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PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Mind-mindedness and Parenting Stress in Mothers of Preterm and Full-Term Infants: the Moderating Role of Perceived Social Support

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The authors declare that they have no conflict of interest.

The study involves human participants. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (Ethic committee of the University of Milano Bicocca, n°231) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study

Abstract

The goal of this study was to examine the effects of preterm birth and maternal childbirth-related posttraumatic stress and parenting stress on maternal mind-mindedness (MM). The study also investigated the effects of perceived social support on parenting stress and mind-mindedness. Sixty-five preterm (N = 32) and full-term (N = 33) mother-infant dyads were observed at 6 months. Measures of maternal MM were obtained from observations of mother-infant interaction. Mothers also provided ratings of their PTSD symptoms, parenting stress, and perceived social support via an online survey. Experiencing a preterm birth did not affect mothers' use of mental state descriptors during mother-infant interaction. Neither childbirth-related posttraumatic stress nor parenting stress directly affected maternal ability to comment on the child's mental states appropriately. However, at medium and high levels of perceived social support, a negative association between parenting stress and mind-mindedness was observed. Maternal perception of being emotionally supported by significant others promoted mind-mindedness in mothers showing low or mild levels of parenting stress, but not in mothers experiencing high stress in parenting their infants. Results suggest that a proclivity to mind-mindedness might be affected by the interaction between parenting stress and social support, rather than by childbirth-related variables, such as prematurity.

Keywords: mind-mindedness; preterm birth; parenting stress; social support; childbirth-related posttraumatic stress

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Key Findings:

1. During dyadic interaction, mothers of preterm children did not differ from mothers of full-term children in their levels of mind-mindedness. Also, the reported stress levels resulted similar among mothers. These results support previous findings indicating that preterm birth itself does not necessarily imply difficulties in the quality of parenting and in the psychological well-being of mothers.
2. Social support directly affects parenting stress: mothers who perceived adequate emotional support from their significant others expressed less stress in dealing with parenting tasks. In accordance with the study's findings, interventions directed at promoting social support can help parents in their childrearing practice by reducing stress.
3. Medium and high levels of perceived social support failed to promote mind-mindedness in those caregivers experiencing high childrearing stress but strengthened maternal mind-mindedness when mothers experienced low or mild parenting stress. Understanding how parenting stress, social support, and mind-mindedness are related is essential at deepening the nature of the mind-mindedness construct itself.

Relevance to the field of Infant and Early Childhood Mental Health

This study contributes to the field by exploring how a set of variables related to childbirth and parenting experience, including perceived social support, can shape parenting attitudes during mother-infant interaction. Its relevance lies in the facet of parenting on which this study focused on, namely maternal mind-mindedness, the proclivity to consider and address the child as an individual with a mind.

Introduction

Mind-mindedness (MM), a construct developed by Meins (1997), represents the caregiver's ability to read the child's internal mental states and treat her or him as an individual with a mind. Similarly to well-known constructs, such as reflective functioning (Slade, 2005) and insightfulness (Oppenheim & Koren-Karie, 2002), it refers to parental engagement with the child at a mental level rather than in response to her or his contingent physical and emotional needs, i.e. caregiver's sensitivity.

In the first year of life, mind-mindedness is measured as the caregiver's tendency to comment on the infant's putative mental states during social interaction (referred as "observational" mind-mindedness), earning the description of a "*type of RF [Reflective Functioning] in action*" (Rosenblum, McDonough, Sameroff, & Muzik, 2008). Later on, from toddlerhood onward, mind-mindedness assessment relies on the caregivers' verbal references to the child's mental states during an interview (defined "representational" mind-mindedness), which simply asks caregivers to describe their child (Meins, Fernyhough, Russell, & Clark-Carter, 1998). A relevant difference between the two approaches is that the observational measure of mind-mindedness allows to differentiate the mind-related comments depending on their appropriateness or, vice versa, lack of attunement to the infants' ongoing mental state and activity in the interaction (Meins et al., 2012).

A growing body of research on maternal mind-mindedness, assessed using the observational measure, which represents the focus of the current study, indicated that mind-mindedness promotes parent-child relationships and the child's socioemotional and cognitive development. As for the parent-child relationship, there is convincing evidence demonstrating significant positive associations between the use of appropriate mind-related comments and parental sensitivity (Laranjo, Bernier, & Meins, 2008; Meins, Fernyhough, de Rosnay, Arnott, Leekam, & Turner, 2012). Both Meins (1999) and Laranjo et al. (2008) noted that the

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

propensity to treat infants as individuals with minds could be a pre-requisite for sensitivity; in order to respond promptly and appropriately to infants' cues, caregivers should first attribute an intention to infants' signals and states. The relation between mind-mindedness and attachment has also been extensively investigated, with the main aim of examining the capacity of mind-mindedness to reduce the attachment transmission gap by accounting for the relation between caregiver's attachment representation and infant attachment security (Bernier & Dozier, 2003). In this context, significant associations between caregiver's proclivity to mind-mindedness and infant's attachment security were found, even if evidence of a robust predictive role of mind-mindedness is still modest, as recently reviewed by McMahon and Bernier (2017).

