Maternal perinatal representations and their associations with mother–infant interaction and attachment: A longitudinal comparison of Portuguese and Brazilian dyads

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*P*rior research in Western countries (mostly the US, Canada and northern Europe) indicates that mothers' representations are associated with mother–infant interaction quality and their child's attachment security later in the first year. Fewer studies, however, have evaluated whether these associations hold for mother–infant dyads in other countries, such as Brazil and Portugal. Although these countries share a similar language and culture, they differ on societal dimensions that may affect parenting attitudes and mother–infant relationships, such as economic stress, social organisation, social policy, and the availability of services for young families. In this longitudinal study, we followed two independent samples of Brazilian and Portuguese mother–infant dyads from the perinatal period to 12 months post-partum. We assessed mothers' perinatal representations using semi-structured interviews in the first 48 hours after the infant's birth, and evaluated the associations of these representations with mother interaction quality at 9 months and infant attachment at 12 months. Results were similar in each country, corroborating prior research in single Western countries: Mothers with more positive perinatal representations were more sensitive to their infants during free play at 9 months and were more likely to have infants classified as securely attached at 12 months.

Keywords: Maternal perintal representations; Mother–infant interaction; Infant attachment; Cross-cultural comparisons.

According to Bowlby (1969), attachment is a biobehavioural evolutionary adaptation that promotes offspring survival by increasing the probability that vulnerable infants will obtain the protection, care, and love they need from their caregivers. In Western industrialised countries, a robust predictor of secure attachment is mothers' sensitive responsivity to their infant's interests and needs during play and everyday caregiving routines during the first year post-partum (revision in Beeghly, Fuertes, Liu, Delonis, & Tronick, 2011). However, other research suggests that the quality of mothers' behavioural responses to infants varies, depending on the mothers' unique experiences and how mothers interpret or represent those experiences. During pregnancy and the perinatal period, mothers' form mental representations about their developing fetus and their expectations about their future role as parents, as well as their infants' temperament and future developmental outcomes. A growing literature in single Western countries shows that these representations are associated with later mother–infant interaction quality and child attachment security (Benoit, Parker, & Zeanah, 1997; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994), suggesting that attachment processes have biopsychosocial roots that begin even before birth. It

is unclear, however, whether these associations hold for mother−infant dyads in different countries. To address this question, we assessed the perinatal representations of mothers from Brazil and Portugal, and evaluated their associations in each sample with mother−infant interaction quality and child attachment later in the first year.

MATERNAL SENSITIVITY

Findings from meta-analytic reviews show that both maternal sensitivity (e.g. De Wolff & van Ijzendoorn, 1997) to infants' needs and interests during the first year of life remain the best single predictor of infant secure attachment in early childhood, although the magnitude of this association is relatively small ($r = .24$). The importance of maternal sensitivity is also highlighted in research demonstrating its association with infants' later positive developmental outcomes, including self-regulatory capacity, cognitive and linguistic development and school adaption and outcomes (for a review, see Beeghly et al., 2011). Findings from intervention research also suggest that enhancing parents' sensitivity to their infants contributes to the development of secure attachment (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2005), further attesting to the significance of the maternal sensitivity construct.

Given growing evidence that maternal sensitivity is linked to children's positive developmental outcomes, it is important for researchers to clarify the definition of this concept. Maternal sensitivity was first operationalised for research by Ainsworth, Bell, and Stayton (1974) in a longitudinal study of mother−infant dyads from middle-class backgrounds in the US, in which dyadic interactive behaviour was observed during daily routines at home (Ainsworth, Blehar, Waters, & Wall, 1978). From these observations, the authors defined maternal sensitivity in a three-component framework: (a) *awareness of signals sent by the child;* (b) *capacity to interpret those correctly;* (c) *adequacy of the mother's given responses* (Ainsworth et al., 1974, p. 127). Each of these dimensions requires a consideration of both maternal and infant behaviour and therefore the construct of maternal sensitivity is best viewed as dyadic in nature (e.g.Crittenden, 1999; van den Boom, 1997). In their meta-analytic review, De Wolff and van Ijzendoorn (1997) verified that different investigators often use different measures of maternal sensitivity, and the dimensions that are stronger predictors of later child attachment include: dyadic *mutuality*, *dyadic synchrony,* maternal *support*, *positive attitude* and *stimulation*. Supporting Bowlby's concept of attachment formation, these findings suggest that early relationships are best characterised as bi-directional, reciprocal and relationship-based processes established between infant and caregiver across interactive caregiving and play routines (Tronick & Beeghly, 2011). Moreover, it is in the context of this emerging unique parent-infant relationship that infants begin to learn different coping and protective strategies that best fit with their partner's behaviour and work best to maintain the relationship.

