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Relationship between maternal anxiety and infants' temperament: The mediating role of mindful parenting

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ABSTRACT

Research has indicated that maternal anxiety does have an effect on infant temperament. Therefore, it is important to study the variables that could play a role in this relationship. In this study, we propose that mindful parenting could act as a mediator in this relationship. Thus, the main objective was to evaluate the relationship between maternal anxiety and child temperament (i.e., negative affectivity, surgency, and effortful control) through the mindful parenting of mothers. Mothers (N = 225) self-reported their anxiety, mindful parenting use, and the temperament of their old infants (aged 4–18 months). First, the reliability and validity results showed that the infant version of the Interpersonal Mindful Parenting questionnaire was a good tool for the assessment of mindful parenting among parents with infants. The five-factor structure of the questionnaire was confirmed; it involved self-regulation in the parenting relationship, listening with full attention, emotional awareness of the child, compassion for the child, and non-judgmental acceptance of parenting behavior. Correlational analyses showed that maternal anxiety was related to negative affectivity and effortful control in infants. Furthermore, mediational analyses indicated that the relation between maternal anxiety and infant negative affectivity was mediated by self-regulation in parenting and the emotional awareness of the child. In addition, the relation between maternal anxiety and infant effortful control was mediated by compassion for the child and listening with full attention. These results contribute to knowledge about the relation between maternal anxiety and child temperament, which may increase the risk of psychological symptoms. The results of this study suggest that promoting mindful parenting skills may be beneficial for affectivity and effortful control in infants.

1. Introduction

Maternal anxiety has been associated with multiple negative developmental and psychological outcomes in infants (for reviews, see Field, 2018; Glasheen, Richardson, & Fabio, 2010). For example, it has been found to predict anxious–depressive symptomatology (Barker, Jaffee, Uher, & Maughan, 2011; O'Connor et al., 2002, 2003) and behavioral problems (Behrendt, Wade, Bayet, Nelson, & Enlow, 2020) in children. Several studies have found that maternal anxiety is also related to infant temperament. In concrete terms, most studies have focused on negative affectivity, and a recent meta-analysis found a positive association between maternal anxiety and infant negative affectivity at 18 months of age (Spry et al., 2020).

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Maternal anxiety has also been related to other temperamental traits, such as effortful control and surgency, although there are fewer studies in this area. However, research results regarding the relationships with these traits are mixed. For example, Behrendt et al. (2020) found a longitudinal relationship between maternal anxiety in infancy and lower levels of effortful control and higher levels of surgency at 3 years of age. Similarly, Henrichs et al. (2009) found that maternal anxiety at 6 months postpartum was related to infants' activity level (which is an aspect of the surgency temperamental trait) and the duration of orienting (which is part of the effortful control temperamental trait). However, Coplan, O'Neil, and Arbeau (2005) found that postnatal maternal anxiety (3 months after birth) was linked to infant activity level but not to positive affectivity, which is also a characteristic of surgency. Furthermore, maternal postnatal anxiety was not related to traits such as soothability and attention, which are indicators of effortful control. Overall, we can conclude that maternal anxiety is related to child temperament, although some of the relationships require further clarification (e.g., Henrichs et al., 2009). It is important to understand infant temperament because of its stability over time (Berhrent et al., 2020) and because certain characteristics of temperament are associated with an elevated risk of problems (Gartstein, Putnam, & Rothbart, 2012; Putnam, Ellis, & Rothbart, 2001, Rigato, Charalambous, Stets, & Holmboe, 2022; Rothbart, 2011).

Given the relationship between maternal anxiety symptoms and offspring characteristics, it is important to identify possible factors that help in understanding this relationship in an effort to improve interventions. One of the factors indicated in the literature is parenting style. Previous studies have indicated that parents with anxiety tend to use fewer positive parenting practices in their child's childhood or preadolescence (Vafaeenejad, Elyasi, Moosazadeh, & Shahhosseini, 2019). Although surprisingly few studies have focused on infants (see the review by Goodman, Watson, & Stubbs, 2016), the available results also suggest a negative relationship between maternal anxiety and positive parenting practices. For example, Seymour, Giallo, Cooklin, and Dunning (2015) conducted a study with mothers of children aged 0 to 12 months, who had medium and high levels of maternal anxiety. They found that maternal anxiety was related to parenting hostility, decreased levels of parenting warmth and involvement, more difficulties in parent–child interactions, and low parenting satisfaction.