Regarding the effects on children developmental outcomes, parental verbal references to infants' mental state during interaction have been related to the development of children's ability to attribute mental states to themselves and others, i.e., theory of mind (ToM), with the parental use of appropriate mind-related comments being positively associated to children's ToM at preschool age (Kirk et al., 2015; Laranjo, Bernier, Meins, & Carlson, 2014; Meins, Fernyhough, Arnott, Leekam, & De Rosnay, 2013). Parental mind-mindedness also seems to promote children's language development (Laranjo & Bernier, 2013; Meins, Fernyhough, et al., 2013) and, although evidence is still limited, the development of executive functioning (Bernier, Carlson, Deschênes, & Matte-Gagné, 2012; Bernier, Carlson, & Whipple, 2010).

Considering its relevance for child development and the quality of parent-child relationship, investigating which variables can explain individual differences in parental mind-mindedness represents a crucial research question. As we describe later on, research aiming at identifying the factors and the conditions that may favor or somewhat interfere with maternal mind-mindedness is continuously growing. The present study contributes to this line of research by investigating how maternal mind-mindedness can vary according to different childbirth experiences (i.e., preterm birth) and different levels of parenting stress. We hypothesize that

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

experiencing stress and/or trauma in the perinatal and postnatal period could prevent mothers to attune to their children's mental state and activity, leading to a decrease in the use of appropriate mind-related comments. At the same time, the role of perceived social support in moderating the impact of maternal stress on mind-mindedness is under investigation.

Understanding Individual Differences In Mind-Mindedness: The Role Of Child And Parent Characteristics

Since its origin, the nature of mind-mindedness construct has been intensively under debate. Relevant questions refer to whether mind-mindedness represents an individual parental trait that operates similarly with different relational partners, or instead, it can be considered as a quality of parent-child relationships (Barreto, Fearon, Osório, Meins, & Martins, 2016; Meins, Fernyhough, & Harris-Waller, 2014). Other questions concern its stability across time (Kirk et al., 2015; McMahon, Camberis, Berry, & Gibson, 2016) and across different assessment approaches (i.e., observational vs. representational; Illingworth, MacLean, & Wiggs, 2016). A parallel line of research that can contribute to clarifying the nature of mind-mindedness construct and better understand individual differences has investigated child, parent, and contextual variables that can interfere with or instead support parental proclivity to interpret and attribute mental states to the child.

Literature addressing the role of child-centered variables in understanding mind-mindedness individual differences observed significant relations between children's emotional, behavioral, and temperamental difficulties, and low levels of maternal mind-mindedness (Demers, Bernier, Tarabulsky, & Provost, 2010a; Walker, Wheatcroft, & Camic, 2012), but studies in this topic are still scant and often restricted to studies approaching mind-mindedness with the interview measure.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Regarding parental characteristics, most studies assessed maternal mind-mindedness, with fathers' mind-mindedness being investigated only marginally. Mother-centered variables correlated to mind-mindedness were examined extensively, with resulting data reporting mixed findings. Meins, Fernyhough, Arnott, Turner, and Leekam (2011) reviewed the literature on this topic and documented the absence of significant associations between mind-mindedness and maternal variables such as mothers' socioeconomic status and educational level (Meins et al., 1998; Walker et al., 2012). It should be noted that these studies assessed mind-mindedness via interview. Considering both observational and representational mind-mindedness findings, McMahon and Bernier (2017) observed a mixed situation with papers evenly divided in reporting significant and non-significant associations with education and SES.

Other maternal variables contributing to mind-mindedness were investigated, for instance age and maternal psychological functioning. Teen mothers were found to address fewer appropriate positive mind-related comments to their infants than adult mothers, and also fewer positive mind-related comments, when the emotional valence of the mental descriptors was coded (Demers, Bernier, Tarabulsy, & Provost, 2010b; Riva Crugnola, Ierardi, & Canevini, 2018). With respect to depression, data are conflicting with studies reporting null associations (Crucianelli et al., 2019; Meins, Centifanti, Fernyhough, & Fishburn, 2013) and others observing significant relationships linking the presence of depression symptoms and the use of non-attuned mind-related comments, although with small effect sizes (Meins et al., 2011).

Rearing a child can also be a stressful experience, and distress can in turn interfere with parental representations, making it more difficult for caregivers to read and attribute mental states to their child. Following this direction, Demers et al. (2010a) investigated the associations between parenting stress and maternal mind-mindedness in a sample of mothers of 18-month-old toddlers: findings showed that the use of positive mind-related descriptors correlated with low levels of parenting stress and with the perception of the child as easy in temperament.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Similarly, Dai, Lim and Xu (2019) observed that in mothers of 15 months old infants, the use of appropriate mind-related comments significantly correlated with the stress perceived in parenting, even controlling for maternal income and education. As stress seems to undermine maternal mind-mindedness, Meins et al. (2011) speculated that a lack of social support would impact maternal tendency to use mind-related comments during interaction; however, their data showed no significant association with the perception of social support, as measured with a 15-items survey developed by Henderson, Duncan-Jones, McAuley, and Ritchie's (1978).

