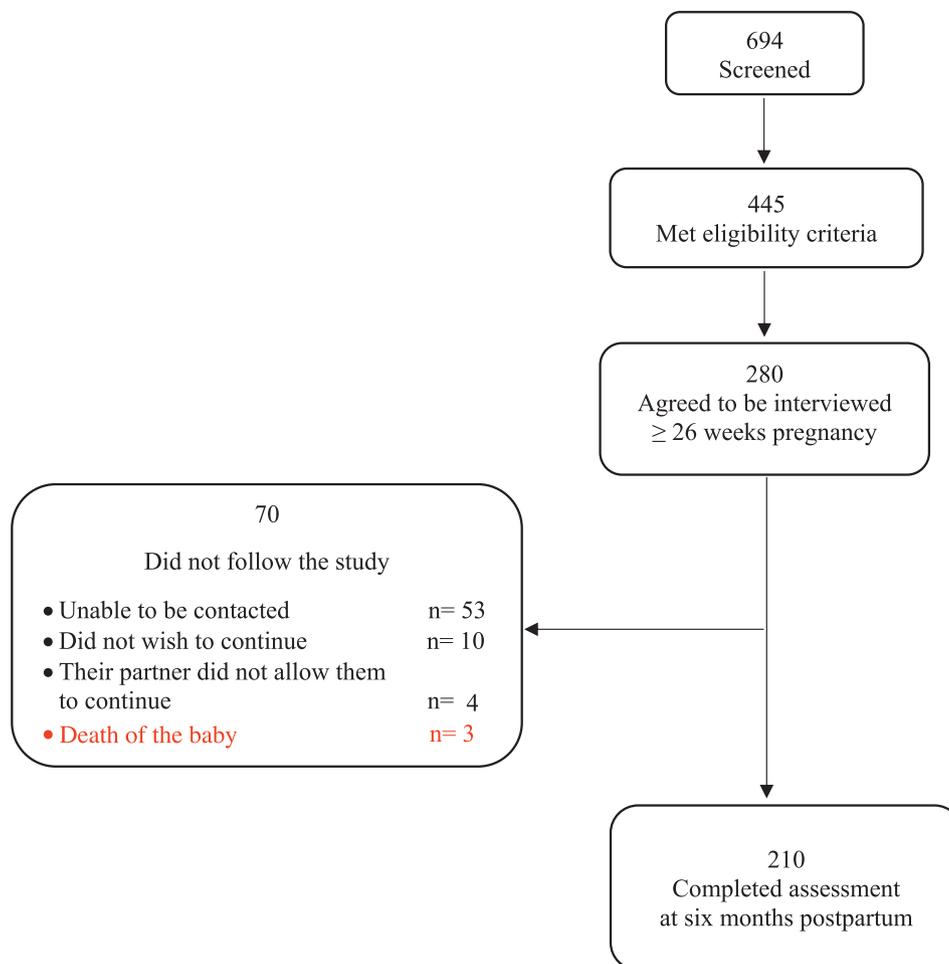


Fig. 1. Participant flow.

their perceptions of each item on a seven-point scale (1 = very easy to 7 = very difficult). Higher scores indicate a more difficult temperament. The possible range for the total score of these twelve items is 12 (not difficult) to 84 (very difficult). When infants were categorized into difficult and non-difficult infant temperament, the 85th percentile of the distribution in fussy/difficult scores was used as a cut-off point. The chosen cut-off point equals approximately +1 standard deviation. Thus, a score of ≥ 46 indicates difficult infant temperament. The ICQ was completed by women at six months postpartum. For this sample, reliability was calculated using the two halves method, obtaining a value of 0.67.

Depressive symptoms were measured through the nine-item depression module from the Patient Health Questionnaire (PHQ-9), developed specifically for use in primary care [28]. A score of ≥ 10 indicates a risk of depression. The PHQ-9 has demonstrated its usefulness as an assessment tool for the diagnosis of depression with acceptable reliability, validity, sensitivity, and specificity [29]. PHQ-9 was completed by women during pregnancy and at six months postpartum. For this sample, Cronbach alpha coefficients were adequate in pregnancy ($\alpha = 0.78$) and at six months postpartum ($\alpha = 0.85$) [26].

