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Prematurity and Maladaptive Mealtime Dynamics: the Roles of Maternal Emotional Distress, Eating-Related Cognitions, and Mind-Mindedness

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Abstract
Premature birth and maternal emotional distress constitute risk factors for feeding disorders. This study examined the roles of maternal cognitions in the link between prematurity, emotional distress and mother-infant maladaptive mealtime dynamics in a sample of 134 families (70 preterm, low medical risk; 64 full-term) followed longitudinally. Specifically, maternal cognitions related to eating and health (perception of child vulnerability and concerns about child's eating) and understanding of mental states (interactional mind-mindedness) were considered. A multiple-mediators model was tested, controlling for infants' weight and breastfeeding history. Although prematurity did not directly predict mealtime dynamics, multiple-mediation analyses revealed indirect pathways: mothers of preterm newborns reported higher emotional distress, which subsequently predicted perception of child vulnerability and concerns about child's eating at 6-months; perception of child vulnerability predicted more conflictual mealtime dynamics, whereas concern about child's eating predicted less reciprocal mealtime dynamics at 12-months. Mind-mindedness at 6-months predicted more reciprocal and less conflictual mealtime dynamics but did not act as a mediator. Implications for understanding pathways from prematurity to feeding disorders are discussed.

Keywords Feeding disorders · Prematurity · Mother-child interaction · Emotional distress · Mind-mindedness · Perception of vulnerability

Premature birth has been repeatedly associated with increased risk for feeding problems, from birth and throughout infancy and toddlerhood (Cerro et al. 2002; Hoogewerf et al. 2017; Rommel et al. 2003; Silberstein et al. 2009b). Feeding is a complex behavior that requires coordination between many systems (e.g., suck and swallow mechanisms, regulation of sleep-wake cycles), commonly unripe among preterm newborns (Neu 2007; Rommel et al. 2003). Many preterm infants and their caregivers experience difficulties in transitioning from gavage to oral feeding (Neu 2007; Silberstein et al. 2009b), have excessive feeding durations (Schädler et al. 2007), and are at risk for behavioral or oral sensory problems (Rommel et al. 2003; Samara et al. 2010). Preterm birth and low birth weight have been linked with failure to thrive during infancy (Santos et al. 2009), and especially with faltering weight starting during the first months of life (Olsen et al. 2010). Although some of the link between prematurity and feeding problems has been attributed to medical risk and to neonatal intensive care unit (NICU) treatment (Hoogewerf et al. 2017), increased rates of feeding problems have also been reported among preterm infants with low medical risk (e.g., Cerro et al. 2002; Silberstein et al. 2009b). Later on, parents of preterm children report frequent food refusal or picky-eating and poor growth, and are concerned regarding their children's food intake (Cerro et al. 2002; Johnson et al. 2016). In addition, difficulties in early mother-infant feeding interactions predict feeding behaviors and characterize preterm feeding disorders (Silberstein et al. 2009a; Silberstein et al. 2009b). For example, most preterm infants admitted to hospital treatment due to persistent feeding disorders demonstrated food refusal behaviors and high distress during feeding interactions

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with their parents (Schädler et al. 2007). Therefore, it is important to understand non-medical early pathways from premature birth to feeding problems.

Feeding in infancy is inherently interactional. In mother-infant feeding, successful feeding depends on mealtime dynamics, such as a mother's attunement to her infant's feeding cues and pace, and child involvement (Chatoor 2002; Mitchell et al. 2013). Feeding problems have been linked with disruptions in mother-infant mealtime dynamics, most notably with lower reciprocity and higher levels of conflict (Ammaniti et al. 2010; Feldman et al. 2004). Thus, undereating disorders are often considered "relationship disorders" (e.g., Atzaba-Poria et al. 2010; Chatoor 2002). The aim of this study is to explore early maternal attributes, focusing on cognitions, that may lead to dysfunctional mealtime dynamics in healthy preterm infants (Fig. 1).

Prematurity, Maternal Emotional Distress and Feeding Problems

Maternal emotional distress is one of the most salient maternal attributes associated with child feeding and growth problems in general, and specifically with dysfunctional mealtime dynamics (Ammaniti et al. 2010; Feldman et al. 2004; O'Brien et al. 2004). Maternal depression and anxiety have been previously associated with conflict and negative affectivity in feeding dynamics in infancy and toddlerhood (Ammaniti et al. 2010), rendering emotional distress a risk factor for axis I "undereating disorders" (Feldman et al. 2004; formerly referred to as feeding disorders), and specifically for infantile anorexia (Ammaniti et al. 2010; Lucarelli et al. 2013). This link has been suggested to arise from mothers' difficulties in tuning in to infants' feeding cues under distress (Ammaniti et al. 2010). In line with this notion, according to Berlin, Davies, Lobato, and Silverman's (2009) biopsychosocial model of early feeding problems, developmental problems can lead to feeding problems via an indirect pathway through the stress associated with caring for children with developmental difficulties. In the present study, we investigated the role of emotional distress following premature birth in feeding interactions.

When a child is born prematurely, the mother-infant relationship develops within a context of maternal emotional distress. Parents of preterm newborns transition into parenthood earlier, usually less prepared, thus experiencing "premature parenting" (Stern 1999). In addition to this early transition, the newborn stays in the NICU for a hospitalization period, where most of the newborn care is performed by nurses rather than by the parents. This situation is often referred to as *role alteration* and may be reflected in higher levels of parental stress (Gueron-Sela et al. 2013; Miles et al. 1993). Indeed, NICU hospitalization has been linked with experience of lowered confidence and increased sense of loss of parental role (Carter et al. 2007; Dudek-Shriber 2004), and mothers of preterm infants report higher levels of anxiety and depression compared to mothers of infants born full-term (e.g., Olshtain-Mann and Auslander 2008; Poehlmann et al. 2009), even when medical risk is low (Gueron-Sela et al. 2013).

Taken together, maternal emotional distress following preterm birth appears to pose a risk for maladaptive mother-infant mealtime dynamics. Yet, to our knowledge, this link and its underscoring mechanisms have not been examined. We specifically aim to uncover how preterm birth and maternal distress after birth may be related to negative mother-infant mealtime interactions by the end of the first year of life. We propose that maternal emotional distress at birth may lead to dysfunctional mealtime dynamics through two indirect pathways involving maternal cognitions: (1) heightened