In recent years, mindful parenting has been identified as a way to apply the discipline of parenting. Concretely, mindful parenting has been described as the application of mindfulness to the relationship between parents and their children. It has been defined as paying attention to the child and parenting intentionally, here and now, and non-judgmentally (Kabat-Zinn & Kabat-Zinn, 1997). Duncan, Coatsworth, and Greenberg (2009) proposed a model and developed a questionnaire, the Interpersonal Mindfulness in Parenting (Duncan, 2007), in which they described mindful parenting as staying aware in the parent–child relationship, listening with full attention to children when interacting with them, being aware of one's own emotions and being able to regulate them, exercising compassion, and acting in a non-judgmental way in parenting behaviors. Since then, various factorial analyses have found somewhat different structures. For example, de Bruin et al. (2014) found a six-factor structure, Lo et al. (2018) found a four-factor structure, while a five-factor structure was found in Portuguese (Moreira & Canavarro, 2017) and Spanish (Orue, Larrucea-Iruretagoyena, Royuela--Colomer, & Calvete, 2023) samples: non-judgmental acceptance of parental functioning, compassion for the child, listening with full attention, self-regulation in the parenting relationship, and emotional awareness of the child.

Mindful parenting has been linked to the emotional state of parents (Cheung, Cheng, Li, Lam, & Chung, 2021). For example, in a study with parents (children 1–19 years old), parental symptoms of both anxiety and depression were related to lower listening with full attention and lower self-regulation in the parenting relationship, while anxiety symptoms were related to lower non-judgmental acceptance (Moreira, Fonseca, Caiado, & Canavarro, 2019). In a study with children aged between 0 and 12 months, the group of parents with significant clinical anxious and depressive symptomatology obtained significantly lower scores in mindful parenting compared to the group of parents without such symptomatology (Caçador & Moreira, 2021). Similarly, in another study with parents of infants (0–12 months old), mothers with clinically significant symptoms of anxiety and depression scored lower than those without symptoms on all mindful parenting factors (Fernandes et al., 2021).

Additionally, mindful parenting has been linked to various characteristics in children. Several studies have found that children of parents who use mindful parenting have fewer internalizing and externalizing problems (Parent, McKee, N Rough, & Forehand, 2016; Parent, Dale, McKee, & Sullivan, 2021) and better emotional adjustment (Geurtzen, Scholte, Engels, Tak, & van Zundert, 2015; Parent et al., 2016). For example, in a study with children and early adolescents between 6 and 13 years of age, children's negative reactivity was related to lower listening with full attention, lower emotional awareness of the children, lower self-regulation in parenting, lower non-judgmental acceptance, and lower compassion for the child (Moreira, Caiado, & Canavarro, 2021).

Few studies have analyzed the effects of mindful parenting on infants, although there is evidence of its potential effects. For example, in high-stress families, mindful parenting measured in three-month-old children was related to lower infant cortisol when these children were six months of age (Laurent, Duncan, Lightcap, & Khan, 2017). In a study with mothers of children aged zero to 12 months, all five mindful parenting factors were negatively related to the mothers' symptoms of anxiety and depression (Fernandes, Canavarro, & Moreira, 2021b). The study also assessed the perceived temperament of infants, measured through an item on maternal perceptions of easy temperament in infants. Correlational analyses showed that all factors of mindful parenting, except listening with full attention, were related to easier temperament. In a similar study, low scores on self-regulation in parenting, listening with full attention, and compassion for the child were related to difficulties in mother–infant bonding (Fernandes, Canavarro, & Moreira, 2021a).

1.1. Current Study

As mothers' anxiety symptoms are associated with their offspring (Spry et al., 2020), it is important to study the factors that potentially explain this relation. In this study, we propose that mindful parenting may play a role in the relationship between maternal anxiety and infant temperament. In fact, in samples of preadolescent children, mindful parenting has been shown to mediate the

relationship between maternal anxiety and the children's symptomatology (Larrucea-Iruretagoyena & Orue, 2023). However, little is known about this relationship in samples of mothers with young children. Consequently, we expect to find that mothers with high levels of anxiety will have lower scores on all the mindful parenting scales and that mindful parenting, in turn, will be related to lower negative affectivity, greater surgency, and greater effortful control in infants aged four to 18 months. In concrete terms, we expect that the most child oriented or interaction oriented mindful parenting dimensions (compassion for the child, listening with full attention, self-regulation in the parenting relationship, and emotional awareness of the child) would be related to infant temperament. However, we also expect that the parent-oriented dimension of non-judgmental acceptance of parenting will be highly related to mothers' symptoms but less to infants' temperament. Moreover, since the psychometric properties of the Interpersonal Mindfulness in Parenting (IM-P; Duncan, 2023) questionnaire have not been evaluated in a Spanish sample of mothers with infants aged 4 to 18 months, we shall first examine the reliability and validity of the questionnaire.