Anxiety symptoms were measured using the Hopkins Symptoms Checklist (SCL-90R) [30], evaluating the degree of distress experienced during the previous two weeks on a five-point Likert scale (none = 0; extreme = 4) [30]. This study used the anxiety subscale, which consists of 10 items and evaluates the symptoms and behaviors clinically associated with an extreme manifestation of anxiety: restlessness, nervousness, tension and panic attacks. A score of ≥ 10 indicates a risk of anxiety. The SCL-90 was completed by women during pregnancy and at

six months postpartum. For this sample, reliability was calculated through the two halves method, obtaining a value of 0.81 in pregnancy and of 0.82 at six months postpartum.

Stressful life events. A short form of 12 items including potential stressors (e.g. illness, financial problems, accident, job loss, intimate partner violence, etc.) was used out of the 23 original items adapted for Mexico [31] from Holmes and Rahe's instrument [32]. These 12 items were selected from among those that produced the greatest stress or were most frequent in Mexican perinatal women. The scale evaluates the occurrence of each event over the past six months as well as the perceived degree of stress they produced (0 = event was not present; 1 = present but produced no stress, 2 = produced little stress, 3 = produced moderate stress, 4 = produced great stress). The cut-off score ≥ 13 reflects higher levels of stress associated with stressful life events [31]. In this study, questions were completed during pregnancy and at six months postpartum. For this sample, reliability was calculated through the two halves method, obtaining a value of 0.64 in pregnancy and of 0.66 in the six months postpartum.

Procedure

Pregnant women in the waiting rooms of the health care institutions were invited to participate. After informed consent had been obtained, a baseline interview was conducted during pregnancy with follow-up at six months postpartum. The pregnancy interview was conducted at the clinics, and the postpartum one in a setting of the participant's choice: home, workplace, health institution, or another location. The study was approved by the Institutional Review Board (IRB) of the Ramón de la

Fuente National Institute of Psychiatry.

Statistical analyses

Frequencies were calculated for categorical data and means and standard deviations for continuous variables. Bivariate analyses were conducted (Pearson's correlations) between infant temperament and hypothesized predictors (perinatal depressive and anxiety symptoms and stressful life events). A multiple linear regression analysis was subsequently undertaken, in which all statistically significant predictors (bivariate analyses) were incorporated into the model. To determine whether there were differences in infant temperament ratings between mothers who were depressed during pregnancy or/and at six months postpartum and non-depressed perinatal women, a one-way analysis of variance (ANOVA) was performed with post-hoc Bonferroni. Afterwards, an analysis of covariance (ANCOVA) was conducted with stressful life events at six months postpartum as covariates and maternal depression was also included as a covariate in the analysis for maternal anxiety and viceversa. For these analyses, we formed four groups, the first with non-depressed perinatal women (PHQ-9 < 10 during pregnancy and postpartum), the second with women with depression during pregnancy (PHQ-9 ≥ 10, only during pregnancy), the third with women with postpartum depression (PHQ-9 ≥ 10, only at 6th postpartum month) and the fourth with women with perinatal depression (PHQ-9 ≥ 10, during pregnancy and at six months postpartum). Similar analyses were conducted to determine whether there were differences in infant temperament ratings between women who were anxious during pregnancy or/and at six months postpartum and non-anxious perinatal women. For this analysis, four groups were formed, the first consisting of non-anxious perinatal women (SCL-90 < 10 during pregnancy and postpartum), the second of women with pregnancy anxiety (SCL-90 ≥ 10, only during pregnancy), the third of women with postpartum anxiety (SCL-90 ≥ 10, only at six months month postpartum) and the fourth of women with perinatal anxiety (SCL-90 ≥ 10, during pregnancy and at six months postpartum). All the statistical analyses were performed using the SPSS version 21.

Results

Sample characteristics

The average age of mothers was 29.5 years (SD = 6.3). As shown in Table 1, over half (56.2%) had completed high school or less, nearly half the mothers had a low family income (46.7%), and the majority (80.5%) were in a relationship. Over half had engaged in some type of paid employment in the previous six months (62.4%), 54.8% were multiparous and 52.9% reported that their pregnancy had been unplanned/unwanted. Over half had given birth to a boy (54.8%).

As can be seen from Table 1, 16.7% reported prenatal depressive symptoms, while 20.0% experienced them at six months postpartum. Anxiety/depressive symptoms were higher in pregnancy (21.4%) than in the postpartum period (16.7%). Thirty-two participants (15.2%) reported their infants as being more difficult.