MATERNAL REPRESENTATIONS AND MOTHER−INFANT ATTACHMENT

Maternal representations have been defined as mothers' own mental and subjective representations of their experiences interacting with their infants, even before their infant's birth, which may influence the parents' interpretation of infant behaviour and their later behavioural responses to their infant (e.g. Fonagy, Steele, & Steele, 1991). Several studies have also examined the nature and origin of maternal representations and their association with the development of attachment relationships (e.g. Sokolowski, Hans, Bernstein, & Cox, 2007).

Balanced and positive maternal representations, measured pre- and postnatally, are associated with the development of a secure attachment (Benoit et al., 1997; Cox, Hopkins, & Hans, 2000; Fuertes, Faria, Fink, & Barbosa, 2011; Korja et al., 2009; Zeanah et al., 1994). For instance, mothers who describe their infants as having a stable positive temperament are more likely to have infants who are classified as secure by the end of the first year of life (e.g. Benoit et al., 1997; Cox et al., 2000; Fuertes, Lopes-dos-Santos, Beeghly, & Tronick, 2009;Zeanah et al., 1994). Although there is no published meta-analytical study to date that confirms that maternal positive representations are a reliable predictor of secure attachment across studies, the accumulated body of knowledge from single studies suggests that they account for significant variance in the child's later attachment formation.

The present study

Although mothers' perinatal representations are well studied in Brazilian and Portuguese research, the theoretical approaches taken in each country differ. The majority of Brazilian studies take a psychoanalytic approach, in which the "*imagined*" baby reflects mothers' past experiences and memories (real or fantasised). In contrast, many Portuguese studies take a transactional, contextual approach informed by developmental psychology. Studies in both countries indicate that maternal representations of the infant are linked to the quality of the mothers' interactive behaviour with the infant (e.g. Sousa, Prado, & Piccinini, 2011). However, the particular dimensions of maternal representations assessed in this research vary from study to study. In one Portuguese study, maternal representations of infant temperament were evaluated (Fuertes et al., 2009). Other studies (Fuertes et al., 2011), including the present study, used a

transactional perspective that evaluated whether mothers' representations affect their interactive behaviour with the infant, which in turn, affect the infant's attachment. This view also posits that over time, infants will progressively adapt to their caregivers' unique style of caregiving and responsivity, and throughout this transactional process, the dyad will adopt its own specific style of dyadic functioning (Sameroff & Fiese, 2000; Tronick & Beeghly, 2011).

These dynamic interactions are also shaped by a network of broader familial and sociocultural contextual influences (Bronfenbrenner & Morris, 2006). Wendland (2001) argues that the comparative data accumulated in cross-cultural research has increased our knowledge about both intra- and intercultural influences that impact on parent-infant relationships, and that this information can inform and guide mother–infant therapeutic approaches with culturally diverse groups.

Brazil and Portugal are two countries that provide a good opportunity for a cross-cultural comparison of the longitudinal associations among maternal perinatal representations, maternal behaviour and attachment formation. Although the two countries are similar in language and culture, they have distinct economic and social realities which may alter mothers' representations and expectations for themselves as parents, their infant's temperament, which in turn could alter mother–infant interaction quality and attachment later in the first year.