2. Method

2.1. Participants

A total of 225 women between 20 and 45 years of age ($M = 32.44$; $SD = 4.71$) participated in this study. Most were Spanish (94.5%), while 3.7% were from South America and 1.8% from other European countries. A total of 62.2% were married, 0.9% were divorced, 25.8% were single, and 11.1% were in a civil partnership. All had between 1 and 4 children ($M = 1.45$; $SD = 0.65$). All of them answered questionnaires about their small children aged 4–18 months ($M = 9.12$; $SD = 4.35$). Of these, 52.4% were boys and 47.6% girls.

In addition, for the reliability and validity analysis of the IM-P questionnaire, we added 107 women who had responded to this measure but not to the other measures, leaving a sample of 332 women for the reliability and validity analyses. The 107 women added for these analyses were between 21 and 45 years of age ($M = 33.67$; $SD = 4.56$). Most were Spanish (94.1%), while 5% were from South America. All of them answered questionnaires about their small children aged 4–6 months. Of these, 48.6% were boys and 46.7% girls, while 4.7% of the mothers did not indicate the sex of their baby.

2.2. Instruments

To measure mindful parenting, we used the Spanish version of the Interpersonal Mindfulness in Parenting (IM-P; Duncan, 2023) questionnaire. The Spanish version has obtained good psychometric properties (Orue et al., 2023). The infant version, in comparison with the child version, leaves out four items ("non-judgmental listening to child," "non-judgmental receptivity to child emotion," "calmly tell child how feeling when upset," and "openness to child's point of view"), as these are not pertinent to mothers' interactions with infants. In addition, we left out the item on "trouble accepting child independence" because mothers indicated to us that they did not understand that item for their infants of a few months. The wording of the other items was adapted to be adequate for parents of infants. In sum, the questionnaire consisted of 24 items with five factors: non-judgmental acceptance of parental functioning, compassion for the child, listening with full attention, self-regulation in parenting, and emotional awareness of the child. The items were scored on a five-point Likert scale, ranging from 1 (*never true*) to 5 (*always true*). Some items had to be reversed to obtain the total score.

The Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) has been used to measure symptoms of anxiety and depression. Although this questionnaire has 21 items to measure depression, anxiety, and stress, in this study, we used only the anxiety scale (seven items). The items have a four-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me a lot, or most of the time*). The Spanish adaptation has shown good psychometric properties (Bados, Solanas, & Andrés, 2005). Cronbach's alpha in this study was.90 for depression and.78 for anxiety.

To measure infant temperament, mothers completed the very short form of the Infant Behavior Questionnaire (IBQ-VSF; Putnam, Helbig, Gartstein, Rothbart, & Leerkes, 2014). This consists of 37 items with seven response options ranging from 1 (*never*) to 7 (*always*). There is also the option to answer that a particular item does not apply. The questionnaire contains three subscales: effortful control (12 items), surgency (13 items), and negative affectvity (12 items). Using a Likert scale of 1 (*never*) to 7 (*always*), mothers recorded the relative frequency of specific infant reactions in the previous week, with the option to not provide a rating if the behavior was not observed. The Spanish version of this questionnaire (Salinas, Montesinos, Carnicero, & García, 2000) has shown good psychometric properties. Cronbach's alpha in this study was.71,.85, and.82 for effortful control, surgency, and negative affectivity, respectively.

2.3. Procedure

To access the women in this sample, we contacted kindergartens with infants aged between 4 and 18 months in Spain. The kindergartens that agreed to participate sent an e-mail to the mothers of the children in their centers. The e-mail included an information sheet with the objectives of the study, and those who agreed to participate completed an online questionnaire carried out by Qualtrics. The questionnaire did not collect personal identification data and was completed anonymously. The study was approved by the university's ethics committee (masked). In addition, for the purpose of validating the questionnaire, we added to the sample the responses to the IM-P questionnaire of a group of women who had been recruited for another study. These women were contacted through the midwives of their health centers. A longitudinal study was carried out in which the women were followed up from

pregnancy until the baby was 12 months old. During the process, they answered the IM-P questionnaire; therefore, we took their data for the validation of this questionnaire. However, these women did not complete the other measures and were thus not part of the rest of this study. In this case, this study was approved by the university (masked) and the Clinical Research Ethics Committee (masked).

2.4. Data Analysis

First, we evaluated the reliability of the subscales of the IM-P infant version by calculating Cronbach's alpha, the discrimination index, and the alpha if the item was deleted. We then performed a confirmatory factor analysis (CFA), as this instrument has already been validated for children aged 18 months and older (Orue et al., 2023). LISREL 9.2 (Jöreskog & Sörbom, 2015) was used to evaluate the factor with the polychoric matrix and asymptotic covariance.

To evaluate the relationships between the study variables, a path analysis was conducted via the robust maximum likelihood (ML), which includes the Satorra–Bentler scaled chi-square (S–B χ^2). A hypothetic mediation model included paths between the maternal anxiety symptoms and the five factors of mindful parenting (listening with full attention, self-regulation in parenting, compassion for the child, emotional awareness of the child, and non-judgmental acceptance of parental functioning), from the five mindful parenting dimensions to the three infant temperament dimensions (negative affectivity, effortful control, and surgency), and from anxiety to the three temperament dimensions.