Bivariate analyses

As shown in Table 2, infant temperament was associated with prenatal and postpartum depressive symptoms ($r = 0.193$, $p < 0.01$; $r = 0.324$, $p < 0.01$, respectively), postpartum anxiety symptoms ($r = 0.350$, $p < 0.01$), and stressful life events during the postpartum period ($r = 0.166$, $p < 0.05$).

Multivariate analyses

A multivariate regression analysis (forward stepwise) was conducted in which only independent variables showing a correlation with

Table 1
Characteristics of participants (n = 210).

	n	%
Educational attainment		
≤ High school	118	56.2
> High School	92	43.8
Monthly family income		
Low income	98	46.7
Medium and high incomes	112	53.3
Marital status		
Partnered	169	80.5
Unpartnered	41	19.5
Paid work		
Yes	131	62.4
No	79	37.6
Parity		
Nulliparous	95	45.2
Multiparous	115	54.8
Planned/wanted pregnancy		
Yes	99	47.1
No	111	52.9
Baby gender		
Girl	95	45.2
Boy	115	54.8
Third trimester of pregnancy		
Depressive symptoms		
Yes (≥ 10)	35	16.7
No (≤ 9)	175	83.3
Anxiety symptoms		
Yes (≥ 10)	45	21.4
No (≤ 9)	165	78.6
Stressful life events		
Yes (≥ 13)	41	19.5
No (≤ 12)	169	80.5
At 6th postpartum month		
Depressive symptoms		
Yes (≥ 10)	42	20.0
No (≤ 9)	168	80.0
Anxiety symptoms		
Yes (≥ 10)	35	16.7
No (≤ 9)	175	83.3
Stressful life events		
Yes (≥ 13)	48	22.9
No (≤ 12)	162	77.1
Difficult infant temperament		
Yes (≥ 46)	32	15.2
No (≤ 45)	178	84.8

infant temperament in the bivariate analysis were included. Table 2 shows perinatal depressive and anxiety symptoms and stressful life events during the postpartum period. In the final model, the independent variables that were significantly associated with infant temperament were postpartum depressive ($\beta = 0.17$, $p = 0.04$) and postpartum anxiety ($\beta = 0.24$, $p = 0.04$) symptoms. This model explained 13% of the variance ($F = 16.85$, $p = 0.000$).

Differences in difficult infant temperament rating between non-depressed and depressed perinatal mothers' groups

As shown in Table 3, the ANOVA results showed that infant temperament was reported as significantly different by depressed mothers during the postpartum period (41.9 ± 8.7 , $p \leq 0.001$) and by mothers who suffered depression during pregnancy and the postpartum period (42.4 ± 12.8 , $p \leq 0.01$) as compared with mothers who were only depressed during pregnancy (36.5 ± 9.2) and women who were non-depressed in both periods (34.8 ± 9.3). Thus, mothers with postpartum depression and mothers with perinatal depression reported their infants as being more difficult at six months.

Differences in difficult infant temperament rating between non-anxious and anxious perinatal women groups

As can be seen in Table 3, the ANOVA results showed that infant temperament was reported as being significantly different by mothers

Table 2
Pearson's correlations among study variables.

Variables	Prenatal depressive symptoms	Prenatal anxiety symptoms	Prenatal stressful life events	Postpartum depressive symptoms	Postpartum anxiety symptoms	Postpartum stressful life events
Prenatal depressive symptoms	–					
Prenatal anxiety symptoms	0.590**	–				
Prenatal stressful life events	0.478**	0.522**	–			
Postpartum depressive symptoms	0.394**	0.280**	0.361**	–		
Postpartum anxiety symptoms	0.374**	0.485**	0.352**	0.636**	–	
Postpartum stressful life events	0.290**	0.269**	0.385**	0.581**	0.516**	–
Infant temperament	0.193**	0.123	0.121	0.324**	0.350**	0.166*

* p < 0.05.

** p < 0.01.

who had anxiety symptoms during the postpartum period (41.5 ± 8.5, p ≤ 0.05) and by those who experienced anxiety symptoms during pregnancy and the postpartum period (42.2 ± 10.9, p ≤ 0.01) as compared with non-anxious mothers (35.1 ± 9.9). Thus, mothers with postpartum anxiety symptoms and mothers with perinatal anxiety symptoms reported their infants as being more difficult at six months of age.

Analysis of covariance (ANCOVA) with stressful life events as covariates

In the ANCOVA analysis (Table 4) no interaction effects of postnatal stressful life events were observed in the association between depression and temperament (p = 0.438). However, an interaction an anxiety emerged in the association between depression and temperament (p = 0.000). Similar data were observed in the ANCOVA for anxiety groups, where interaction effects of stressful life events were not observed in the association between anxiety and temperament either, although an interaction of depression was observed in the association between anxiety and temperament. (p = 0.002).