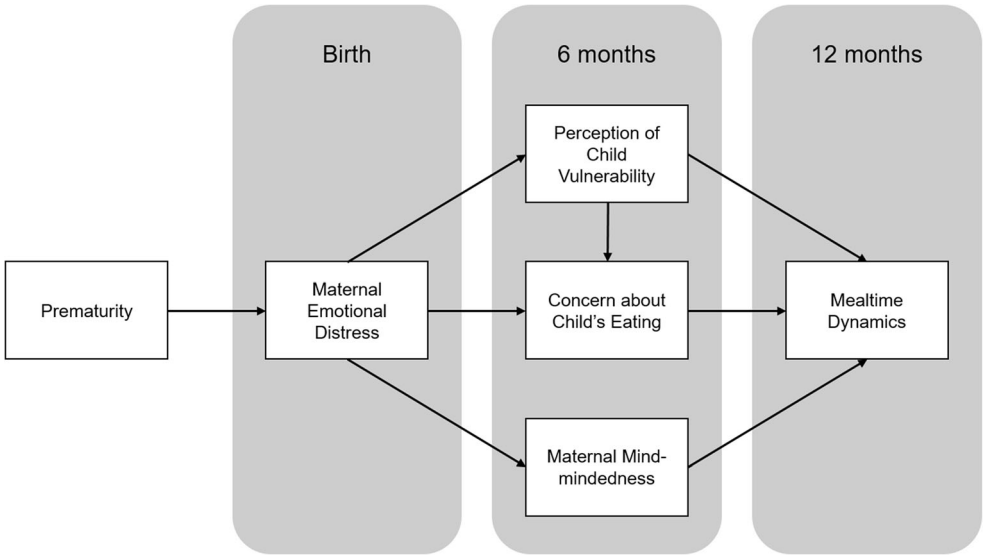

Fig. 1 A schematic depiction of the present study's conceptual multiple-mediation model

perception of child vulnerability and concerns about child's eating; and (2) lowered ability to understand the child's mind (mind-mindedness).

Pathways from Emotional Distress to Mealtime Dynamics

Maternal cognitions related to infants' growth and health: Perception of child vulnerability and concern about the child's eating. One pathway through which prematurity and emotional distress can lead to maladaptive feeding interactions is via mothers' *perceptions of their infants' vulnerability.* Green and Solnit (1964; see also Houtzager et al. 2014) suggested that parents of children who experienced medical risk tend to perceive them as more physically vulnerable and easily hurt than other children, even after these risks have been overcome. Thomasgard and Metz (1995) suggested that, in addition to child medical risk, mothers with higher emotional distress are more prone to perceive their children as vulnerable. In line with these notions, past research has found associations between parental depression and stress and perception of higher child vulnerability (e.g., Gordo et al. 2018; Tluczek et al. 2011).

Prematurity has long been associated with maternal perception of child vulnerability (e.g., Green and Solnit 1964; Horwitz et al. 2016; Perrin et al. 1989). Research indicates that the link between maternal perception of child vulnerability and prematurity is not only due to the medical risk associated with prematurity, but is explained in addition by mothers' distress (e.g., Horwitz et al. 2016). In a meta-analysis, Tallandini, Morsan, Gronchi, and Macagno (2015) found that both prematurity and emotional distress contributed to vulnerability perception; while the link between prematurity and perception of child vulnerability was small and decreased over time, maternal distress was a stronger, more stable predictor of vulnerability perception.

Perception of child vulnerability is related to more negative mother-child interactions and lower maternal patience and support as well (Porter et al. 2009; Thomasgard and Metz 1995). Importantly, this attribute can promote parental overprotection and discouragement of the child's independence (Mullins et al. 2007; Thomasgard and Metz 1995), which are linked with feeding problems as well (Berlin et al. 2009). Lastly, mothers who perceived their child as more vulnerable reported lower confidence in their ability to feed their newborn (Teti et al. 2005).

Because weight and growth are considered markers of healthy development in infancy (e.g., World Health Organization 2018), it is likely that perception of child vulnerability is linked with mealtime dynamics through specific *concerns about the child's eating*. Parents of preterm children report being less satisfied with their child's health and weight (Cerro et al. 2002). These concerns may elicit negative or controlling behaviors during feeding; for example, maternal concerns about eating were found to mediate the relation between feeding disorders and mothers' heightened intrusiveness and lowered structuring during feeding (Gueron-Sela et al. 2011).

Although parental perception of child vulnerability has been theoretically discussed as being part of the etiology of feeding problems and dysfunctional feeding (e.g., Berlin et al. 2009), to our knowledge, the association between feeding and parental perception of child vulnerability, in general or among parents of preterm infants, has yet to be examined. It is expected that mothers who experience higher levels of emotional distress at birth would perceive their infants as more vulnerable, and thus would be more concerned about their child's eating; over time, they are expected to exhibit less positive and more controlling mealtime dynamics.

Maternal cognitions related to infants' signals: mind-mindedness (MM). A second path through which maternal early emotional distress may be related to dysfunctional mealtime dynamics is through reduced maternal MM, a mother's ability to consider her child as a psychological agent and to understand the mental states behind her child's behavior (Meins 2013). MM is considered a basic component of maternal sensitive responsivity because it enables the mother to first recognize and interpret the infant's cues and signs (Meins 2013). This capacity is thought to promote secure attachment (Meins et al. 2012) and mothers' ability to regulate their child's emotions (Fonagy et al. 2002).

A mother's ability to understand her infant's cues and be attuned to hunger and satiety signs is considered important for facilitating healthy feeding dynamics (e.g., Chatoor 2002). The link between MM and feeding was examined by Farrow and Blissett (2014), who reported that mothers who tended to ascribe more mental-states to their 6-months-old infants when asked to describe them (i.e., had higher representational MM), were more sensitive and had more positive feeding interactions with their infants at 12 months. Relatedly, previous studies have linked low maternal sensitivity with feeding problems and negative feeding interactions (Atzaba-Poria et al. 2010), providing additional indirect support for the role of MM in healthy feeding interactions. Moreover, in a longitudinal study following low-risk preterm infants, mothers' adaptation to babies' pace and signals during feeding following birth predicted fewer eating difficulties at 12 months (Silberstein et al. 2009a). Thus, mothers' ability to understand their infant's cues is of importance for later feeding behaviors, especially when feeding preterm infants.

Mothers with psychological vulnerability may have more difficulties in recognizing their babies' feeding signals, especially when infants may have unclear signals and irregular sleep and feeding rhythms (Ammaniti et al. 2010), as in the case of prematurity. This, in turn, may increase dyadic conflict

and negative affectivity in mealtimes. That is, maternal emotional distress may mitigate mothers' MM, which could manifest in dysfunctional mealtime dynamics.

Studies examining the associations between maternal emotional distress and MM during mother-infant interactions, mostly focusing on depression, indicated mixed patterns of results: While negative associations between depression and MM were reported in some studies (Bigelow et al. 2018; Pawlby et al. 2010), lack of associations were reported in others (Meins et al. 2011). Bigelow et al. (2018) reported that higher maternal depression symptoms following birth, but not concurrent depression, predicted less appropriate references to infants' mental states during play interactions when infants were 4 months old. They noted that studies in which depression and MM were uncorrelated mostly examined concurrent links after the age of 6 months, and that emotional distress tended to decrease as infants grew older. This has led to the proposal that early emotional distress in proximity to birth constitutes a risk factor for lowered MM in later stages of the mother-infant relationship (Bigelow et al. 2018). Thus, it is expected that *early* maternal emotional distress following premature birth, when the mother-infant relationship begins to form, would be associated with later mealtime dynamics through MM.