We used different fit indices to evaluate the fit of the models: the root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR). For the CFI, values above 0.95 reflect good fit indices; for the RMSEA, values less than 0.06 and SRMR values less than 0.08 reflect adequate fit indices (Hu & Bentler, 1999).

3. Results

3.1. Reliability and Factorial Validity of the Interpersonal Mindfulness in Parenting Questionnaire

The results regarding the reliability of the IM-P infant version are presented in Table 1. All discrimination indices were good except that of Item 2 ("when upset with child, notice feelings before acting") in the self-regulation in the parenting relationship factor. In addition, the results showed that the Cronbach's alpha for that subscale increased from.72 to.77 by eliminating that item. Therefore,

Table 1
Descriptive Statistics for the Items of the IM-P – infant version, Reliability Analyses and Factor Loadings (N = 332).

	Mean (SD)	Cronbach́s Alpha	Corrected item-total correlation	Cronbach alpha if item deleted	Factor loading
Non-Judgmental Acceptance of Parenting Functioning	3.34 (0.82)	.83			
Self-critical of parenting mistakes	2.95 (1.21)		.71	.77	.72
Self-blame during challenges with baby	3.26 (1.16)		.74	.77	.78
Acceptance of parenting challenges	3.55 (0.96)		.61	.80	.74
Forgiving of self when regret parenting actions	2.99 (1.06)		.38	.84	.49
Self-criticism of self as parent	3.63 (1.19)		.70	.78	.79
Self-critical comparison with other parents	3.64 (1.09)		.45	.83	.61
Compassion for the Child	4.64 (0.54)	.82			
Kind to baby when upset	4.67 (0.65)		.68	.73	.51
Caring for baby when struggling	4.76 (0.58)		.69	.74	.45
Patient with baby when struggling	4.50 (0.68)		.64	.78	.53
Listening with Full Attention	3.87 (0.64)	.83			
Not listening to baby with full attention	3.44 (0.84)		.65	.79	.59
Rushing through activities with baby	4.05 (0.79)		.67	.79	.60
Distracted while engaged with the baby	3.94 (0.83)		.68	.78	.62
Busy thinking, not listening to baby	3.83 (0.88)		.69	.78	.68
Pay attention to baby when together.	4.06 (0.79)		.48	.83	.43
Self-Regulation in the Parenting Relationship	3.79 (0.58)	.72			
When upset with baby, notice feelings before acting	3.48 (1.17)		.18	.77	–
React too quickly to baby	3.62 (0.95)		.47	.68	.58
Emotions affect parenting	4.12 (0.91)		.45	.69	.61
Regretting parenting actions when upset	4.20 (0.87)		.56	.67	.58
Effort to keep emotional balance when upset with baby.	3.90 (0.90)		.48	.68	.39
Non-reactivity in difficult moments with baby	3.33 (0.97)		.47	.68	.46
Emotional reactivity in response to baby behavior	3.90 (0.81)		.55	.67	.54
Emotional Awareness of the Child	4.64 (0.54)	.55			
Unaware of baby's feelings	4.01 (0.79)		.31	.53	.35
Aware of baby's worries	4.36 (0.72)		.42	.38	.50
Aware of baby's unspoken feelings.	3.76 (0.81)		.37	.45	.42

we decided to eliminate it, and we did not include it in the CFA analyses.

A model in which the five dimensions of mindful parenting were correlated showed an acceptable fit: Satorra–Bentler $\chi^2(200, N = 332) = 623.60$, RMSEA = 0.073, [90% CI (0.066, 0.080)], CFI = .94, and SRMR = 0.084. The factorial loadings of the items were all statistically significant. An examination of the modification indices indicated that the errors of Items 14 and 12, 20 and 12, 20 and 14, and 11 and 4 could be correlated. These items belonged to the same factor and evaluated similar features of mindful parenting. Therefore, we chose to run a new model where those item errors were allowed to correlate. This adjusted model obtained a good fit: Satorra–Bentler $\chi^2(216, N = 332) = 513.89$, RMSEA = 0.064, [90% CI (0.057, 0.071)], CFI = .95, and SRMR = 0.076. Table 1 displays the item loadings for the CFA, the discrimination indices of the items, and Cronbach's alpha for the five factors. As can be seen, the reliability indices were all good except for emotional awareness of the child, which obtained a.55 Cronbach's alpha.