Discussion

This study was designed to evaluate the association between maternal reports of infant temperament at six months postpartum and pre and postpartum depressive and anxiety symptoms. The association

Table 3
Analysis of variance (ANOVA) with post-hoc Bonferroni results.

	Difficult Infant Temperament			Group comparisons (Bonferroni)
	n	M	SD	
Depression				
(1) Non-depressed perinatal women	150	34.8	9.3	1 < 3***, 4**
(2) Women with pregnancy depression	18	36.5	9.2	
(3) Women with postpartum depression	25	41.9	8.7	
(4) Women with pregnancy and postpartum depression	17	42.4	12.8	
F = 6.37, p = 0.000				
Anxiety				
(1) Non-anxious perinatal women	137	35.1	9.9	1 < 3*, 4**
(2) Women with pregnancy anxiety	34	35.3	8.4	
(3) Women with postpartum anxiety	19	41.5	8.5	
(4) Women with pregnancy and postpartum anxiety	20	42.2	10.9	
F = 5.10, p = 0.002				

Note: M = mean; SD = standard deviation.

*** p ≤ 0.001.

** p ≤ 0.01.

* p ≤ 0.05.

Table 4
Analysis of covariance (ANCOVA) between the depression and anxiety groups with infant temperament and variables: stressful life events, symptoms of anxiety and depression as covariates.

	Infant temperament			
	SS	df	F	p
Depression groups	429.447	3	1.638	0.182
Covariates				
Postpartum stressful life events	52.847	1	0.605	0.438
Postpartum anxiety symptoms	1217.363	1	13.929	0.000
Error	17829.365	204		
Anxiety groups	250.704	3	0.928	0.428
Covariates				
Postpartum stressful life events	34.497	1	0.383	0.537
Postpartum depressive symptoms	929.909	1	10.330	0.002
Error	18365.006	204		

between maternal reports of infant temperament and pre and postpartum stressful life events was also evaluated. The study sought to determine whether there are differences in difficult infant temperament ratings between women who were depressed or anxious during pregnancy or/and at six months postpartum and non-depressed, non-anxious perinatal women. To our knowledge, this longitudinal study is the first to examine these variables in Latin America.

Although scientific evidence has shown the need to deepen the study of child temperament and the mother-child relationship, given their implications for the quality of life of the mother and the socio-emotional development of the infant, there is a dearth of studies, particularly in low- and medium-income countries. These countries have a prevalence of social determinants that mainly affect women, which can have a negative impact on maternal and child mental health, such as poverty, limited opportunities for education and employment, difficulty of access to health services, gender inequality and intimate partner violence [33–35].

The findings show that maternal postpartum depressive and anxiety symptoms are linked to difficult infant temperament. This association is consistent with findings from previous studies [15,36,37]. For example, Britton [12] noted that the association between postpartum depressive and anxiety symptoms and difficult infant temperament is present from the early postpartum period. McGrath et al. [15] found that women with postpartum depressive symptoms reported their infants as being more temperamentally difficult at two and six months of age. Della Vedova [20] reported that higher scores of postnatal state anxiety were a predictor of increased temperamental difficulties of the infant at three months old.

As for the prenatal emotional state, difficult infant temperament was not associated with prenatal depressive and anxiety symptoms or stressful life events. Although some studies have identified prenatal depressive and anxiety symptoms as predictors of difficult temperament, others have failed to support this association [11]. In this study, the lack of an association between prenatal depression and childhood temperament may be related to the fact that the women who dropped out of the study had the most severe depressive symptoms.

Regarding the lack of association between prenatal anxiety symptoms, prenatal stressful life events and infant temperament, in his study on the role of prenatal maternal stress in child development, DiPietro [38] suggests that it is premature to conclude that maternal prenatal stress has negative consequences for child development. According to this author, mild stress may be a necessary condition for optimal development. Di Pietro et al. [39] also found that pregnancy-specific stress was associated with better neurological maturation in fetus. This issue requires further study.