According to National Statistics (Pordata, 2018), Portugal is a relatively small country with one of the world's lowest infant mortality rates (2.6‰) and the world's best neonatal medical conditions. It is considered the sixth best country in which to be born for medical assistance. Portugal also has a free national early childhood intervention programme (serving children from birth to age 6) that is based on a family-centred approach, and provides free health, education and social services to its citizens. The average rate of completed mandatory education for the general population in Portugal is 75% (12 years of obligatory education), and most citizens are middle-class in socio-economic status. In contrast, Brazil is a large, diverse country with many social inequalities. According to Brazilian National Statistics (Brasil, IBGE, 2016), the infant mortality rate in Brazil is high (about 13.8 deaths per 1000 live births), which differs by region. In the Southeast region, where the present study was conducted (state of São Paulo), the infant mortality rate is 10.7‰. The average number of years of completed education in the São Paulo state is 8.85 years. Moreover, although Brazil has laws that guarantee the early intervention services for children at risk, not all children benefit from them due to budgetary deficits and a dearth of available programmes.

The goal of the current study was to carry out a cross-country comparison of mother–infant dyads in Brazil and Portugal who were followed from the perinatal period to the end of the first year post-partum. Specifically, in each group, we assessed mothers' perinatal representations using semi-structured interviews in the first 48 hours after the infant's birth, and evaluated the associations of these representations with maternal interactive behaviour at 9 months and child attachment at 12 months. Based on the societal and demographic differences in the two countries, we expected that dyads' nationality would be related to differences in the longitudinal associations observed among these variables.

METHOD

Participants

A total of 51 mother–infant dyads of Portuguese and Brazilian nationality participated in this study. The sample included 25 Portuguese mother–infant dyads with infants born at term (10 girls and 15 boys) and 26 Brazilian dyads with infants born either at term or near-term (15 girls and 11 boys; two of the Brazilian infants were born at 35 gestational weeks; all others were born at term). All infants were healthy and clinically normal at delivery as determined by paediatric examination. No infants had any sensory or neuromotor disabilities, serious illnesses or congenital anomalies. Their parents also had no known mental health or drug/alcohol addiction problems, as ascertained via medical record review or self-report. Table 1 provides descriptive statistics for infant, maternal/familial socio-demographic characteristics in the two samples.

On average, mothers in the Portuguese sample were somewhat older than mothers in the Brazilian sample ($t(49) = -2.188$; $p < .05$) and had more years of completed formal education ($t(49) = 3.288$; $p < .05$). Families in the Portuguese sample also had better socio-economic resources than families in the Brazilian sample, on average.

Infants in the Brazilian and Portuguese samples were similar on most birth characteristics, with the following exceptions: Compared to infants in the Brazilian sample, infants in the Portuguese sample had, in average, a higher gestational age at birth ($t(49) = -2.466$; $p < .05$). No other significant socio-demographic differences were found between the two samples.

Procedures

Analyses in the current study were based on data collected in two larger parallel longitudinal studies (from birth to 12 months) focused on infant's self-regulation and attachment conducted in Brazil and Portugal. Although results in the present study are original, details about the same samples and similar proceedings are published in other publications by this research team

TABLE 1
Infant and family demographics according to sample

Infant and family variables	Sample	M	SD	Min.−max.
Maternal age	Portuguese	29.84	4.68	21−38
	Brazilian	26.23	6.86	16−43
Maternal years of education	Portuguese	14.28	3.82	7−22
	Brazilian	11.42	2.19	6−15
Gestational age (weeks)	Portuguese	39.69	1.06	37.29−41.29
	Brazilian	38.81	1.45	35−40.14
Birthweight	Portuguese	3356.28	505.99	2570−4350
	Brazilian	3190.96	417.98	2345−3930
Apgar at first minute	Portuguese	9.16	.47	8−10
	Brazilian	8.88	1.18	5−10
Apgar at fifth minute	Portuguese	9.92	.28	9−10
	Brazilian	9.92	.27	9−10
Siblings number	Portuguese	1.56	.65	1−3
	Brazilian	1.35	.56	1−3

(Rodrigues, Ribeiro, Lamônica, Lopes dos Santos, & Fuertes, 2018).