Other variables that captured the attention of researchers in dealing with individual differences in mind-mindedness were related to mothers' obstetric history. Meins et al. (2011) hypothesized that a mother's perception of her pregnancy and labor experiences could play an essential role in the development of adequate representations of the newborn and the child's future characteristics: women who have more troubles in their obstetric histories would feel less attuned to their infants' emotional needs and mental states from the beginning, resulting in lower mind-mindedness attitudes. Studies on this topic (Dai et al., 2019; Meins et al., 2011) confirmed that in western and non-western cultures, the positive recollection of pregnancy and childbirth make mothers more likely to get attuned to their infants' mental state and to show appropriate mind-related comments during dyadic interactions. Furthermore, mothers who recalled a highly positive emotional reaction in the first contact with the newborn later reported less parenting stress (Dai et al., 2019). Furthermore, when addressing negative pregnancy and birth experiences, Camisasca, Procaccia, Miragoli, Valtolina, and Di Blasio (2017) indicated that mothers reporting childbirth-related posttraumatic stress symptoms were more likely to make fewer mind-related comments in the interaction with their children aged 17 months.

Parental Distress and Mind-Mindedness: Effects of Perceived Social Support

A sudden interruption of pregnancy and its culmination in a preterm birth constitute a very special condition that could have a significant impact on parental psychological health,

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

disturbing the process of building representations of the child and of oneself as a parent (Spinelli et al., 2016). Mothers and fathers coping with preterm birth acknowledge the traumatic load of this experience, reporting feelings of powerlessness and shock due to the unpredictability of the event (O'Donovan & Nixon, 2019). Literature indicated that 6 months after childbirth, mothers kept experiencing symptoms of posttraumatic stress, with some evidence showing higher levels of trauma being associated with infants' low birth weight, length of hospitalization and illness severity (Feeley et al., 2011; Holditch-Davis, Bartlett, Blickman, & Miles, 2003). When not resolved, early maternal childbirth-related posttraumatic stress could significantly affect parenting experience and behavior. Accordingly, literature shows that the presence of posttraumatic symptoms mediates the association between preterm birth condition and levels of parenting stress; mothers who experienced their infant's birth as a traumatic event reported higher levels of parenting stress, but mothers who did not experience the event as traumatic, showed lower levels of parental stress (Suttora, Spinelli, & Monzani, 2014). Other reports indicated that preterm birth might lead parents to perceive their role and the rearing of their child as particularly stressful and demanding, with a higher level of parenting stress being documented in both mothers and fathers (Chang & Fine, 2007; Gray, Edwards, O'Callaghan, Cuskelly, & Gibbons, 2013). However, findings in this field are controversial since other studies obtained different results, indicating no or small effects of preterm birth on parenting stress (Howe, Sheu, Wang, & Hsu, 2014; Schappin, Wijnroks, Venema, & Jongmans, 2013).

To date, there is only one study investigating the association between preterm birth and maternal mind-mindedness. In this study (Costantini, Coppola, Fasolo, & Cassibba, 2017), mothers of 14-month-old preterm children showed mind-mindedness abilities similar to those of mothers of full-term peers, but variables such as parenting stress were not considered in the study design. The researchers' focused on the role of MM on children's developmental outcomes, and findings indicated that maternal mind-mindedness contributed significantly to

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

the growth of linguistic abilities in the second year of life only for preterm infants, suggesting a different impact of maternal mind-mindedness due to birth condition.

In this light, the present study aims at exploring how birth condition (preterm vs. full-term), maternal childbirth-related traumatic symptoms, and maternal levels of parenting stress can relate to individual differences in maternal mind-mindedness measured at 6 months of age during mother-child interaction. As the literature suggests (Holditch-Davis et al., 2003), at 6 months mothers of preterm infants are still recovering from the traumatic effects of childbirth; thus, this age may constitute an interesting period for such an investigation. Significant intercorrelations among birth conditions, perinatal PTSD symptoms, and parenting stress are expected. Our main hypothesis is that the severity of preterm birth and high levels of posttraumatic symptoms and parenting stress, would interfere with maternal development of adequate representations of the child, leading to lower levels of mind-mindedness.

Finally, maternal perceived social support will also be considered. The perception of being supported by one's partner, family, or close friends could have different effects on parenting stress and related outcomes. Cohen and Wills (1985) proposed two models describing the impact of social support on individual wellbeing. The direct or main effect model claims a direct protective effect of social support on individuals' wellbeing, independently from the level of displayed stress, while the buffer model sustains the idea of perceived social support as a moderator of the relation between stress and adverse outcomes. Literature often confirms both models, with data showing either main and moderating effects: a study based on an extensive sample (Mcconnell, Breitzkreuz, & Savage, 2011) found that social support had strong direct effects on parent-child health and wellbeing and a smaller, but significant, role in moderating the impact of parenting stress on positive parent-child interaction.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

In this frame, we aim at understanding whether perceived social support contribution to maternal attitudes towards children's mental states could be direct and/or could buffer the negative effects of maternal distress on mind-mindedness.

Method

Participants

The sample includes 65 Italian mother-infant dyads (38 male, 27 female; 47 first-born), with 32 infants born preterm (PT: F = 47%; firstborn = 75%) and the remaining 33 infants born at gestational term (FT: F = 36%; firstborn = 70%). Preterm and full-term infants did not differ in gender, $\chi^2(1, 65) = 0.74, p = .390$, or birth-order, $\chi^2(1, 65) = 0.23, p = .633$.