The Present Study

The aim of the present study was to uncover mechanisms by which preterm birth may be related to maladaptive mother-infant mealtime dynamics at 12-months, focusing on maternal cognition. Families having low-medical-risk preterm infants or full-term infants were followed from birth through ages 6- and 12-months (corrected age in the preterm group). We measured mothers' depression and anxiety symptoms (emotional distress) shortly after birth, cognitions related to the child's growth and development (perception of child vulnerability and concerns about child's eating) and maternal cognitions related to the child's signals (MM) during mother-infant interaction at 6-months, and mealtime dynamics at 12-months. A multiple-mediation model (Hayes 2018) testing the following hypotheses was examined (Fig. 1):

- Hypothesis 1: Premature birth would be linked with more dysfunctional mother-infant mealtime dynamics.
- Hypothesis 2: Maternal emotional distress at birth would mediate the association between premature birth and mealtime dynamics at the age of 12 months, through two pathways:

- Hypothesis 2a: Perception of child vulnerability and concern about child's eating would partly-mediate the link between emotional distress and mealtime dynamics. Specifically, mothers of preterm infants will experience higher emotional distress; this, in turn, will predict higher perception of child vulnerability, which will predict higher concern about child's eating, leading to poorer quality of mealtime interactions.
- Hypothesis 2b: Maternal MM at 6-months would partly-mediate the link between maternal emotional distress and mealtime dynamics. Specifically, mothers of preterm infants would experience higher emotional distress; this, in turn, will be linked to lower MM, which would subsequently predict more negative mealtime interactions.

Method

Participants

The sample included 134 families with infants born full-term ($n = 64$) and preterm ($n = 70$), who participated in the longitudinal preterm early development study (e.g., Gueron-Sela et al. 2015). Families were approached in proximity to birth, either at the maternity ward (full-term group; 1.39 days after birth on average, $SD = 1.03$) or at the NICU (preterm group; 12.03 days after birth on average, $SD = 12.82$) at Soroka Medical Center, the largest medical center in the southern region of Israel. Two-parent Hebrew-speaking families after singleton birth were asked to participate in the study; 70% agreed and signed written informed consent forms. The main reasons for refusal to participate were time constraints and reluctance to be filmed. Families were then visited at home when infants were 6 months ($M = 5.73$, $SD = 0.44$ in the preterm group, $M = 6.11$, $SD = 0.48$ in the full-term group) and 12 months old ($M = 11.84$, $SD = 0.64$ in the preterm group, $M = 11.78$, $SD = 0.58$ in the full-term group). Age was corrected for prematurity in the preterm group. Details on attrition are reported elsewhere (Gueron-Sela et al. 2015). Originally, 148 families had participated in the study at the age of 12 months, but 14 were excluded from the present analyses due to the following reasons: uncodable interactions due to technical reasons (12 families; e.g., infant's face was out of the frame; coder was unable to hear mother's speech), missing data in key variables (one family), and child diagnosed with cerebral palsy (one family).

Infants in the preterm group (60% boys) were born between 28 to 34 weeks of gestation, with birth weight above 1000 g and low medical risk, as assessed based on infants' medical records using the Nursery Neurobiological Risk Score (NBRS; Brazy et al. 1991). The NBRS included seven items, assessing seven neonatal conditions (infection, blood pH, seizures, intraventricular hemorrhage, assisted ventilation, periventricular variation, and hypoglycemia), each of which rated on a scale from "0" (none) to "4" (severe).

Summed (total) NBRS scores of "6" or above indicate risk for abnormal outcomes; in the preterm group, summed NBRS scores ranged between "0" and "4" ($M = 0.66$, $SD = 1.00$), indicating low neonatal medical risk. All full-term infants (> 37 weeks of gestation; 44% boys) scored "0" on the NBRS.

Demographic information regarding mothers and infants are reported in Tables 1 and 2, respectively. Mothers in the two groups did not differ in age, $t(132) = -1.20$, $p = .233$, education, $U = 1903.5$, $p = .092$, or occupation, $U = 2059.0$, $p = .412$. Following birth, preterm infants were hospitalized for longer periods, $t(69.41) = -9.63$, $p < .001$, and had lower Apgar scores than their full-term counterparts, $t(68) = 4.65$, $p < .001$. Most newborns had up to two siblings, and groups did not differ with respect to birth order, $t(132) = -0.35$, $p = .727$. As would be expected, preterm infants had lower birth weight compared to full-term infants, $t(129.55) = 19.75$, $p < .001$.

Infants' weight and length at 6 and 12 months of age were recorded from parent-held child health records. Preterm infants weighted significantly less than full-term infants at 6 months, $t(123) = 3.42$, $p = .001$, and at 12 months of ages, $t(119) = 2.37$, $p = .019$. Weight differences did not interact with gender ($F_s < 1$). Infants' weight at ages 6- and 12- months were strongly correlated ($r = .75$, $p < .001$). In addition, standardized weight-for-length scores were calculated based on the World Health Organization's standards by gender (World Health Organization 2006). Groups did not differ in standardized weight-for-length scores at 6 and 12 months, $t(113) = 0.15$, $p = .880$, and $t(109) = 0.91$, $p = .366$, respectively. These comparisons indicate that at the corrected-ages of 6- and 12-months, as a group, preterm infants had normal weight-for-length ratios, but still weighted less than their full-term counterparts. Therefore, infants' raw weight measurements were entered as covariates to all regression analyses.

Mothers were also asked to report on whether they breastfed their infants at the age of 6 months, and on the duration of breastfeeding by the age of 12 months. Most of the mothers in the sample reported that they had breastfed their infant at some point (79.1%), and mothers breastfed their infants until the age of 4.49 months on average (SD = 4.42). A Chi-Square test indicated a marginally-significant difference between groups in rates of breastfeeding, $\chi^2(1) = 3.46$, $p = .063$, with higher rates of breastfeeding in the full-term group (85.94%) compared to the preterm group (72.86%). Therefore, we control for this variable in the main regression analyses. Groups did not differ significantly with respect to duration of breastfeeding (age in which mothers stopped breastfeeding), $t(130.76) = 1.40$, $p = .165$, and most infants were no longer breastfed by 12 months of age (85.2% of the total sample, 82% of the full-term and 88.1% of the preterm group).

Procedure

Families were invited to participate in the study after the Helsinki Review Board at Soroka University Medical Center approved the study's procedures. Measures were collected at three time-points. First, mothers completed questionnaires regarding their emotional distress in proximity to birth, at the maternity ward (full-term group), or at the NICU (preterm group). Next, two home visits at families' houses were conducted when infants were 6- and 12- months of age. At 6 months, mothers completed questionnaires regarding their perceptions of their infants' vulnerability, weight, and eating. In addition, mother-infant free-play interactions were videotaped for the assessment of maternal MM. At 12 months of age, home visits were scheduled to take place when the infant usually ate (typically at snack-time), and mother-infant feeding interactions were videotaped for assessment of