All procedures regarding recruitment, follow-up methods, and the timing of follow-up visits in the Brazilian and the Portuguese samples were identical. Twenty-four hours after the infant's birth, a research assistant contacted potential participants and explained the study's purpose and procedures. To determine eligibility, mothers were administered a brief interview to collect demographic information. Eligible, consenting mothers gave their written informed consent to participate. Once consent was obtained, information from the infant's hospital medical record was obtained regarding his or her perinatal health condition.

Within the first 48 hours after birth, a semi-structured interview was conducted to collect mothers' representations regarding their pregnancy, labour and delivery, expectations about the parental role, their infant's temperament, and their infant's future developmental outcomes. In Portugal, the study aims and procedures were approved by the Ethics Commission of Matosinhos Hospital, and in Brazil, by the Ethics Commission of Bauru School of Dentistry—University of São Paulo (CEP/FOB-USP) and the Santa Isabel Maternity of Bauru.

Following recruitment in each longitudinal study, mothers were recontacted to schedule the follow-up visits to the laboratory at the University where mother−infant interaction in free play was videotaped at 9 months post-partum and mother−infant attachment was evaluated in the Strange Situation at 12 months post-partum, respectively.

Maternal semi-structured interview: Perinatal representations

During their stay at the Neonatal Care Unit, mothers were interviewed regarding their perinatal representations in the first 48 hours after the infant's birth, in the following categories: *pregnancy* (planned/unexpected pregnancy; father's reaction to pregnancy announcement; other family members' reaction; medical services; social support; family support, worries, expectations and affectional emotions); *emotions in pregnancy and labour* (emotions and worries), *first 2 days* of *maternal experience* (emotions, areas of difficultness, own baby versus idealised baby; self-evaluation of the ability to take care and engage with the infant) and *future perspectives* (expectations about the infant's future development and health, expectations about the future mother−infant relationship). The interviews were audio-recorded and lasted approximately 1 hour. The validity of the interview was tested and confirmed in past research (Fuertes et al., 2011; see the interview in Appendix).

Using Bardin's (2011) method of content analyses, the audio-recorded interviews were transcribed and a content analysis was performed. Each maternal utterance was scored on a sentence-by-sentence basis. Next, each sentence in each category was coded as either positive, negative or ambivalent in representational quality. For instance, in the category "desired pregnancy," mothers who expressed that they did not desire their pregnancy were assigned one point in the negative representations category, whereas mothers who reported that they desired their pregnancy were assigned one point in the positive representations category. Ambivalent answers or answers with mixed feelings were assigned one point in the ambivalent representations category. Some sentences such as "feeling love for my baby," were additionally scored according to the level of emotional intensity on a scale from 1 to 4 in either the positive or negative representations categories (e.g. a 4 for negativity was applied to sentences such as "I don't feel yet love for my baby, I don't know why but I don't feel love"; a 4 for positivity

was assigned for sentences such as "I am totally in love with my baby since I heard that I was pregnant, and each day more and more"). This scoring system was previously tested in Portuguese samples and was applied in independent samples with full-term and preterm infants (Fuertes et al., 2011). In the present study, mothers' positive, negative and mixed/ambivalent responses in each category were summed and averaged for analytical purposes.

Three coders carried out the content analysis of each interview independently in each sample. When scoring was completed, the three coders compared their scores and resolved any disagreements via conferencing. Overall, the average inter-coder agreement for major classification prior to conferencing in each sample was very good (80%).

Mother−infant free play interaction

Child-adult relationship experimental index (CARE-Index; Crittenden, 2003). The CARE-Index was used to score qualitative dimensions of infant-adult interaction from the videotaped free play context at the 9-month lab visit. The CARE-Index system focuses on seven aspects of the infant's and mother's interactive behaviour: facial expression, verbal expression, position and body contact, affection, turn-taking contingencies, control and choice of activity. Up to two points are assigned for each dimension, for a possible maximum total score of 14. The final score is obtained by summing the individual scores based on three maternal scales (sensitivity, control and unresponsiveness) and four infant scales (cooperation, compulsive-compliance, difficulty and passivity). In addition, there is a global 14-point scale of dyadic synchrony based on general characteristics of mother−infant play. Although the mother and infant are scored separately, the scale is considered to be dyadic because each behaviour is analysed in a dyadic transactional context, according to the partner's behaviour and perspective. Hence, maternal and infant scales are highly correlated and for that reason in our study only maternal scales will be used in analyses.