Inclusion criteria for preterm infants were having a weight of less than 1500 grams and a gestational age <33 weeks at birth. Exclusion criteria for the preterm and full-term group were the presence of genetic abnormalities, severe neurofunctional impairment, defined as Neurofunctional Assessment greater than 2 (Picciolini, Gianni, Vegni, Fumagalli, & Mosca, 2006), and/or neurosensory disabilities (blindness or deafness). On average, preterm children were hospitalized for 48.47 ($N = 31^1$; $SD = 21.73$) days and had a gestational age of 30.94 ($SD = 2.19$) weeks and a birth weight of 1292 ($SD = 326$) grams, while full-term children had a gestational age of 39.87 ($SD = 1.24$) weeks and a birth weight of 3418 ($SD = 442$) grams.

Because infant birth weight and gestational age were highly correlated ($r = .93, p < .001$), a Prematurity Index was calculated for all infants by standardizing and summing these two variables (Poehlmann, Schwichtenberg, Bolt, & Dilworth-Bart, 2009). The Prematurity Index scores ranged from -3.51 to -1.00 ($M = -1.89, SD = 0.64$) for preterm infants and from 0.62 to 2.66 ($M = 1.82, SD = 0.55$) for term infants, with higher scores representing less prematurity.

¹ Hospitalization data from one preterm participant were missing

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Mothers had a mean age of 36.72 ($SD = 5.16$) years in the preterm group and of 34.48 ($SD = 2.61$) in the full-term group, with a significant difference between groups, $t(63) = -2.21, p = .031$; maternal education was lower for the preterm group, with 15.81 ($SD = 3.19$) years for PT mothers and 17.36 ($SD = 2.63$) for FT mothers, $t(63) = 2.03, p = .036$. Only two mothers out of sixty-five were originally from another country, but they were very fluent in Italian, their second language. All mothers were Caucasian.

Parents of preterm infants eligible for the study were approached for enrollment in the follow-up service of the Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico; this service only includes patients from its own NICU. Parents of full-term infants were recruited to participate in the study by written invitations that were sent to families based on birth records provided by neighboring cities. The ethics committees of authors' institutions approved the study and written informed consent was obtained from all parents.

Procedure and Measures

When the infants were 6 months old ($M = 6.33, SD = 0.26$ for term infants; $M = 6.48, SD = 0.54$ corrected age for preterm infants), dyads were invited to participate in a videotaped play session lasting from 10 to 15 minutes, depending on the infant's state and fussiness. Face-to-face interactions with the infant in a baby seat were chosen in order to favor the relational exchanges in dyads, as most of the infants at this age are still not able to seat properly without support. Dyads were free to use some age-appropriate toys available in the room. For each dyad, maternal mind-mindedness was assessed using the first 8 minutes of the videotaped interaction to avoid infant's fatigue and to obtain comparable measures. First, maternal utterances directed at the child were fully transcribed and then coded according to the mind-mindedness coding manual, version 2.2 (Meins & Fernyhough, 2015). A coder classified each maternal comment as mind-related (MR) if it included a reference to the infant's desires, wishes, preferences, intentions, epistemic states, emotions and attempts to manipulate others' beliefs, and mental

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

processes, such as memories or decisions. In addition, maternal utterances that were meant to be said by the infant were coded as mind-related. Once a comment was coded as mind-related, the coder further classified it as appropriate or non-attuned according to the criteria included in the Coding Manual 2.2 (Meins & Fernyhough, 2015). A mind-related comment was considered appropriate when the coder agreed on the maternal interpretation of the child's current mental state based on child observable behavior. Mind-related comments were coded as non-attuned when mothers failed to identify children's current internal state correctly. A second coder, trained by the first author and blind to the study's hypotheses, coded a randomly selected 25% of the mother-infant interactions (16 out of 65 pairs). Interrater reliability between the two coders, tested with intraclass correlation, was .98 for appropriate comments and .88 for non-attuned comments.

In the present study, the amounts of appropriate mind-related comments (AMRC) and non-attuned mind-related comments (NAMRC) were used as measures of maternal mind-mindedness. As suggested by Meins and Fernyhough (2015), to control for maternal verbosity, proportional frequencies of AMRC and NAMRC were calculated relative to the total amount of maternal verbal utterances.

Following the play session, mothers completed an online survey including several questionnaires. Among these, mothers completed the Perinatal PTSD Questionnaire (PPQ) – Modified version (Callahan, Borja, & Hynan, 2006) and the Parenting Stress Index-Short Form (PSI-SF; Abidin, 1997; Italian validation by Guarino, Di Blasio, D'Alessio, Camisasca, & Serantoni, 2008). The PPQ is a 14-item questionnaire that assesses childbirth-related posttraumatic symptoms, including intrusiveness or re-experiencing, avoidant behaviors, hyperarousal, and general posttraumatic symptoms. Mothers were asked to indicate on a five-point Likert scale (0 = *not at all* to 4 = *often, for more than a month*) how often they experienced the symptoms after childbirth. The total PPQ score ranges from 0–56, with high values

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

representing greater posttraumatic symptom severity ($\alpha = .76$). The PSI-SF is a commonly used measure of stress related to parenting, including 36 items rated from 1 to 5 on a Likert scale (1 = *strongly disagree*; 5 = *strongly agree*) assessing parental distress (PD), parent-child dysfunctional interaction (P-CDI) and the burden of dealing with a difficult child (DC). In the present work, only the total stress scale score (PSI) was considered, with high values indicating greater parenting stress ($\alpha = .90$).