Table 1 Maternal Demographic Information

		Total Sample $N = 134$	Full-term Group $N = 64$	Preterm Group $N = 70$
Age (years)	Mean (SD)	31.67 (5.19)	31.11 (4.89)	32.18 (5.43)
Education	Under 12 years	7.5%	6.3%	8.6%
	Partial high-school diploma	7.5%	4.7%	10.0%
	Full high-school diploma	28.4%	25.0%	31.4%
	Academic education	56.7%	64.1%	50.0%
Occupation	Unemployed	19.4%	23.4%	15.7%
	Unskilled worker	2.2%	–	4.3%
	Sales and customer service	11.9%	7.8%	15.7%
	Clerical work	22.4%	23.4%	21.4%
	Management position	9.0%	6.3%	11.4%
	Professional worker/ Technician	20.1%	15.6%	24.3%
	Academic professional	14.9%	23.4%	7.1%

Note. Mothers' age is at birth

Table 2 Means and Standard Deviations of Infant Demographic Variables

		Total Sample $N = 134$	Full-term Group $N = 64$	Preterm Group $N = 70$
Birth order	M (SD)	2.45 (1.31)	2.41 (1.26)	2.49 (1.36)
Gestational age (weeks)	M (SD)	35.66 (3.94)	39.44 (1.21)	32.21 (1.8)
Days of hospitalization	M (SD)	12.06 (13.4)	3.08 (1.37)	19.74 (14.29)
Apgar score	M (SD)	9.67 (0.86)	10 (0.00)	9.38 (1.11)
Birth weight (g)	M (SD)	2562 (888)	3356 (405)	1827 (486)
Weight at 6-months (kg)	M (SD)	7.33 (0.95)	7.62 (0.92)	7.07 (0.90)
Weight-for-length at 6-months (z)	M (SD)	−0.14 (0.99)	−0.12 (1.08)	−0.15 (0.90)
Weight at 12- months (kg)	M (SD)	9.40 (1.04)	9.63 (0.94)	9.18 (1.08)
Weight-for-length at 12-months (z)	M (SD)	0.16 (1.16)	0.25 (1.22)	0.06 (1.10)

mealtime dynamics. Maternal MM and mealtime dynamics were coded by different coders.

Measures

Maternal Emotional Distress (Birth) Mothers' emotional distress was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977) and the state anxiety scale from the State-Trait Anxiety Inventory (STAI-S; Spielberger et al. 1970). The CES-D includes 20 items assessing depression symptoms ($\alpha = .87$). Mothers were asked to indicate the frequency in which they had experienced each symptom in the past week, on a scale of "0" (never) to "3" (most or all of the time). The STAI-S was used to measure current anxiety symptoms ($\alpha = .94$). For each of the 20 items, mothers were asked to indicate how they felt at the time of assessment, on a scale ranging between "1" (not at all) to "4" (very much). Depression and anxiety scores were strongly correlated ($r = .82$, $p < .001$), and therefore a composite 'emotional distress' score was created by averaging each mother's standardized scores on the two measures. Higher scores indicated higher levels of emotional distress.

Maternal Perception of Child Vulnerability (6 Months) Mothers' perception of their infants' health and physical vulnerability was measured using the Child Vulnerability Scale (Perrin et al. 1989). Mothers reported on the extent to which 15 items reflected their child (e.g., "When there is something going around, my child usually catches it"), on a scale ranging between "1" (definitely not true) and "5" (definitely true). To better distinguish between perceptions of vulnerability in general and specific perceptions regarding feeding, one item concerning eating behaviors ("My child usually has a healthy appetite") was removed from analyses. Higher scores indicated a perception of the infant as more vulnerable ($\alpha = .76$).

Maternal Concern about Child's Eating (6 Months) For the assessment of mothers' concerns regarding infants' eating behaviors, mothers completed the 'pressure to eat' subscale from the Child Feeding Questionnaire (Birch et al. 2001; $\alpha = .78$) and the 'concern about infant undereating or becoming underweight' subscale from the Infant Feeding Questionnaire (Baughcum et al. 2001; $\alpha = .68$). Mothers rated items on both scales on a 5-point scale between "1" (disagree a lot) and "5" (agree a lot). The two subscales were moderately-to-strongly correlated ($r = .58$, $p < .001$), and thus a composite score was created by averaging standardized scores on the two subscales. Higher scores indicated higher concern about the child's eating.

Maternal MM (6 Months) Mothers were given a box of age-appropriate toys and were instructed to play with their infants as they normally would. Interactions were videotaped, and later coded by three trained coders using the Interactional MM Coding System (Meins and Fernyhough 2010). Mothers' speech during the interaction was transcribed, and mind-related comments were identified from the transcripts. Mind-related comments were either comments in which mothers used mental-state language regarding their infant's mind (i.e., referred to their infant's internal states, e.g., "want," "angry," etc.), or comments in which they talked on behalf of their infant. Next, coders classified each mind-related comment as either "appropriate," (i.e., as reflecting a plausible interpretation of the infant's mental state), or "nonattuned," (i.e., comments that did not seem to match the infant's current mental state). MM scores were calculated as the proportion of appropriate mind-related comments out of the total number of utterances each mother made during the interaction. Ten percent of the interactions were coded by all three coders. Intraclass correlation coefficients were .98 for identification of mind-related comments, and .97 for the number of appropriate mind-related comments.

Mother-Infant Mealtime Dynamics (12 Months) Mothers were asked to feed their infant "as the child normally eats," without the presence of other family members. Meals lasted 11.85 min on average (SD = 5.76 min), and included either a snack (e.g., yogurt, salad) or a light dinner (e.g., pasta, scrambled eggs,

soup). Mealtime interactions were videotaped, and later coded by two trained coders using the Mother-Infant/Toddler Feeding scale (Chatoor et al. 1998). The coding scheme included five subscales: Dyadic reciprocity, dyadic conflict, talks and distractions, struggle for control, and maternal non-contingency. Each subscale was comprised of several items referring to infant and mother behaviors, rated on a scale between "0" (none) and "3" (very much); ratings of infant and mother items were summed together to create subscale scores. The talks and distractions and the maternal non-contingency subscales had low internal consistency ($\alpha_s = .45$ and .33, respectively), and therefore were omitted from further analyses. The dyadic reciprocity subscale included 11 mother and five infant items regarding affective engagement, synchrony, and positive affect (e.g., "mother waits for infant to initiate interactions", "infant smiles at mother"). Higher scores indicated more positive reciprocal mealtime interactions. The dyadic conflict subscale included four mother and eight infant items regarding observed conflict over feeding (e.g., "mother makes negative statements about infant's food intake or preferences," "infant refuses to open mouth"), with higher scores indicating more conflictual dynamics. The struggle for control included four mother and three infant items reflecting mother-infant competition over who controlled the feeding interaction (e.g., "mother controls feeding by overriding infant's cues", "infant spits food out"), and higher scores indicated higher levels of struggles for control.

The dyadic conflict and struggle for control subscales had a moderate-to-strong correlation ($r = .60$, $p < .001$), whereas the dyadic reciprocity subscale had weak-to-moderate correlations with the other two subscales (dyadic conflict: $r = -.27$, $p = .002$; struggle for control: $r = -.12$ $p = .152$). Therefore, items from the dyadic conflict and struggle for control subscales were aggregated to create a single 'mealtime dyadic conflict and control' subscale (Aviram et al. 2015), and mealtime dyadic reciprocity was considered separately ($\alpha = .80$). Fifteen percent of the videotaped interactions were coded by the two coders, and intra-class correlation coefficients were .88 for mealtime dyadic reciprocity and .79 for mealtime dyadic conflict and control.