3.2. Descriptive Analyses

Means and standard deviations of the study variables (N = 225) are presented in Table 2 along with the Pearson correlations among all the variables. As can be seen, maternal anxiety correlated negatively with infants' effortful control and positively with infants' negative affectivity. However, it was not related to infants' surgency. All the dimensions of mindful parenting correlated within each other, indicating a coexistence between them. All dimensions of mindful parenting except compassion for the child correlated negatively with infants' negative affectivity, while all except self-regulation in the parenting relationship correlated positively with infants' effortful control. However, only compassion for the child was associated with surgency.

3.3. Mediation Model for Anxiety, Mindful Parenting, and Infant Temperament

The hypothetical model included the covariance between, on the one hand, all the mindful parenting factors and, on the other, the three infants' temperament types. In addition, we also included all possible paths from maternal anxiety to the five mindful parenting factors and to the three infants' temperaments. Finally, we included all possible paths from each mindful parenting factor to each infants' temperament type. Table 3 shows all the unstandardized coefficients of all the relationships tested.

We estimated the hypothetical model, and it was saturated, and its fit was perfect. So, first we eliminated the path that showed the lowest relationship and re-estimated the model. This parsimonious model (Fig. 1) presented good fit indices: Satorra–Bentler $\chi^2(8, N = 225) = 11.49$, RMSEA = .044, [90% CI (.0;.096)], CFI = .99, and SRMR= .027.

As shown in Fig. 1, maternal anxiety was directly and positively associated with infants' negative affectivity. In addition, anxiety was negatively associated with all dimensions of mindful parenting. The dimensions of mindful parenting played a different role in the relationship with temperament dimensions. Self-regulation in the parenting relationship and emotional awareness of the child were negatively related to infants' negative affectivity. Compassion for the child, listening with full attention, and emotional awareness of the child were positively related to infants' effortful control, although the relationship between emotional awareness of the child and effortful control was only marginally significant. Finally, compassion for the child was positively related to infants' surgency. In addition, the model also suggested indirect relationships between anxiety and infant temperament through different dimensions of mindful parenting. To test whether the six proposed indirect relationships were significant, a bootstrapping analysis was performed (2500 samples). The 95% coefficient interval (CI) for each estimated indirect effect was evaluated following the recommendations of Shrout and Bolger (2002). Therefore, the indirect effect was considered significant at the 0.05 level if the 95% CI did not contain zero. The results indicated the following indirect effects. First, anxiety was negatively related to negative affectivity through self-regulation in the parenting relationship (95% CI [0.012, 0.193]) and emotional awareness of the child (95% CI [0.001, 0.136]), which were also negatively associated. Second, anxiety was negatively associated with listening with full attention, which was positively associated

Table 2
Descriptive Statistics and Correlations among the Study Variables (N = 225).

	1	2	3	4	5	6	7	8	9	*M*	*SD*
1. Maternal Anxiety	1									0.45	0.47
2. Non-Judgmental Acceptance of Parenting Functioning	-.45 * **	1								3.23	0.80
3. Compassion for the Child	-.20 * *	.22 * **	1							4.65	0.54
4. Listening with full Attention	-.26 * **	.26 * **	.19 * *	1						3.78	0.64
5. Self-Regulation in the Parenting Relationship	-.23 * **	.39 * **	.47 * **	.44 * **	1					3.72	0.61
6. Emotional Awareness of the Child	-.18 * *	.26 * **	.51 * **	.26 * **	.42 * **	1				4.03	0.56
7. Negative Affectivity	.22 * **	-.21 * **	-.02	-.19 * *	-.22 * **	-.15 *	1			3.75	1.08
8. Effortful Control	-.15 *	.13	.36 * **	.25 * **	.30 * **	.30 * **	.09	1		4.94	0.78
9. Surgency	.05	.01	.19 * *	.05	.03	.11	.45 * **	.42 * **	1	4.46	1.10

Note. * $p < .05$; * * $p < .01$; * ** $p < .001$

Table 3
Unstandardized coefficients of the Hypothetical Mediational Model Tested (N = 225).