Contrary to expectations, we did not find any association between postpartum stressful life events and infant temperament. Some women may have had protective factors enabling them to cope with stressful life events, such as social support networks and a good relationship with their partners, which, in turn, will have a positive impact on maternal reports of infants' temperament. In this regard, some authors suggest that in conditions of family stress, the quality of maternal care tends to deteriorate, and in turn, the child's capacity to regulate their negative emotions also declines. Conversely, when marital and family processes promote maternal sensitivity, the self-regulating capacity of the child is facilitated and a positive change in their emotionality produced [40]. This issue warrants examination in future studies.

On the other hand, the results also showed that mothers with prenatal depressive symptoms who maintained depressive symptoms during the postpartum and mothers with depression symptoms during the postpartum alone reported their infants as being more difficult. Similar data were found by McGrath et al. [15]. According to these authors, postpartum depressive symptoms may negatively affect women's perceptual accuracy when evaluating their infants. Thus, an extremely active child may be perceived as difficult by their mother if she is also suffering postpartum depression [15]. Leerkes and Crockenberg [18] found that maternal depressive symptoms moderated the degree of agreement between the maternal report and that of an external evaluator on infant novelty stress. Thus, mothers with depression symptoms showed difficulty identifying signs of distress in their infants.

Alternatively, Field et al. [41] suggest that mothers who have postnatal depression tend to avoid emotional interaction with their children, which could lead to the development of difficult infant

temperament. Our results highlight the need to continue exploring this association, given that both maternal depression and difficult infant temperament are recognized as risk factors for mother-child interaction difficulties and subsequent developmental problems [27].

Likewise, mothers with prenatal anxiety symptoms who maintained anxiety symptoms during postpartum and mothers with anxiety symptoms during the postpartum period alone reported their infants as being more difficult. In this respect, Martini et al. [13] suggest that excessive infant crying and feeding problems may be related to interactional deficits on the part of anxious mothers, who perceive their infants as difficult during soothing or feeding situations.

On the other hand, it is important to emphasize that comorbidity between depression and postnatal anxiety played an important role in maternal perception of difficult infant temperament. To our knowledge, to date, there have been no studies which have observed this phenomenon. A recent meta-analysis has estimated that comorbidity between depression and anxiety affects one in ten expectant mothers and one in twelve postnatal women [42]. It is therefore a phenomenon that requires special clinical and research attention, since, as our data suggest, and previous studies have indicated [42], comorbidity between depression and anxiety may have negative consequences for the mother-infant relationship and, therefore, the socio-emotional development of the infant.

Lastly, the sample in this study is representative of urban women over 18 years old, from different socioeconomic strata and with varying levels of educational attainment, who had experienced pregnancy and the postpartum period and were seeking prenatal care at public health institutions. These women may share some of the difficulties of living in large cities with women from low- and middle-income countries.

Limitations

Our findings should be interpreted with caution. Infant temperament was only evaluated through maternal reports. Future comparative studies using multiple informants are required to determine the causes and effects of the interaction between postnatal depression and difficult infant temperament. Another limitation is the loss of participants. Women who dropped out of the study experienced more vulnerability, since they were younger, had lower academic attainment and greater depressive symptomatology [26]. Although scientific evidence has shown the need to deepen the study of child temperament and the mother-child relationship, given their implications for the quality of life of the mother and the socio-emotional development of the infant, there is a dearth of studies, particularly in low- and medium-income countries, with a prevalence of social determinants that mainly affect women, which can have a negative impact on maternal and child mental health, such as poverty, limited opportunities for education and employment, difficulty of access to health services, gender inequality and intimate partner violence, among others [33–35].

The lack of association between childhood temperament and prenatal depression could be related to this last difference. At the same time, it is important to note that the characteristics of the women who dropped out of this study correspond to those previously reported by Morse and Dunkin [43], who found that pregnant women who are more likely to drop out of school are usually younger, with lower educational achievement, underemployed and with more emotional difficulties and/or a history of mental health problems. The importance of pointing out these characteristics is that these are women who may need greater support from health services. It is therefore necessary to develop strategies to retain this population in the studies undertaken in order to identify their needs and provide them with timely attention.

Conclusion

In this study, postpartum depressive and anxiety symptoms play an important role in shaping difficult infant temperament. Comorbidity

between the two conditions warrants clinical attention and additional research, since it is related to maternal perception of difficult infant temperament. Psychological interventions are required since these women may require assistance with emotional adaptation in the transition to motherhood and in learning new strategies to care for infants who may be difficult.

Declaration of Competing Interest

The authors declared no potential conflict of interest regarding the research, authorship, and/or publication of this article.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.srhc.2019.05.005>.

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