Mothers were also asked to complete the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988), a 12-item self-report questionnaire that investigates the social support a person experiences from family, friends and significant others. The Italian version of the scale was used in this study (Di Fabio & Busoni, 2008). Participants expressed their agreement with the statements on a seven-point Likert scale (1 = *very strongly disagree*; 7 = *very strongly agree*). High values represented high levels of perceived social support ($\alpha = .95$).

Analysis Plan

Preliminary analyses included exploring data distribution and examining differences between mothers of preterm and full-term infants regarding the main variables, i.e. childbirth-related posttraumatic stress and parenting stress, perceived social support, and mind-mindedness using independent t-tests. In the main analysis section, consistent with our aims, associations among study variables in the whole sample were examined using Pearson's correlation. Moderation analysis was then used to examine the main and buffering effects of perceived social support on the association between maternal stress and mind-mindedness. Two moderation analyses were performed with the PROCESS macro (Hayes, 2012) using IBM SPSS Statistics version 25. The PROCESS macro uses bootstrapping methods to assess the interaction between design variables. The interactions between independent and moderating variables on the dependent variable were tested at each of the three levels of the moderator (-1,

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

0, and +1 SD). Significant interactions are those in which 95% confidence intervals do not contain zero. All variables were standardized into z-scores before being entered into the moderation models.

Results

Preliminary analyses

The descriptive statistics of posttraumatic stress, parenting stress, perceived social support, and mind-mindedness measures in FT and PT mothers are shown in Table 1. Estimates of skewness and kurtosis for PPQ, PSI and MSPSS scores were within reasonable limits, with skewness ranging from -1.50 to 0.74 and kurtosis from -0.42 to 3.02. However, scales were not normally distributed (Shapiro-Wilk test, $p < .05$). Distribution for appropriate mind-related comments was normal, with data low in skewness, 0.28, and kurtosis, -0.34. The data for non-attuned were non normal, highly skewed, 2.20, and high in kurtosis, 6.12. Because data were skewed, we also ran nonparametric tests (Mann-Whitney'U and Spearman's ρ). The results did not differ, so t-tests and Pearson's correlations are reported respectively in Table 1 and Table 2.

DISPLAY TABLE 1 HERE

The results of independent t-tests comparing the two groups of mothers did not reveal any significant differences due to birth condition. Childbirth-related posttraumatic symptoms, assessed with PPQ, were similar among mothers. In our sample, 15 mothers, 8 of FT (24%) and 7 of PT dyads (22%), were at risk of perinatal PTSD - according to Callahan et al. (2006), PPQ scores equal to or higher than 19 are at risk -, with scores ranging from 19 to 35. As for the Parenting stress index (PSI), the results revealed that 11 of FT mothers (33%) and 7 of PT mothers (27%) scored at or above the PSI's 50th percentile ($PSI > 68$), exhibiting medium to high distress in parenting their children. Mothers of preterm and full-term children reported similar levels of social support.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

As to the key study outcome, namely, maternal mid-mindedness, t-test results indicated the absence of statistically significant differences due to birth condition. In agreement with literature results, appropriate and non-attuned mind-related comments represented respectively the 14% and 2% of the total number of comments.

Main Analyses

Pearson correlation analyses were performed to investigate the associations between childbirth-related PTSD symptoms, parenting stress, perceived social support and the use of mind-related comments during mother-infant interactions. To maximize the statistical power and given the results of our preliminary analyses, data from the two groups of mothers were aggregated and the Prematurity Index was considered as a measure of prematurity severity.

As reported in Table 2, maternal scores in the PPQ significantly correlated with PSI scores; specifically, mothers with pronounced posttraumatic stress symptoms related to childbirth were also at higher risk of experiencing parenting stress at 6 months. Furthermore, high parenting stress was associated with lower levels of perceived social support (MSPSS). The results indicated a lack of significant associations between the use of appropriate and non-attuned mind-related comments and maternal reported levels of childbirth-related posttraumatic stress and parenting stress. Associations between mind-mindedness measures and MSPSS scores were also not significant. The severity of prematurity failed to account for individual differences in mind-mindedness, childbirth-related posttraumatic stress, parenting stress, and perceived social support.

DISPLAY TABLE 2 HERE

As highlighted in the introduction, social support may buffer the adverse effects of stress on parenting behaviors and attitudes; in this sense, the interaction between maternal stress, posttraumatic and/or parenting stress, and the level of perceived social support may explain differences in maternal mind-mindedness. Only appropriate mind-related comments (AMRC)

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

were considered in the following analyses. The latter decision relies upon previous results indicating that only appropriate mind-related comments relate to positive parenting and maternal sensitivity (Meins et al., 2012). Two moderation models were hypothesized.