The videotaped free-play interactions in each sample were scored independently by two trained coders with established reliability on the CARE-Index. Intercoder reliability between the two coders' ratings in the present study was evaluated using intraclass correlation coefficients (ICC). The average ICCs were consistently high for the CARE-Index maternal, infant and dyadic scales in the Portuguese sample (maternal scales: .87 for sensitivity, .81 for control, .78 for unresponsiveness; infant scales: .78 for cooperation, .82 for compulsive-compliance, .92 for difficulty and .92 for passivity). In the Brazilian sample, intercoder reliability was good to very good, with ICCs ranging from .68 to .84 (maternal scales: .75 for sensitivity, .72 for control, .79 for unresponsiveness; infant scales:

.73 for cooperation, .68 for compulsive-compliance, .84 for difficulty and .71 for passivity).

Mother−infant attachment

At the 12-month visit, the infant's attachment behaviour with each parent was videotaped during Strange Situation (SS; Ainsworth et al., 1978). The original SS is a 21-minute laboratory paradigm involving a sequence of eight episodes designed to place mild but increasing levels of stress on the infant (i.e. being introduced to an unfamiliar play room, interacting with an unfamiliar adult stranger, and brief separations from and reunions with the mother). Scoring of infant attachment from the videotapes of the SS was accomplished by two trained and reliable coders using Ainsworth et al. (1978) scales for secure (B) and insecure (A: avoidant and C: ambivalent/resistant) categories. Scoring guidelines developed by Mary Main et al. were used for scoring the disorganised/disoriented category (D). All cases in each group were scored independently twice as either secure, insecure-avoidant, insecure-ambivalent or disorganised/disoriented. No disorganised/disoriented classification was identified by either coder in Portuguese and Brazilian samples. Any disagreements in classification were resolved in conference. Overall inter-coder agreement for major classification prior to conferencing was excellent (90%).

Analytic plan

Preliminary analyses were conducted on all study variables to evaluate whether the data met assumptions of normality and homogeneity of variance, using a significance level of $p < .05$. Four sets of statistical analyses were then conducted. First, the quality of mother−infant interaction at 9 months in the Brazilian and Portuguese samples were compared using independent sample *t*-tests. Second, associations between mothers' averaged total scores for positive, negative and mixed/ambivalent perinatal representations and the quality of maternal interactive behaviour at 9 months were evaluated using Pearson correlations. Third, paired-sample *t*-tests were used to evaluate whether secure and insecurely attached infants in each sample (evaluated separately) differed on mothers' mean scores for positive, negative and mixed/ambivalent perinatal representations or on rated dimensions of mother−infant interaction quality at 9 months. Fourth, we evaluated whether any dimensions of maternal interactive behaviour in free play at 9 months were a significant mediator (either full or partial) of the association between mothers' perinatal representations and infant's attachment security at 12 months. Potential mediation was evaluated using linear regression analysis and the Sobel/Goodman Test.

TABLE 2
Correlation coefficient (r) from Pearson correlation analysis between maternal perinatal representations and the quality of maternal and infant interactive behaviour at 9 months in Brazilian and Portuguese samples

	Sample	Positive representations	Negative representations	Ambivalent representations
Maternal interactive behaviour				
Sensitivity	Portuguese	.674**	−.379	−.367
	Brazilian	.841**	−.515*	−.348
Control	Portuguese	−.501**	.269	.285
	Brazilian	.003	.171	−.182
Unresponsivity	Portuguese	−.269	.171	.128
	Brazilian	−.696**	.296	.424*

*Significant correlation, $p < .05$; **Highly significant correlation, $p < .01$.