Analytic Plan

The analytic plan included preliminary analyses and hypotheses testing. The preliminary analyses included examination of possible group differences in study variables (focusing on the mediators in the conceptual model, depicted in Fig. 1). In addition, we examined whether the study variables were linked with additional demographic variables that could be related to feeding: infant gender, birth order, weight at 6- and 12-months, and breastfeeding.

Next, the main analyses were conducted. Hypothesis 1 was tested by comparing mean levels of mealtime dynamics between the preterm and full-term groups using t-tests. Hypothesis 2 was tested by examining multiple-mediator models, using the PROCESS tool for SPSS (v3.2; Hayes 2018). Two models were tested: one predicting the conflict and struggles for control dimension of mealtime dynamics, and the other predicting the dyadic reciprocity dimension. Specifically, we tested a customized model enabling a combination of sequential and parallel mediators (where the path from emotional distress through MM is parallel to the sequential path through perception of child vulnerability and concern about child's eating). Indirect effects were tested using bootstrapped confidence intervals (CI) with 10,000 resamples at $\alpha = .05$. Demographic variables that were related to the study variables were entered as covariates to the main analyses. Models were also tested with neonatal risk covariates (NBRS or Apgar), which did not change direct and indirect effects, and thus are not reported.

When null results emerged, Bayes Factors (BF_{01}) were computed to test whether the data could provide support for the null hypothesis. BF_{01} indicates the ratio between the likelihood of the data given the null hypothesis and its likelihood given the alternative hypothesis; values ranging between 1 and 3 imply anecdotal evidence for the null hypothesis, and larger values indicate substantial evidence in favor of the null hypothesis (Jeffreys, 1961; Wetzels et al., 2011). That is BF_{01} values that were larger than 3 were interpreted as supporting the absence of an effect.

Results

Preliminary Analyses

Descriptive statistics, including the study variables' means and standard deviations (SDs), as well as bivariate correlations between them, are presented in Table 3. As expected, mothers of preterm infants exhibited higher levels of emotional distress following birth than mothers in the full-term group, $t(119.2) = -5.32$, $p < .001$, $d = -0.91$. At 6-months, mothers in the preterm group reported higher perception of child vulnerability, $t(132) = -2.32$, $p = .022$, $d = -0.40$, and concern about child's eating, $t(132) = -5.32$, $p = .008$, $d = -0.47$, than mothers of full-term infants. Groups did not differ in maternal MM at 6-months, $t(132) = -0.72$, $p = .473$, $d = -0.12$, $BF_{01} = 4.27$.

Associations between Study Variables and Demographic Variables Dyads including female and male infants did not significantly differ with respect to any of the study variables ($p_s > .169$), and birth order was not significantly related to any of the study variables ($-.04 \le r_s \le .12$, $p_s \ge .185$). Mothers of infants who weighed less were more concerned about their infants' eating ($r = -.31$, $p < .001$, and $r = -.29$, $p = .001$, at 6- and 12- months, respectively). Duration of breastfeeding

Table 3 Means, Standard Deviation, and Bivariate Correlations Between Study Variables

	1.	2.	3.	4.	5.	6.	Mean (SD) Total Sample $N = 134$	Full-term Group $N = 64$	Preterm Group $N = 70$
1. Maternal emotional distress (birth)	–	.34***	.31***	.02	.04	.10	0.00 (0.95)	−0.41 (0.66)	0.38 (1.03)***
2. Maternal perception of child vulnerability (6 m)		–	.31***	−.03	−.01	.24**	28.09 (7.77)	26.48 (6.96)	29.55 (8.22)*
3. Maternal concern about child's eating (6 m)			–	−.08	−.22*	.05	0.00 (0.89)	−0.21 (0.84)	0.19 (0.90)**
4. Maternal MM (6 m)				–	.29***	−.18*	0.09 (0.07)	0.08 (0.07)	0.09 (0.07)
5. Mealtime dyadic reciprocity (12 m)					–	−.25**	30.39 (5.43)	31.08 (5.90)	29.76 (4.92)
6. Mealtime dyadic conflict and control (12 m)						–	8.84 (5.49)	8.97 (5.68)	8.73 (5.35)

Note. MM = mind-mindedness

*$p < .05$. **$p < .01$. ***$p \leq .001$

(i.e., age in which mothers stopped breastfeeding) was related to MM at 6 months ($r = .29$, $p = .001$) and dyadic reciprocity at 12 months ($r = .23$, $p = .009$). Thus, raw weight measures at 6- and 12-months, whether mothers breasted or not (dichotomously-coded, 0 = no breastfeeding), and duration of breastfeeding were added as covariates to regression analyses. Six mothers did not report on breastfeeding duration, and we were unable to obtain official weight records of nine infants (four preterm) at 6 months and 15 (seven preterm) at 12 months. Missing values were imputed using the "Hmisc" R package (Harell 2019; version 4.2–0).

Hypothesis 1: Prematurity and Mealtime Dynamics

Contrary to Hypothesis 1, preterm and full-term dyads did not differ in mother-infant mealtime conflict and struggle for control, $t(132) = 0.25$, $p = .801$, $d = 0.04$, $BF_{01} = 5.25$, nor in dyadic reciprocity, $t(132) = 1.41$, $p = .161$, $d = 0.244$, $BF_{01} = 2.19$ (see Table 3), indicating that there was no direct link between preterm birth and mealtime dynamics at the age of 12 months.

Hypothesis 2: Multiple-Mediator Analysis

Next, the full conceptual model was examined for each mealtime dynamics dimension. Analyses were conducted with infants' raw weight measurements at 6- and 12-months and breastfeeding variables as covariates, and therefore effects represent the unique contribution of study variables over and above these covariates. Full regression analyses are presented in Table 4, and the resulting models predicting mealtime dynamics are depicted in Fig. 2.[1]

Associations between Mediators Prematurity predicted higher maternal emotional distress following birth ($\beta = .39$, $p < .001$), which predicted maternal perception of child vulnerability at 6-months ($\beta = .29$, $p = .002$). The difference between mothers of preterm and full-term infants' perception of child vulnerability was mediated by emotional distress following birth (standardized indirect effect = .11, 95%CI [.04, .21]). Perception of child vulnerability predicted concern about child's eating ($\beta = .24$, $p = .005$), and this link mediated the association between maternal emotional distress at birth and concern about child's eating at 6-months (standardized indirect effect = .07, 95%CI [.01, .16]), and the direct effect approached significance ($\beta = .17$, $p = .059$). Emotional distress and perception of child vulnerability also mediated the association between prematurity and concern about child's eating (indirect effect through emotional distress = .07, 95%CI [.001, .15]; indirect effect through emotional distress and perception of child vulnerability = .03, 95%CI [.003, .07], standardized). MM at 6-months was not associated with any other mediator. In specific, contrary to our hypothesis, MM was not associated with mothers' emotional distress following birth ($BF_{01} = 8.93$).