DISPLAY TABLE 3 AND 4 HERE

The first model considered how levels of perceived social support (MSPSS) moderated the association between perinatal posttraumatic symptoms and maternal mind-mindedness. The interactions were tested at each of three levels of the moderator variable (-1 , 0 , and $+1$ SD; i.e., at low, medium, and high levels of perceived social support). This first model yielded no significant results, as shown in Table 3, thus implying the absence of significant interactions between the level of posttraumatic stress and perceived social support on maternal mind-mindedness. The second model tested the moderation by perceived social support of the association between parenting stress and maternal mind-mindedness. The results reported in Table 4 indicated that although there was no direct effect of parenting stress on maternal mind-mindedness, the interaction between PSI and MSPSS was significant ($B = -0.26$, $t = -2.60$, $p = .0111$, $f^2 = 0.12$) at average values of the moderator (conditional effect = $-.25$, $t = -2.51$, $p = .014$, 95% CI = -0.62 , -0.07) and at $+1$ SD of the moderator (conditional effect = $-.50$, $t = -2.92$, $p = .004$, 95% CI = -0.81 , -0.15). The interaction was not significant at -1 SD of the moderator (conditional effect = $-.01$, $t = 0.06$, $p = .950$, 95% CI = -0.30 , 0.32). The effect size of the interaction was in the medium range according to Aguinis, Beaty, Boik, and Pierce (2005). At medium and high levels of perceived social support, parenting stress was negatively related to maternal mind-mindedness (Figure 1). For low levels of perceived social support, the interaction was not significant ($t = 0.01$, $p = .99$, 95% CI = -0.30 , 0.30).

DISPLAY FIGURE 1 HERE

Discussion

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Considering the role of parental mind-mindedness in promoting child development and parent-child relationship, we aimed at examining the impact on mind-mindedness of a set of variables related to childbirth and parenting experience. The principal intent of the present study was to explore the effects of maternal stress on maternal mind-mindedness in a sample of mothers of preterm and full-term infants aged 6 months. The study also considered the support that mothers perceived from their families, friends and significant others as a variable that might play a protective role in their psychological well-being and parenting behaviors.

As reviewed in the introduction, previous literature suggests that maternal mind-mindedness could be affected by negative and traumatic experiences during pregnancy and childbirth (Camisasca et al., 2017; Dai et al., 2019). Experiencing pregnancy and labor as negative, can distort early representations of the child, as the mother does not feel attunement with the newborn from the outset (Meins et al., 2011). Considering preterm birth as a potentially traumatic condition, we aimed at investigating mind-mindedness and its association with the caregiver's perinatal PTSD symptoms and parenting stress in this population too. Our findings suggested that mothers of preterm and full-term children made comparable amounts of appropriate and non-attuned mind-related comments during interaction. The experience of preterm birth did not affect maternal tendency to refer to the child in terms of mental and inner states. This result is consistent with the study of Costantini et al. (2017) that failed to highlight any differences in the mind-mindedness of mothers of preterm children in the second year of life. Accordingly, recent results from the study of Ruiz, Witting, Ahnert, and Piskernik (2020) indicated no differences due to birth status in the overall levels of reflective functioning between mothers of term and preterm children. However specifically investigating the topics extracted from the Parental Development Interview (Slade, Aber, Bresgi, Berger, & Kaplan, 2003) with a latent Dirichlet allocation (LDA) modeling technique, the authors highlighted that mothers of children born preterm tended to reflect more intensively than mothers of full-term children on

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

their children's thoughts and feelings. It could then be that mothers of preterm reveal similar uses of mind-mindedness during interaction than mothers of full-term infants, but, when asked to reflect on their infants' thoughts and feelings, they exhibit a higher understanding of their infant mental states.

In our findings, preterm birth and its severity also had no effects on mothers in terms of stress, with mothers from the two conditions reporting comparable levels of posttraumatic and parenting stress. These results could be unexpected considering the suddenness of preterm birth, its threatening effects on a child's survival, well-being, and development. One possible interpretation could concern the fact that preterm infants with severe neurofunctional impairments and/or neurosensory disabilities were excluded from the present study, as their conditions are rare and difficult to compare with those of healthier preterm (Piccolini et al., 2006; Tommiska, Östberg, & Fellman, 2002). Empirical evidence highlights that parents of children with developmental disabilities are at increased risk of experiencing psychological stress and trauma compared to other parents (Lee, 2013). Future studies should investigate how preterm birth and the presence of developmental or neurosensory disabilities interact in affecting parents' wellbeing and emotional reactions.

Another explanation is that posttraumatic stress reactions in preterm parents may depend upon the level of hospital care and support provided. In a work by Montiroso, Provenzi, Calciolari, and Borgatti (2012), the parental experience of stressors related to the NICU environment was assessed in 25 Italian NICUs with the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles, Funk, & Carlson, 1993). Findings showed that maternal perception of care and support during hospitalization, calculated separately for each NICU, made a significant contribution to reducing maternal stress. These findings can help give sense to the observed results, as acknowledged in the study's limitations section. At the same time, it is worth noting that risk factors for the development of posttraumatic stress symptoms,

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

such as obstetric complications, inadequate intrapartum care, and history of psychological problems, are often reported in full-term pregnancies, a piece of evidence that could help to understand the lack of significant differences in our sample (Ayers, Harris, Sawyer, Parfitt, & Ford, 2009; Simpson & Catling, 2016).