Path	*B*	*SE*	*p*
Maternal Anxiety → Non-judgmental Acceptance of Parental Functioning	-0.76	0.10	.000
Maternal Anxiety → Compassion for the Child	-0.23	0.09	.017
Maternal Anxiety → Listening with full Attention	-0.36	0.12	.002
Maternal Anxiety → Self-Regulation in the Parenting Relationship	-0.30	0.09	.001
Maternal Anxiety → Emotional Awareness of the Child	-0.21	0.08	.010
Maternal Anxiety → Negative Affect	0.31	0.14	.023
Maternal Anxiety → Effortful Control	-0.07	0.12	.549
Maternal Anxiety → Surgency	0.25	0.15	.085
Non-judgmental Acceptance of Parental Functioning → Negative Affect	-0.11	0.11	.308
Non-judgmental Acceptance of Parental Functioning → Effortful Control	-0.04	0.06	.484
Non-judgmental Acceptance of Parental Functioning → Surgency	0.03	0.09	.711
Compassion for the Child → Negative Affect	0.34	0.18	.066
Compassion for the Child → Effortful Control	0.34	0.17	.048
Compassion for the Child → Surgency	0.45	0.19	.016
Listening with full Attention → Negative Affect	-0.12	0.12	.327
Listening with full Attention → Effortful Control	0.17	0.08	.035
Listening with full Attention → Surgency	0.12	0.12	.317
Self-Regulation in the Parenting Relationship → Negative Affect	-0.28	0.16	.082
Self-Regulation in the Parenting Relationship → Effortful Control	0.12	0.12	.327
Self-Regulation in the Parenting Relationship → Surgency	-0.19	0.15	.208
Emotional Awareness of the Child → Negative Affect	-0.22	0.15	.136
Emotional Awareness of the Child → Effortful Control	0.15	0.09	.099
Emotional Awareness of the Child → Surgency	0.07	0.16	.660

Note. All possible covariances were statistically significant.

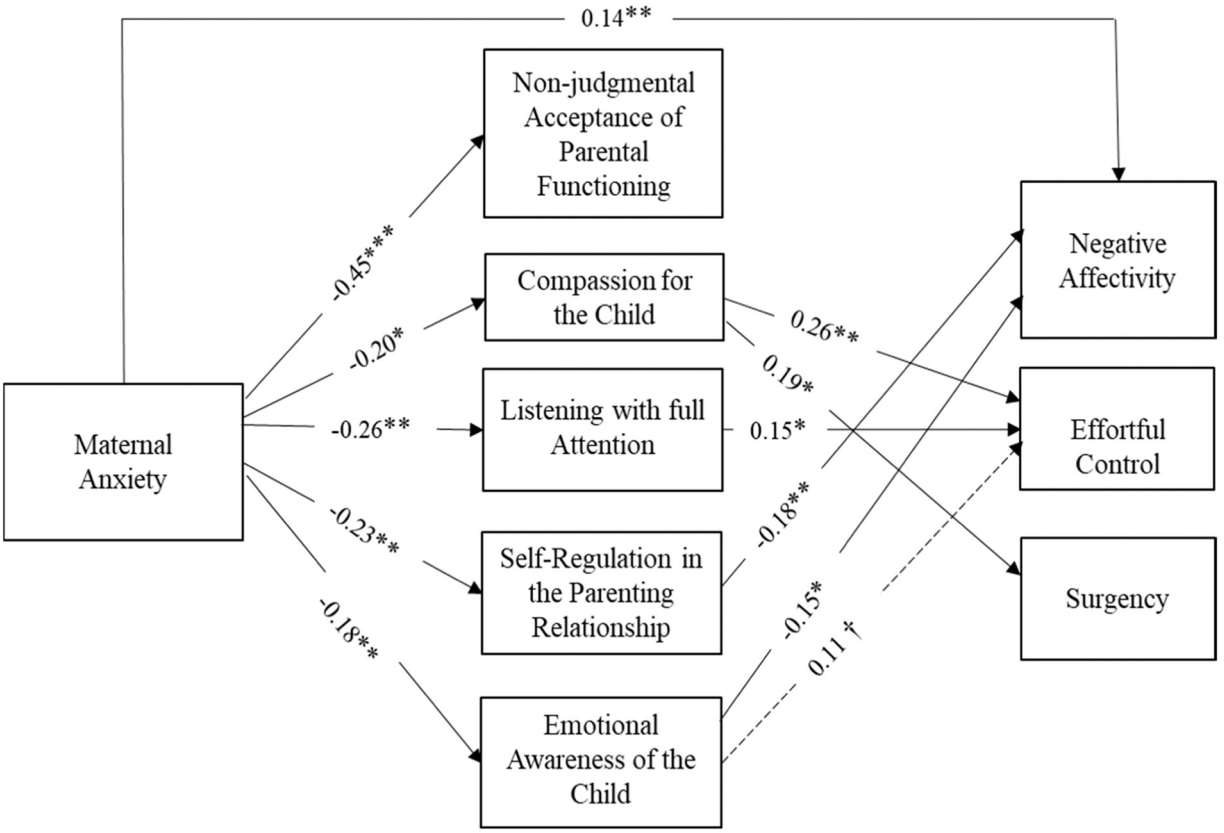

Fig. 1. *Mediation Model for Maternal Anxiety, Mindful Parenting and Infant Temperament (N = 225). Note.* Only statistically significant paths are shown. All possible covariance were included (not shown for clarity purposes). † $p < .10$; * $p < .05$; * * $p < .01$; * ** $p < .001$.

with effortful control (95% CI [- 0.162, - 0.006]). The relationship between anxiety and effortful control also occurred via compassion for the child (95% CI [- 0.207, - 0.008]), but not via emotional awareness of the child (95% CI [- 0.093, 0.003]). Finally, anxiety was negatively associated with compassion for the child, which in turn was positively associated with surgency (95% CI [- 0.216, - 0.001]).