Pathways Predicting Mealtime Dyadic Conflict and Control Mealtime dyadic conflict and control was predicted by maternal perception of child vulnerability ($\beta = .26$, $p = .006$) at 6-months. The indirect path from prematurity to mealtime dyadic conflict and control at 12-months through emotional distress at birth and perception of child vulnerability at 6-months was significant (see Table 5), providing partial support for Hypothesis 2b. It should be added that Bayesian analysis indicated substantial support for a lack of a zero-order

[1] We also examined these models with mean emotional distress at 6 and 12 months as a serial mediator between emotional distress at birth and maternal cognitions variables at 6 months. This model revealed the same pathways reported in the main text, with the inclusion of emotional distress at 6 and 12 months as an additional mediator. Because this finding does not alter the theoretical meaning of these pathways, we report the more parsimonious model in the main text.

Table 4 *Hierarchical Regression Analyses for Testing the Multiple-Mediation Models*

	Mediators				*Mealtime Dynamics (12 m)*	
	Emotional Distress (birth) β	Maternal MM (6 m) β	Perception of Child Vulnerability (6 m) β	Concern about Child's Eating (6 m) β	Dyadic Conflict and Control β	Dyadic Reciprocity β
Control variables						
Weight 6 m	−.09	.14	−.18	−.07	.20	−.05
Weight 12 m	.04	−.16	.17	−.21	−.10	−.02
Breastfeeding (y/n)	−.15	.02	−.10	−.02	−.17	−.03
Breastfeeding duration	.11	.28**	.05	.01	.12	.17
Study variables						
Prematurity	**.39*** **	.11	.05	.05	−.05	−.15
Emotional distress		−.01	**.29****	.17	.08	.14
Perception of child vulnerability				**.24****	**.26****	.05
Concern about child's eating					−.03	**−.23***
Maternal MM					−.15	**.24****
R^2	.19	.10	.14	.22	.13	.18
F	6.02***	2.44*	3.40**	5.10***	1.99*	3.01**

Note. MM = mind-mindedness. DV = dependent variable. * $p < .05$. ** $p < .01$. *** $p < .001$

correlation between concern about child's eating and dyadic conflict and control ($BF_{01} = 7.90$). Although there was a significant zero-order correlation between dyadic conflict and control and MM (Table 3), maternal MM did not significantly predict mealtime dyadic conflict and control in the main model (specifically, when breastfeeding duration was added as a covariate).

Pathways Predicting Mealtime Dyadic Reciprocity Mealtime dyadic reciprocity was predicted by maternal concern about child's eating ($\beta = -.23$, $p = .013$) and by MM ($\beta = .24$, $p = .006$) at 6-months. Supporting Hypothesis 2b, the indirect path from prematurity to mealtime dyadic reciprocity at 12-months through emotional distress following birth, perception of child vulnerability, and concern about child's eating was revealed (Table 5). Of note, a Bayesian analysis indicated support for a lack of a correlation between perception of child vulnerability and dyadic reciprocity ($BF_{01} = 7.90$), such that perception of child vulnerability contributed to dyadic reciprocity only through its contribution to variability in concern about child's eating.

Discussion

In the present study, we sought to examine the roles of early maternal cognitions in the link between maternal distress following the birth of a preterm infant and feeding problems (Cerro et

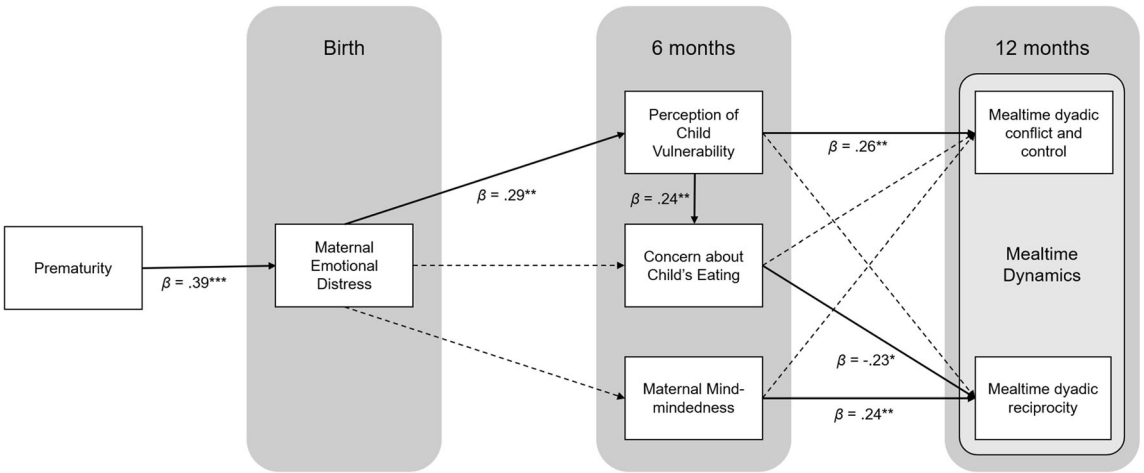

Fig. 2 The final models predicting mealtime dynamics at age 12-months. Only significant coefficients are presented in the figure ($p_s < .05$); dashed lines represent nonsignificant paths. *Note*. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 5 *Confidence Intervals for Standardized Indirect Effects in the Multiple Mediation Models*

Path	DV: Mealtime Dyadic Conflict and Control			DV: Mealtime Dyadic Reciprocity		
	Effect	*95%LL*	*95%UL*	*Effect*	*95%LL*	*95%UL*
Prematurity ➔ Emotional distress ➔ DV	.03	−.03	.11	.05	−.01	.13
Prematurity ➔ Maternal MM ➔ DV	−.02	−.07	.01	.03	−.02	.08
Prematurity ➔ Perception of child vulnerability ➔ DV	.01	−.03	.08	.002	−.02	.03
Prematurity ➔ Concern about child's eating ➔ DV	−.001	−.03	.02	−.01	−.06	.03
Prematurity ➔ Emotional distress ➔ Maternal MM ➔ DV	.001	−.02	.02	−.001	−.02	.02
Prematurity ➔ Emotional distress ➔ Perception of child vulnerability ➔ DV	**.03**	**.004**	**.07**	.01	−.02	.03
Prematurity ➔ Emotional distress ➔ Concern about child's eating ➔ DV	−.002	−.02	.02	−.02	−.04	.0001
Prematurity ➔ Perception of child vulnerability ➔ Concern about child's eating ➔ DV	−.0003	−.01	.0004	−.003	−.02	0.01
Prematurity ➔ Emotional distress ➔ Perception of child vulnerability ➔ Concern about child's eating ➔ DV	−.001	−.01	.01	**−.01**	**−.02**	**−.0004**

Note. MM = mind-mindedness. DV = dependent variable. LL = lower limit. UL = upper limit

al. 2002; Hoogewerf et al. 2017; Rommel et al. 2003). Although in the current low-risk sample prematurity was not directly linked with mother-infant mealtime dynamics at 12-months, results revealed a cascade of processes linking premature birth and later dysfunctional mealtime dynamics, namely higher conflict and struggle for control and less reciprocity during feeding. Specifically, pathways through high levels of maternal depression and anxiety following birth, via the perception of the child as more vulnerable and higher levels of concerns regarding the child's eating behaviors at 6-months, were revealed. Maternal MM at 6-months was related to more reciprocal and less conflictual dynamics but did not play a mediating role.