Putting aside the preterm birth, one of the main purposes of the study was to understand the effects of childbirth-related posttraumatic stress, parenting stress, and social support on maternal mind-mindedness. The results showed the absence of associations between maternal mind-mindedness, perinatal PTSD symptoms and parenting stress; thus, childbirth-related posttraumatic stress and parenting stress showed no direct effects on maternal mind-mindedness, in contrast with previous studies' findings. Camisasca et al. (2017) observed that mothers who used fewer mental descriptors during the interaction with their 17 months old children, were likely to report more childbirth-related PTSD symptoms. As for parenting stress, both Dai et al.'s (2019) and Demers et al.'s (2010a) observed negative associations with the caregivers' tendency to appropriately attribute mental states to their children, respectively when children were 15 and 18 months old.

However, other analyses helped in clarifying these preliminary results. Firstly, parenting stress resulted negatively correlated with perceived social support; mothers who perceived good support from their partners, families, and friends expressed less stress in dealing with the care of their children. In this sense, maternal perception of being sustained by her significant others may reduce parenting stress appraisal or even prevent it. At the same time - because our analyses are correlational - low levels of parenting stress may lead mothers to perceive their social networks as more supportive. Secondly, the results of moderation analyses showed a significant interaction between perceived social support and parenting stress on mind-mindedness, at specific levels of social support. For mothers reporting low support from their interpersonal relationships, the association between parenting stress and maternal mind-mindedness was not

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

significant. Contrariwise, for adequate and high levels of social support, high levels of mind-mindedness were associated with low levels of stress. In other words, a high social support promoted mind-mindedness for mothers experiencing no difficulties in child-rearing but still resulted in low mind-mindedness for mothers reporting stress in dealing with their parental tasks. We can suppose that mothers who perceive support from their network, but at the same time still perceive high levels of stress from parenting demands, can feel this pattern as incongruent and attribute their difficulties to the child or to dyadic relational aspects, reducing their ability to comprehend and read the child's mental states. In our data, social support did not moderate the adverse effects of stress on parenting behaviors but instead promoted mind-mindedness in mothers showing no or mild parenting stress. In this light, our findings did not confirm the stress-buffering hypothesis on social support, but rather provided data on a promotive effect of support on maternal mind-mindedness. Summarizing, the perception of social support - a qualitative rather than a quantitative aspect of this construct - resulted associated with lowered parenting stress overall, which could be interpreted as a direct effect on stress, but fails at buffering the negative effect of parental stress on mind-mindedness.

Östberg and Hagekull (2000) addressed how social support, and other variables such as daily workload or child fussiness, affect parenting stress in a sample of Swedish mothers, testing Cohen and Wills's (1985) dual model of social support. They found social support to have direct and indirect - through maternal workload - effects on parenting stress; however, moderating effects of social support were not observed as the model was shown to apply to all mothers, independently from the amount of social support reported. Other studies succeeded in finding buffering effects of support on parenting stress in mothers of preterm and full-term children (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Lutz et al., 2012). For instance, Lutz et al. (2012) found that maternal perception of information social support by family members (i.e. the provision of knowledge and facts) improved child's behavioral regulation - assessed

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

with the Parent-Child Early Relational Assessment (PCERA) (Clark, 1985) - for mothers who perceived more stress related to parenting but not for those reporting less stress. Mothers who feel as more demanding the task of parenting, may benefit more from information support as reflected in more positive mother-child interaction. In our study, the measure of social support (MSPSS) captures the perception of emotional social support rather than other kinds of social support, such as information support, instrumental support (i.e., provision of concrete resources, such as money or childcare), presence of tangible aid and positive social interaction (Armstrong, Birnie-Lefcovitch, & Ungar, 2005; Lutz et al., 2012). In this sense, it is possible to hypothesize that while more concrete types of social support can moderate the adverse effects of stress on the quality of parent-child interaction, emotional support can have beneficial effects only in mothers not experiencing significant parenting difficulties. In a similar direction, Guralnick, Hammond, Neville and Connor's work (2008) found that for parents of children with developmental disabilities high parenting support – in form of advices on parenting specific problems and assistance with child care responsibilities – promoted less child- and parent-related stress, whereas emotional support and validation from others exerted limited effects on parental stress. As social support is a multidimensional construct, differences in the effects of support on stress and other outcomes can depend on the functional and/or structural aspects of social support considered in the study design (Armstrong et al., 2005; Cohen & Wills, 1985; Guralnick et al., 2008)

Clinical Implications and Limitations

A better understanding of the effects of different dimensions of social support on parenting stress and related outcomes, could inform healthcare professionals on how to intervene in such circumstances. Based on our findings, interventions and programs directed at promoting parents' social support can help them in their childrearing practices by reducing stress, both in typical and atypical conditions, such as preterm birth. However, our results also highlighted

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

that high emotional social support per se is not enough to reduce the negative effects of high parenting stress on maternal mind-mindedness. The early identification of parents at risk of acute stress is pivotal to provide them with social, educational and psychological interventions oriented at supporting and promoting their ability to attune to their infants' mental states, such as the *Minding the Baby* (Slade et al., 2006) and the *Mothering Inside Out* (Suchman, Ordway, de las Heras, & McMahon, 2016) programs.