4. Discussion

The main aim of this study was to evaluate the mediating role of the five facets of mindful parenting on the relationship between maternal anxiety and temperament in infants aged 4 to 18 months. We first evaluated the psychometric properties of the IM-P questionnaire for parents of infants since we were unaware of previous evaluations of the reliability and validity of results obtained through this questionnaire in a Spanish sample of parents of infants.

First, the results for the reliability and validity analyses showed the appropriateness of using this questionnaire to evaluate mindful parenting in parents of infants. The only problematic item was the following on self-regulation in the parenting relationship scale: "When upset with child, notice feelings before acting." This item obtained poor reliability indices, so it was eliminated and further excluded from the validity analyses. In the adaptations of the questionnaire in different countries, Item 2 has either been part of different factors or eliminated (Kim, Krageloh, Medvedev, Duncan, & Singh, 2019). In the original version (Duncan, 2007), the Portuguese sample (Moreira & Canavarro, 2017), and the Mainland China context (Pan, Liang, Zhou, & Wang, 2019), it was included in the factor on self-regulation in the parenting relationship. In the Hong Kong adaptation (Lo et al., 2018), it was included in the dimension of emotional awareness in parenting, while in the Netherlands context (De Bruin et al., 2014), it was included in the dimension of emotional awareness of self. These mixed results indicate that it is not clear which of the factors corresponds to this item. In this version of the instrument, we did not have the emotional awareness of self factor, and the results indicated that Item 2 was not consistent with the items of self-regulation in the parenting relationship, so we decided to eliminate it. Finally, we were left with a questionnaire of 23 items grouped into five factors. The five-factor structure is consistent with the theoretical framework of the IM-P (Duncan et al., 2009). It is also consistent with a finding from a Portuguese sample of mothers of infants aged between 0 and 12 months (Fernandes et al., 2021b) and a Spanish sample of parents of older children (Orue et al., 2023).

Regarding the relationships between the study variables, as expected, maternal anxiety was related to all five factors of mindful parenting (Caçador & Moreira, 2021; Fernandes et al., 2021b), indicating that more anxious mothers had less ability to pay attention to their children and their parenting in an intentional way, here and now, and non-judgmentally. Maternal anxiety was also related to negative affectivity in infants, corroborating previous study results (Spry et al., 2020), as well as effortful control (Coplan et al., 2015). However, contrary to previous findings (Van den Heuvel, Johannes, Henrichs, & Van den Bergh, 2015), in this study, maternal anxiety was not related to surgency (positive affectivity).

More interestingly, the mediational model identified several significant mediations. In particular, maternal anxiety was related to negative affectivity not only directly but also through self-regulation in the parenting relationship. This result is consistent with study reports of the relation between maternal emotional regulation capacity and lower negative affectivity in infants (e.g., Edwards et al., 2017). The other significant mindful parenting dimension that mediated the relationship between maternal anxiety and negative affectivity was the emotional awareness of children, indicating that anxious mothers are less aware of their infants' emotions, leading to increased difficulties related to distress or irritability. However, we must take into consideration another possible explanation for this finding, that is, the idea that mothers who are more attentive to their infants' emotions might report more negative affectivity because they are more aware and more sensitive to the infants' distress cues. Therefore, it would be interesting to include independent observer ratings of infant temperament in future studies.

The relationship between maternal anxiety and effortful control was mediated by compassion for the child and listening with full attention. In addition, the emotional awareness of the child was marginally associated with effortful control. It is interesting to note that these three factors of mindful parenting are child-oriented (De Bruin et al., 2014) as opposed to the more parent-oriented dimensions (non-judgmental acceptance of parental functioning and self-regulation in parenting). This suggests that child-oriented mindful attitudes, such as being attentive to the child's emotions, having compassion for them, and listening attentively to them, help them develop regulatory capacity. This is reflected in behavior such as the infant's attention to one object for a prolonged period of time, decreased distress when a caregiver uses calming techniques, and expression of satisfaction when the caregiver holds them (Putnam et al., 2014).

Compassion for the child was the only factor related to the temperamental trait of positive affectivity/surgency. It refers to an inward disposition of the parent toward the child, that is, one of acceptance, openness, and patience, especially when the child is having a hard time. This result suggests that this attitude helps the child develop positive affectivity, which is reflected in actions as a willingness to approach, vocal reactivity in everyday activities, smiling and laughing in caregiving and play situations, high activity levels (moving arms and legs), and high perceptual sensitivity (Enlow, White, Hails, Cabrera, & Wright, 2016; Putnam et al., 2014).