RESULTS

Cross-country comparison of mother−infant interaction quality at 9 months

Results of independent-sample t-tests indicated that mothers of Brazilian nationality were significantly more unresponsive with their infants during free play at 9 months ($M = 3.19$; $SD = 2.91$) than Portuguese-born mothers ($M = 1.79$; $SD = 1.54$; $t(49) = -2.184$; $p = .03$).

Association between perinatal maternal representations and mother−infant interaction quality in the Brazilian and Portuguese samples

Mothers' mean scores for representations in each sample, were then compared with maternal behaviours observed during free play at 9 months, using Pearson correlations (see Table 2).

As expected, in both samples, mothers' mean number of positive and negative perinatal representations were negatively associated with each other ($r = -.872$; $p < .001$ in the Portuguese sample; $r = -.822$; $p < .001$ in the Brazilian sample). However, no statistically significant associations were found between mothers' perinatal representations.

Associations between infant attachment security and mothers' perinatal representations and mother−infant interactive quality in each sample

The number and percentage of infants' attachment in each sample are presented in Table 3. Portuguese secure attachment incidence (60%) was approximate to Western countries results, that is, around 67% whether the Brazilian was 48%. Such value is more likely in samples with socio-economically disadvantage (Mesman, Van IJzendoorn, & Sagi-Schwartz, 2016). In this analysis, we evaluated whether infant attachment status at 12 months was associated with mothers' perinatal positive, negative and ambivalent representations, or mother−infant interaction quality at 9 months. Given that mothers' positive and negative representations were highly (negatively), only positive maternal representations were evaluated in this analysis. Moreover, because insecure-avoidant attachment classification was relatively rare in the Portuguese and Brazilian samples, we combined the two insecure attachment categories (avoidant and ambivalent/resistant) into a single group ("insecure attachment") for analytic purposes.

Similar findings were found in each sample an association between secure attachment and mothers' positive perinatal representations. Specifically, in the Brazilian sample, mothers of infants classified as securely attached had a higher mean number of positive perinatal representations than mothers of infants classified as insecurely attached ($M = 6.59$; $SD = 1.84$; $t(24) = -4.439$; $p < .001$). Likewise, in the Portuguese sample, mothers of infants classified as securely attached had a higher mean number of positive perinatal representations ($M = 6.47$; $SD = 1.51$) than mothers of infants classified as insecure ($M = 5.18$; $SD = 1.17$; $t(23) = -2.354$; $p < .05$).

Other significant associations varied by sample. For instance, in the Brazilian sample only, contrary to expectations, mothers of infants classified as securely attached had a higher mean number of ambivalent/mixed perinatal representations ($M_{secure\ attachment} = .31$; $SD = .60$

TABLE 3
Distribution of Infants attachment pattern observed in the Strange Situation in Brazilian and Portuguese samples

		Avoidant	Secure	Resistant-ambivalent	Total
Sample	Portuguese	3 (12%)	15 (60%)	7 (28%)	25 (100%)
	Brazilian	4 (15.4%)	12 (46.2%)	10 (38.5)	26 (100%)

Note: Pearson chi-square $= .986$, df $= 2$, ns; likelihood ratio chi-square $= .990$, df $= 2$, ns.

TABLE 4
Association between mother−infant interactive behaviour and attachment security in Brazilian and Portuguese samples

	Portugal			*Brazil*		
	Secure M (SD)	*Insecure* M (SD)	*t*	*Secure* M (SD)	*Insecure* M (SD)	*t*
Maternal behaviour						
Sensitivity	10.25 (2.3)	7.80 (1.8)	2.85**	8.36 (2.6)	8.50 (2.3)	−1.41
Control	2.25 (2.3)	4.20 (2.3)	−2.14*	2.00 (1.7)	2.43 (2.5)	−.479
Unresponsivity	1.50 (1.6)	2.00 (1.5)	−.79	3.64 (2.9)	3.07 (3.0)	.476

*p < .05, **p < .01.

vs. $M_{\text{insecure attachment}} = 1.30$; $SD = 1.57$, $t(24) = 2.287$; $p < .05$). In contrast, associations between infant attachment and mother−infant sensitivity were significant only in the Portuguese sample (see Table 4), namely between infant secure attachment and maternal sensitivity; and between infant insecure attachment and maternal passivity.