Mealtime Dynamics among Low-Risk Preterm Infants

In this study, we focused on mother-infant maladaptive mealtime dynamics as indicators of unsuccessful eating practices in children's day-to-day feeding, and this measure did not reveal a direct link between prematurity and mealtime dynamics at the age of 12-months. In general, this finding is at odds with previous studies reporting increased feeding problems among low-risk preterm infants (e.g., Cerro et al. 2002; DeMauro et al. 2011; Hawdon et al. 2000). Some of the previous studies of low-risk preterm samples were based on parental reports (e.g., Cerro et al. 2002; DeMauro et al. 2011), and in line with their findings, in the present study mothers of preterm infants reported higher concerns regarding their child's eating compared to mothers of full-term infants. Furthermore, preterm infants weighed less than their full-term counterparts at both 6- and 12-months of age (corrected for prematurity). That is, prematurity was directly linked with concerns about infants' eating and infants' actual weight but was only indirectly linked with mealtime dynamics through mothers' cognitions about health and eating.

Studies focusing on variations within low-risk preterm samples suggest that difficulties in attainment of full oral feeding in the NICU and/or early motor development may contribute to the development of feeding problems among this group of infants (Bertoncelli et al. 2012; Ross and Browne 2013; Silberstein et al. 2009a; Silberstein et al. 2009b). One possible explanation for the lack of difference in mealtime dynamics in the present sample is that as a group, the sample had low complications in these developmental aspects. To further illuminate sources of variance in feeding behaviors, future studies should assess multiple aspects of feeding problems and attainment of early milestones among healthy preterm and full-term infants.

Perception of Child Vulnerability, Concern about Child Eating and Mealtime Dynamics

Past research has revealed that mothers of preterm infants tend to perceive their infants as more vulnerable than mothers of full-term infants, and this association has been attributed to heightened emotional distress (Cerro et al. 2002; Horwitz et al. 2016; Tallandini et al. 2015). The results of the present study corroborate past findings, revealing that the link between prematurity and vulnerability perceptions was mediated

by maternal emotional distress *at birth*, supporting the notion that maternal emotional distress is one of the determinants of vulnerability perception (Gordo et al. 2018; Thomasgard and Metz 1995; Tluczek et al. 2011).

Perception of vulnerability and emotional distress were also associated with specific concerns about the child's eating. In line with previous studies (e.g., Cerro et al. 2002), mothers of preterm infants were more concerned about their infants being underweight or not eating enough (even after controlling for objective weight measures). Second, the link between prematurity and concerns about child's eating was mediated by emotional distress at birth, and (partly) by the association between emotional distress and perceptions of vulnerability.

Both perceptions of child vulnerability and concern about child's eating at 6 months were related to mealtime dynamics at 12 months. In general, this pattern of results provides empirical support for Berlin and colleagues' (2009) biopsychosocial model, according to which one of the ways in which developmental problems can lead to feeding problems is through an indirect link via parental concerns. However, when examining specific aspects of feeding dynamics, slightly different pathways to positive (dyadic reciprocity) and negative (conflict and control) aspects of these feeding interactions emerged. As both lowered reciprocity and heightened conflict during mother-child mealtimes were previously identified as markers of feeding disorders (Ammaniti et al. 2010; Feldman et al. 2004; Chatoor et al. 1998), it is of importance to uncover the processes underscoring them to better understand the etiology of dysfunctional feeding interactions.

Dyadic Reciprocity Dyadic reciprocity refers to the extent to which the mother and the infant engage in a synchronous positive feeding interaction (Chatoor et al. 1998). In reciprocal dyads, mothers show signs of pleasure, position their infants to enable eye contact, talk to their infants, flatter their feeding, and follow their infants' pace. In return, infants show signs of positive affect, create eye contact, and seem engaged in feeding. Low reciprocity manifests in detachment and lack of relatedness between the mother and the infant (Chatoor et al. 1998).

In the present study, the full pathway from prematurity, through emotional distress, perception of child vulnerability and concern about eating, predicted lower levels of mother-infant dyadic reciprocity. This pathway suggests that maternal worries about vulnerability, eating and weight appear to obstruct positive, reciprocal interactions during feeding. A possible interpretation for this cascade of processes is that concerns about eating interfere with mothers' ability to be emotionally present in the feeding interaction. According to Grusec and Davidov (2010), reciprocity is present in non-stressful contexts of interactions, where the parent and the child can interact as equals. Anxiety and worries about the child's development and health, associated with prematurity, may lead to "internal noise" and preoccupation with disturbing thoughts. For example, one thought ("internal voice") mothers may have, commonly said at NICUs, is that the child must eat to gain weight and develop. As suggested by Gueron-Sela et al. (2011), preoccupation with feeding-related worries may preclude more concerned and anxious mothers from engaging in positive interaction in the specific context of these concerns– feeding. Thus, eating-related concerns may render the mother "goal-oriented" during feeding, targeted at her mission to increase food intake, without paying much attention to the infant's cues. Such mothers may neglect the fact that mealtimes are bonding opportunities as well, and these interactions would be characterized by the lack of positive affectivity and a sense that the mother and the infant are not connecting. Presumably, this lack of relatedness may make feeding less successful and lead to lower child compliance (Chatoor et al. 1997; Grusec and Davidov 2010), and further strengthen and validate the mother's concerns (Chatoor et al. 1997), creating a cycle of continuously negative and out-of-sync transactions during feeding.

Dyadic Conflict and Control Mother-infant dyadic conflict and control refers to the extent to which the mother and the infant struggle over who sets the pace of feeding (Chatoor et al. 1998). In conflictual dyads, both parties show signs of distress– the infant refuses food and appears distressed, and the mother makes negative comments towards the infant and his or her eating, forces food into the infant's mouth and appears to ignore feeding cues. This is in contrast to nonconflictual dynamics, wherein the infant sets the pace of food intake, and the mother supports the infant's autonomy by assisting feeding in a developmentally-appropriate manner.

Mothers' tendency to perceive their infant as more vulnerable was associated with more conflictual feeding dynamics. When examining the pathway from premature birth to dyadic conflict and control, results indicated that mothers of preterm newborns tended to exhibit more emotional distress, which, in turn, was related to a tendency to perceive the infant as more vulnerable. Unlike the pathway to dyadic reciprocity, however, specific concerns about eating were not related to conflictual mother-infant mealtime dynamics. This suggests that struggles over who controls the feeding are related to a more global tendency to see the child as weak and lagging in their development, rather than to specific concerns about food intake and eating. Past research suggests that mothers who perceive their infants as more vulnerable provide less autonomy support, and tend to be overprotective or impatient (Mullins et al. 2007; Porter et al. 2009; Thomasgard and Metz 1995). Thus, a possible interpretation of this finding is that worries about the child's health elicit maternal intrusive behavior during mealtimes, perhaps as a result of the mother wishing that her child would be healthier, stronger and develop better; yet, this may come at the cost of not providing the infant with

opportunities to be autonomous and lead the nature and pace of the feeding, eliciting control battles over food consumption.