Conversely, non-judgmental acceptance of parental functioning did not mediate the relationship between maternal anxiety and any of the temperamental traits because it was not related to negative affectivity, effortful control, or surgency. However, it was the mindful parenting dimension most related to maternal anxiety. This result is coherent with those of previous study reports that this dimension is related to maternal anxiety and stress (Moreira et al., 2019; Moreira & Canavarro, 2018), suggesting that it relates more to parental well-being than offspring symptoms. It is not surprising that mothers who experienced more anxiety symptoms also judged their functioning and were self-critical and less accepting of their mistakes and limitations as mothers (Moreira & Canavarro, 2018). However, this way of judging themselves was not related to their infants' temperament in the same way as other child-oriented or interaction-oriented dimensions of mindful parenting. It is interesting to note that this dimension of mindful parenting (i.e., the non-judgmental acceptance of the parental functioning) is closely related to the non-judging facet of general mindfulness (e.g., Orue

et al., 2023), indicating that both dimensions relate to the non-judgmental acceptance of oneself—in the case of mindful parenting, it relates to acceptance as a parent.

4.1. Limitations and Future Research

Several study limitations were notable. Perhaps the most important was the cross-sectional design, which prevented us from assessing the directionality of the relationships. It is important to keep in mind that infant temperament is both shaped by and profiles the social environment in which the child grows (Kiff, Lengua, & Bush, 2011). Thus, it could be that infant temperament also predicts maternal anxiety symptoms (e.g., Buss, Zhou, & Trainer, 2021). Therefore, future longitudinal studies should examine possible bidirectional relationships among parental anxiety, mindful parenting, and infant temperament. Another limitation was the non-inclusion of fathers in the study sample. In a study with preadolescents that examined the mediating role of mindful parenting between maternal and paternal anxiety and their children's problems, it was found that only mothers' anxiety, not that of fathers, was related to both mindful parenting and their children's problems (Larrucea-Iruretagoyena & Orue, 2023). Therefore, it is important that future studies involving infants include both mothers and fathers to evaluate the range of associations and their potential interaction. Finally, we should keep in mind that all measures—those referring to mothers' anxious and mindful parenting and infants' temperament—were reported by the mothers; therefore, there may have been some bias. Other informants or observational methods might have produced different results. However, it is important to note that recent studies found little evidence that mothers' current depressive or anxious symptoms were associated with their reports of child temperament (Olino, Guerra-Guzman, Hayden, & Klein, 2020).

4.2. Clinical Implications

Despite the abovementioned limitations, the results of this study have clear clinical implications. Maternal anxiety is related to early infant temperament through various facets of mindful parenting. Therefore, it is highly recommended that mothers be offered both mindfulness-based interventions, which have been shown to be effective in reducing anxiety symptoms (Leng, Yin, & Ng, 2023), and mindful parenting interventions (Potharst, Aktar, Rexwinkel, Rigterink, & Bögels, 2017), which can help them interact differently with their children to minimize potential detrimental effects on their children. This is of particular importance in the context of children's mental health, especially in the first 24 months of life, which is the most critical period in brain development (Knickmeyer et al., 2008), and considering that early temperament tends to be stable (Behrendt et al., 2020; De Pauw & Mervielde, 2010). Specifically, it seems to be particularly relevant to have an awareness of both the child's and one's own emotions and being able to regulate them in the relationship with the child in order to reduce the development of negative affectivity in the child. This is important because there is strong evidence suggesting that negative affectivity is related to future externalizing problems (e.g., conduct problems; Rigato et al., 2022) and internalizing problems (e.g., distress or poor regulation of negative emotions; Putnam, Rothbart, & Gartstein, 2008). In addition, listening with full attention to infants when interacting with them and being compassionate toward them are important for the development of adequate effortful control in infants. This is especially important for understanding the etiology of pre-school behavior problems (Rothbart et al., 2011) and can protect against emotional problems (Gartstein et al., 2012). Furthermore, being compassionate toward the child, for example, by being kind to them when they are upset or being patient and caring toward them when they are having difficulties is related to surgency in the child. Surgency is generally related to greater sociability in childhood and adulthood (Putnam et al., 2001).

4.3. Conclusions

In conclusion, infant temperament is related to maternal anxiety, and the use of mindful parenting by mothers explains part of the covariance between them. Therefore, obstetrics and gynecology professionals who have close contact with women and infants from the first days of life, as well as professionals in the psychological field, should give importance to and reinforce conscious parenting in the first years of life. In this way, they can assist both infants and their mothers in securing healthy mental development.

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CRediT authorship contribution statement

Joana del Hoyo-Bilbao: Data curation, Formal analysis, Methodology, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. **Izaskun Orue:** Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

None.

Data availability

Data will be made available on request.

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