Mother−infant interaction mediational effects on attachment security

Using linear regression analysis and the Sobel/Goodman Test, we tested the potential meditational effect of the following variables: *maternal sensitivity*, *maternal control*, *maternal unresponsivity*, *mothers' positive, negative and ambivalent representations* on our dependent variable infant attachment security (secure vs. insecure attachment) by each sample. Significant mediation was found only for one maternal interaction variable, and only for dyads in the Brazilian sample. Specifically, greater maternal passivity mediated the association between mothers' ambivalent representations in the perinatal period and infants' later insecure attachment (reduced model $R = .623$; $R^2 = .388$; $Z = 3.55$; $p < .001$).

DISCUSSION

The present study compared whether Brazilian and Portuguese mother−infant dyads differed in the longitudinal associations between mothers' positive negative, and mixed/ambivalent perinatal representations and their observed level of sensitivity with the infant during free play at 9 months, and with the infant's secure/insecure attachment in the Strange Situation at 12 months. For that purpose, 51 mother−child dyads (25 Portuguese, 26 Brazilian) participated in this research.

When mother−infant interaction quality during free play at 9 months was compared in the Brazilian and Portuguese samples, mothers in the Brazilian sample were rated as being more passive than Portuguese mothers. Several studies have also found that maternal passivity is more prevalent when dyads are from higher social and economic risk backgrounds (e.g. Costa, Lopes dos Santos,

& Fuertes, 2014 ; Fuertes, Faria, Soares, & Crittenden, 2008). Consistent with these results, we found that many Brazilian mothers in our sample tended to be silent during mother−infant interaction, and rarely offered toys or followed their infant's exploration. They also were unlikely to engage their infants with eye contact, smiles or varied facial expressions. In turn, infants in the Brazilian sample were likely to play by themselves or tried to obtain mother's attention using negative behaviours such as screaming or crying.

The Brazilian mothers in our sample had less years of completed formal education and experienced more economical disadvantages than mothers in the Portuguese sample. Alvarenga, Malhado, and Lins (2014) reported that, in Brazil low income and low maternal education have a negatively impact on infant development and on parenting quality. However, further research is necessary to understand why these factors contribute to maternal passivity in our Brazilian sample, or whether these findings would hold in Brazilian mother−infant dyads from higher socio-economic backgrounds.

One of our main goals was to study the association between maternal perinatal representations and mother−child interaction quality and infant attachment later in the first year. To our knowledge, this is the first comparative study about these topics in mother−infant dyads from Brazilian and Portuguese cultures. Our results indicate that, in both samples, mothers' positive perinatal representations about *pregnancy, emotions in pregnancy and labour*, *first 2 days* of *maternal experience* and *future perspectives* were associated with a higher level of maternal sensitivity and higher infant cooperation with the mother during mother−infant free play interactions at 9 months. These results are congruent with those reported in previous studies in single Western countries, which show that mother's positive perinatal representations are associated with later positive maternal interactive behaviour with the infant (e.g. Korja et al., 2009). In our Brazilian sample (but not in our Portuguese sample), a higher mean number of maternal ambivalent representations were associated with greater maternal passivity and infant difficulty during free play at 9 months. Such finding is in itself original. Based on the predictions of

Sameroff and Fiese's (2000) transactional model, we speculate that mother's mixed feelings about their pregnancy and their uncertainty regarding the future (assessed shortly after birth) may lead over time to greater difficulty in parenting (e.g. responding sensitively to the infant's needs and interests). Perhaps mothers' initial maternal hesitation and successive failures in engaging the infant in positive interactions may lead mothers to become more disengaged during social interactions with their infants in later infancy. Such results are correlational and deserve further detailed exploration: our research team is continuing to evaluate the developmental outcomes of these children over time in both samples.