Maternal MM, Emotional Distress, and Mealtime Dynamics

Maternal MM and Mealtime-Dynamics It has been argued that mothers' abilities to tune in to their infants' mental states and understand their satiety and hunger signs are of importance for aiding positive and synchronous feeding interactions (Chatoor 2002). In support of this notion, we found that mothers' MM, as evident in real-time mother-infant interactions at the age of 6 months, was associated with more positive feeding interactions at 12 months of age. Past studies have focused mainly on maternal sensitivity, which refers to the behavioral aspect of responding to infants' cues, in feeding interactions (e.g., Atzaba-Poria et al. 2010), but little attention has been given to MM, as the internal process of understanding the child's cues. Farrow and Blisset (2014) reported more positive feeding interactions among mothers with high representational MM, as evident in descriptions of the child. The present study adds to previous literature by showing that mothers' interactional MM, that is, their accuracy in spontaneously interpreting their infant's mental states during play, was associated with better functioning of mother-infant feeding interactions.

Maternal MM was associated with both higher mother-infant dyadic reciprocity and lower conflict and control, although the latter association was weaker and was nonsignificant within the full mediation model. Thus, a mother's ability to represent her infant's mental states and appropriately interpret the infant's signs appears to facilitate engagement in more harmonious, positive feeding interactions. It is likely that mothers who better recognize their infant's cues during feeding consequently adjust their behavior to support feeding, engage the child in feeding, and balance between consumption of food and the child's involvement and autonomy. Interestingly, MM at 6-months as measured during free-play interactions may bolster feeding as well. This result suggests that the maternal ability to understand and interpret her infant's cues has a domain-general and universal contribution to the mother-infant relationship, which manifests itself also in the feeding setting, but is not limited to it. This notion is corroborated by the wealth of evidence linking MM with various positive aspects of mother-child relationships, such as maternal sensitivity and mother-child attachment (Meins et al. 2012).

MM, Premature Birth, and Emotional Distress We hypothesized that some of the negative effects of prematurity on mother-infant feeding will be accounted for by a link between maternal emotional distress and MM. Our analyses did not support this hypothesis: prematurity did not compromise maternal MM per se (although it might mitigate other aspects of it, e.g., Yatziv et al. 2018). Relatedly, we also did not find an association between maternal emotional distress at birth and MM (and the absence of an effect was also supported by Bayesian inference). Previous studies regarding MM and emotional distress, usually focusing on depression symptoms, reported mixed results (Bigelow et al. 2018; Pawlby et al. 2010; Meins et al. 2011). Based on these mixed patterns, Bigelow et al. (2018) suggested that maternal depression in early stages of the mother-infant relationship, several weeks postpartum, may have longitudinal effects on subsequent MM. However, in the current study emotional distress (both depression and state anxiety) measured in proximity to birth did not predict later MM. Thus, the relation between mothers' depression and anxiety and their ability to represent their child's mind remains unclear. Future studies should further examine the time course of maternal emotional distress throughout the first year postpartum and its association with MM by collecting multiple measures of anxiety, depression, stress reactivity, and MM in shorter intervals.

Limitations and Future Directions

The findings of the present study should be considered in light of some limitations. First, the sample size of the present study did not enable the examination of multilevel models and specific paths within each group. Specifically, variables related to NICU experience and hospitalization (e.g., days of hospitalization, stress related to NICU admission) may have unique contributions to variability in maternal emotional distress within the preterm group; future studies should examine the roles of these aspects in the conceptual model outlined in Fig. 1 in a larger sample of families having preterm newborns. Second, maternal cognitions were only examined at the age of 6 months, and thus their stability over time was not addressed. Relatedly, a possible explanation for the lack of association between prematurity, emotional distress and MM is that preterm mothers' psychological vulnerabilities may interfere with mentalization in the specific context of mothers' concerns and worries, i.e., feeding, growth, and health. It is possible that mothers of preterm infants with elevated signs of emotional distress would show lower MM during feeding, but not during free-play. Future studies should further examine whether and how domain-specific and domain-general MM are differentially associated with mother-infant feeding and prematurity. Furthermore, in the present study, we focused on maternal perception and mealtime interaction aspects of early feeding but did not assess infants' actual feeding outcomes: weight gain, feeding behaviors (such as appetite) or eating patterns (including the number of daily meals, diet quality, or picky-eating). Although previous studies indicate relations between mealtime dynamics and feeding outcomes (Ammaniti et al. 2010; Aviram et al. 2015; Chatoor et al.

1998), the extent to which they are related in the current study could impact our understanding of whether the observed paths convey risk for abnormal outcomes. Future studies should incorporate these measures in examining links between maternal emotional distress and feeding-related cognitions across time, in order to examine the interplay between maternal attributes, mother-infant feeding interactions, and feeding outcomes across time, as variables that could have bidirectional relation. Relatedly, the present study only examined maternal emotional distress after birth and did not consider earlier symptoms during the prenatal period; future studies on the impact of maternal emotional distress on feeding outcomes should examine longitudinal trajectories starting from pregnancy. Finally, in the current study, we did not measure father-infant mealtime dynamics. Although mothers are usually the main caregivers in the first months of life (e.g., Karu and Tremblay 2018), fathers are also part of the feeding environment, and their involvement in child-rearing is important when facing child feeding problems (Atzaba-Poria et al. 2010); future studies should further examine how paternal attributes and involvement may interact with maternal attributes in contributing to feeding problems among preterm infants.

Clinical Implications

The results of the present study indicate two *ports of entry* in treating feeding problems: through maternal emotional distress, and through maternal cognitions regarding the infant. First, we found that early maternal emotional distress in proximity to birth constitutes a risk factor for mother-infant dysfunctional feeding interactions by the end of the first year of life, namely less reciprocal and more conflictual mealtime dynamics. These aspects of feeding interactions are characteristic of mealtime dynamics with children diagnosed with feeding disorders, such as infantile anorexia (e.g., Ammaniti et al. 2010; Feldman et al. 2004) and thus *early* preventive programs can target emotional distress following birth, as well as maternal perception of the child as vulnerable and concerns regarding her child's eating, especially among mothers of preterm infants. Importantly, the findings highlight the importance of (1) early diagnosis of maternal depression and anxiety after birth, and (2) assistance of the medical staff at NICUs and maternity wards in decreasing stress around birth and in the first mother-newborn feeding interactions. Further, it is important to identify mothers with increased concerns regarding their infant's vulnerability and eating in the medical system. Second, our results also demonstrated that mothers' ability to understand mental states can help facilitate more functional and healthier mother-infant mealtime dynamics. Thus, clinical programs for treatment of feeding relations may benefit from the incorporation of elements from mentalization-related protocols, such as the reflective parenting program (Slade 2007). *Early interventions* aimed at treating early risk factors and promoting mentalization could help prevent innumerable negative mealtime interactions before they are engraved in the relationship.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standard.

Informed Consent Informed consent was obtained from all individuals participants included in the study.

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