Before closing the discussion, some important limitations of our study design deserve to be mentioned. The first refers to the study sample; putting aside the sample size, the preterm group includes only very low birth weight infants from a single NICU unit. As studies show, care and support may vary dramatically from one NICU to another, leading to results that are not always easy to interpret. In this study, given the lack of differences in stress and mind-mindedness among the mothers in the groups, we may speculate about the availability of good-quality NICU care; however, this conclusion should be better addressed with specific studies. A second limitation refers to the cross-sectional nature of the study's design, which does not permit to draw conclusions about the causal relationships among the measured variables. Longitudinal designs investigating preterm birth, stress, and different dimensions of social support as predictors of maternal mind-mindedness are needed. At last, another limitation and an important topic for future studies concerns the lack of data on children's development and wellbeing. Studies of parenting are fundamental but can lack impact when they don't consider children's developmental outcomes.

The study involves human participants. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (Ethic committee of the University of Milano Bicocca, n°231) and

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants involved in the study

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PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

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PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Table 1

Descriptive Statistics of the Study Main Measures by Group

	Total sample (N = 65)	Preterm Group (N = 32)	Full-term Group (N = 33)	
	Mean (SD)	Mean (SD)	Mean (SD)	t (p)
PPQ	12.63 (8.21)	13.62 (9.16)	11.67 (7.17)	-0.96 (.344)
PSI	60.01 (14.37)	56.81 (14.36)	63.23 (13.87)	1.83 (.072)
MSPSS	71.58 (11.43)	70.40 (13.81)	72.72 (8.59)	0.82 (.417)
AMRC	0.14 (0.05)	0.14 (0.06)	0.13 (0.05)	-1.19 (.238)
NAMRC	0.02 (0.03)	0.02 (0.03)	0.02 (0.02)	-0.51 (.612)

PPQ: Perinatal PTSD Questionnaire; PSI: Parenting Stress Index; MSPSS: Multidimensional Scale of Perceived Social Support; AMRC: mind-related appropriate comments; NAMRC: mind-related non-attuned comments.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Table 2

Pearson Correlations between the Study Variables

	1	2	3	4	5
1. PI					
2. PPQ	-.19 (.135) ^a				
3. PSI	.20 (.099)	.38 (.002)			
4. MSPSS	.05 (.7695)	-.21 (.092)	-.37 (.003)		
5. AMRC	-.09 (.467)	-.16 (.195)	-.18 (.151)	-.01 (.932)	
6. NAMRC	-.01 (.953)	.03 (.791)	.01 (.953)	.12 (.351)	.20 (.113)

PI: Prematurity Index; PPQ: Perinatal PTSD Questionnaire; PSI: Parenting Stress Index;

MSPSS: Multidimensional Scale of Perceived Social Support; AMRC: mind-related appropriate comments; NAMRC: mind-related non-attuned comments.

^a r (p)

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Table 3

Moderation analyses of PPQ and MSPSS on Appropriate Mind-mindedness (AMRC)

Model	<i>B</i>	SE	<i>t</i>	<i>p</i>	LLCI	ULCI
Constant	-0.01	0.13	-0.07	.942	-0.26	0.25
PPQ	-0.17	0.13	-1.35	.181	-0.43	0.08
MSPSS	-0.02	0.14	-0.15	.879	-0.31	0.26
PPQ X MSPSS	-0.04	0.12	-0.38	.701	-0.27	0.18
Model Summary	<i>R</i>	<i>R</i> ²	<i>p</i>			
	0.17	0.03	.585			
PPQ X MSPSS		<i>R</i> ² change	<i>p</i>			
		0.00	.701			

PPQ: Perinatal PTSD Questionnaire; MSPSS: Multidimensional Scale of Perceived Social Support.

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Table 4

Moderation analyses of PSI and MSPSS on Appropriate Mind-mindedness

Model	<i>B</i>	SE	<i>t</i>	<i>p</i>	LLCI	ULCI
Constant	-0.09	0.12	-0.75	.454	-0.34	0.15
PSI	-0.25	0.13	-1.92	.059	-0.50	0.01
MSPSS	0.06	0.14	0.43	.669	-0.22	0.34
PSI X MSPSS	-0.26	0.10	-2.60	.011	-0.45	-0.06
Model Summary	<i>R</i>	<i>R</i> ²	<i>p</i>			
	0.37	0.14	.030			
PSI X MSPSS		<i>R</i> ² change	<i>p</i>			
		0.10	.011			

PSI: Parenting Stress Index; MSPSS: Multidimensional Scale of Perceived Social Support

PARENTAL STRESS, SUPPORT AND MIND-MINDEDNESS

Figure 1

Perceived Social Support X Parenting Stress on Appropriate Mind-Related Comments

(AMRC)