Moreover, mothers' positive perinatal representations were associated with a higher rate of secure infant attachment at 12 months in both samples. This result corroborates previous findings obtained by our research team in independent Portuguese samples of preterm and full-term infants (Fuertes et al., 2011), and also extends this association to dyads in our Brazilian sample. These results are also generally consistent with findings reported in research conducted primarily in single Western countries (e.g.Benoit et al., 1997 ; Cox et al., 2000 ; Fuertes et al., 2011 ; Korja et al., 2009 ; Zeanah et al., 1994). Although causal interpretations of this accumulating body of correlational research are not appropriate, the findings do reinforce the notion that prevention efforts should help new mothers build positive representations of themselves and their infant during the perinatal period, and foster positive mother–infant interactions later in the first year as a way of building secure attachment relationships (Marvin, Cooper, Hoffman, & Powell, 2002).

One caveat is that maternal representations are likely to be susceptible to sociocultural differences, such as differences in parental goals and expectations for parenting and their infant's development. This topic deserves further study in larger, more culturally diverse samples. The possibility of sociocultural influences also suggests that prevention and intervention efforts focused on maternal representations should also support differences in parents' goals and beliefs in diverse cultural groups. Further research focused in exploring cultural specificities and their association with maternal perinatal representations and the quality of early mother–infant relationships is needed, if we are to support and build on evidence-based practices for mother–infant dyads.

Another interesting result was that maternal passivity mediates the association between mothers' ambivalent representations and their infant's insecure attachment, but only in the Brazilian sample. Although significant mediation was present, this finding should be viewed cautiously because maternal passivity was not directly associated with insecure attachment. This finding may suggest that, for mothers in the Brazilian sample, greater uncertainty expressed in their perinatal representations, predicted greater passivity during mother–infant interactions, which in turn may have undermined their capacity to be a safe haven and secure base for their infant by the end of the first year.

Studying the determinants of mother–infant interaction in future research may help guide and inform the establishment of more effective early prevention and intervention practices and strategies for new mothers and their infants. Our results strengthen the idea that early intervention should begin early and focus on enhancing mothers' early positive representations and supporting the establishment of a reciprocal, contingent, positive and secure mother–infant relationship in early childhood.

Contributions and limitations

This longitudinal study is among the first to our knowledge to evaluate the association between mothers' early perinatal representations and observations of mother–infant interaction quality and infant attachment later in the first year, in two independent Portuguese and Brazilian samples. Our results contribute to a growing body of knowledge about cross-cultural differences in parent-infant relationships during the first year of life. However, our findings may not generalise to dyads in other countries or dyads in other socio-economic groups within each country. Given the small sample size in each sample, statistical power to find cross-group differences may also have been limited. For these reasons, findings from the present study should be viewed as preliminary and should be discussed in light of each sample's sociocultural and demographic characteristics. Replication of the current findings in a larger longitudinal samples is needed.

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APPENDIX A

THE MATERNAL INTERVIEW (FUERTES, 2005)

PREGNANCY

1. Do you remember the moment when you knew you were pregnant? How did you felt (planned/unexpected pregnancy/desired)?
2. How was the reaction of your husband/partner? And how did your family react?
3. Did you feel supported during pregnancy (by friends, partner, family, and health professionals)?

EMOTIONS IN PREGNANCY AND LABOUR

4. Do you remember what you felt the first time your baby moved inside of you?
5. As your baby grew inside of you, how did you imagine him/her?
6. Were you afraid that something might happen to your baby? How was the labour?

FIRST 2 DAYS OF EXPERIENCE

7. Remember the moment you first felt love for your baby?
8. What did you feel when you first hold your baby?
9. How easy/difficult it is to take care of him or her?
10. Would do you describe your baby's temperament?

FUTURE PERSPETIVES

11. What will it be like to take care of your child at home? How do you expect to relate with him/her?
12. Do you expect some difficulties?
13. How do you imagine your baby future (health and development)?