Published in final edited form as:
Early Hum Dev. 2013 September ; 89(9): 699–704. doi:10.1016/j.earlhumdev.2013.05.003.

Differential associations between maternal scaffolding and toddler emotion regulation in toddlers born preterm and full term

Sarah J. Erickson, PhD[a], **Susanne W. Duvall, PhD**[b], **Janell Fuller, MD**[c], **Ron Schrader, PhD**[d], **Peggy MacLean, PhD**[c], and **Jean Lowe, PhD**[c]

[a]University of New Mexico, Department of Psychology, Albuquerque, NM 87131

[b]Oregon Health & Science University, Division of Psychology, Institute on Development & Disability, Portland, Oregon 97239-3098

[c]University of New Mexico, Department of Pediatrics, Albuquerque, NM 87131

[d]University of New Mexico, Clinical and Translational Center, Albuquerque NM 87131

Abstract

Background—Parental "scaffolding" behavior has been associated with developmental outcomes in at-risk children.

Aims—Because there are limited empirical data regarding how scaffolding is associated with *emotion-based* developmental skills, the purpose of this study was to compare associations between maternal verbal scaffolding and toddler emotion regulation, including fewer displays of negative affect and increased contentment and enjoyment during play, in toddlers born preterm and full term.

Study Design—This study was a cross-sectional cohort design. Maternal and toddler behavior was assessed during 5 minutes of videotaped free play with standardized toys.

Subjects—131 toddlers (18-22 months) and their mothers were included (77 born preterm; 54 born full term).

Outcome Measures—Toddler emotion regulation, negative affect, and dyadic mutual enjoyment were coded from videotaped play.

Results—The association between maternal scaffolding and emotion regulation was different for dyads with a toddler born preterm versus full term, wherein the association was positive for toddlers born preterm and non-significant for toddlers born full term. Similarly, the association between maternal scaffolding and negative affect was different for the two groups: negative for toddlers born preterm and non-significant for toddlers born full term. Finally, the association between maternal scaffolding and mutual enjoyment was positive for toddlers born preterm and non-significant for toddlers born full term.

Corresponding Author: Jean Lowe, Ph.D., University of New Mexico, Department of Pediatrics, Division of Neonatology, MSC10 5590, 1 University of New Mexico, Albuquerque, NM 87131-0001, Tel 505-272-3946, Fax 505-272-6845, jrlowe@unm.edu.

Conflict of Interest

None of the authors had any conflict of interest to report related to this study.

Conclusions—Our findings highlight early differences in mother-child interactive style correlates of children born preterm compared to those born full term. Maternal scaffolding behavior may be uniquely associated with emotion regulation and a positive dyadic encounter for toddlers born preterm.

Keywords

Preterm; Maternal Scaffolding; Toddler Communication; Emotion Regulation; Affect; Mutual Enjoyment

1. Introduction

Children born preterm are at greater risk for developmental delays, including difficulties with cognitive function, self-regulation, attention, executive function, and emotion regulation [1-3]. Because outcomes are highly variable in this population, increasing our understanding of factors associated with developmental outcome variability among this population may be instrumental in elucidating risk and resilience factors as well as in developing interventions to optimize outcomes [4,5].

Given the range of potential developmental outcomes, intervention research for children born preterm has included the impact of parent behaviors on child development [6]. Parental scaffolding is one such behavior that has been shown to influence outcomes in at-risk children [7]. According to the sociocultural theory of development [8], scaffolding entails cognitive support processes that enable children to accomplish goals that otherwise exceed their ability. As parents model, support, and encourage the development of new skills through scaffolding, children gain autonomy and become better able to solve problems independently. Responsive parenting, which includes scaffolding, has been related to positive cognitive, social, language and reading outcomes in children born prematurely [6-8].

Verbal scaffolding, which helps children solve problems and understand conceptual links between objects and/or activities through verbal prompts provided by their parent, has been the focus of recent research highlighting the importance of parents' verbal input for children's learning [9]. In both preterm and full term populations, more sensitive parental support and higher levels of verbal scaffolding during early childhood have been shown to predict better language [7,10], nonverbal problem-solving [7], reading [10], cognitive [11], social development [11], and executive functioning skills [7] once children are in school. Despite the demonstrated link between maternal scaffolding in preterm and full term children's cognitive development [7, 11-13], limited empirical data are available regarding how scaffolding is associated with emotion based developmental skills. Emotion regulation, the ability to modulate one's emotional state and response to change and environmental context, is one emotion-based developmental skill conceptualized to be fundamental for learning [14]. Emotion regulation involves the coordinated and dynamic interplay between both negative and positive emotional states, which may promote effective coping [14]. Thus, the overarching construct of emotion regulation includes limited frequency, duration, and intensity of negative affect and greater enjoyment, contentment, and engagement in activities [14].

Because verbal scaffolding maintains a child's focused attention and provides contingent responding and rich language stimulation, it is conceptualized to support emotion regulation [15], as attention and engagement are hypothesized to be incompatible with negative affect, emotional distress and emotion dysregulation [16,17]. More broadly, supporting a child's focused attention with language and affective-emotional support is hypothesized to facilitate

the development of cognitive and social skills [9]. Engaging in appropriate and mutually regulatory exchanges with their parents may promote the development of self-regulation in full term infants [18] and has been shown to be related to lower negative affect in preterm children [19]. Among preschoolers born preterm, impairments in self-regulation were predicted by less sensitive parenting styles [20]. In this way, emotion regulation, including fewer displays of negative affect and increased contentment and enjoyment during play with parents, may be mediated in part by parent-child interactions that involve scaffolding.

The purpose of the current study was to examine and compare maternal verbal scaffolding correlates in toddlers born preterm and full term. Specifically, we investigated the associations between maternal verbal scaffolding and toddler emotion regulation, negative affect, and dyadic mutual enjoyment.

2. Methods

2.1. Subjects

The study included toddlers between the ages of 18 and 22 months and their mothers. Toddlers were assessed between 2005 and 2008. Toddlers born preterm were recruited from the developmental follow-up clinic for the University of New Mexico's Newborn Intensive Care Unit. The full term sample was recruited through the University of New Mexico's Pediatric Clinic. Seventy-seven toddlers born preterm (birth weights of less than 1250 grams and/or born at less than 32 weeks gestation) and fifty-four toddlers born full term participated. Age at testing was adjusted for gestational age for the preterm group. Toddlers were excluded from the study if they had been prenatally exposed to drugs, were visually/hearing impaired, had a known genetic abnormality, constituted a multiple birth, and/or did not reside with their biological families. Table 1 provides further demographic information.

2.2. Measures

2.2.1. The Bayley Scales of Infant and Toddler Development-Cognitive Score [21,22]—The Bayley Scales of Infant Development-II (BSID-II) Mental Developmental Index (MDI) [21] and the Bayley Scales of Infant and Toddler Development-III (BSID-III) Cognitive Score [22] were used to assess cognitive function. The BSID-III was used for children assessed after 2007 (37 participants). To have a comparable cognitive measure for both groups, we transformed the BSID-II MDI to a BSID-III Cognitive Score based on a conversion formula that has been detailed in a prior publication [23]. Thus, the BSID-III Cognitive Score was used as a measure of cognition for all participants. It has a mean of 100 and a standard deviation of 15.

2.2.2. Verbal Scaffolding Scale [24]—Child and mother dyads were videotaped for 10 minutes with a standard set of toys. The first five minutes (where both mother and child were visible and codable) of the videotaped mother-child interaction was used for coding purposes. Verbal scaffolding, using the Verbal Scaffolding Manual [24,25], was based on the content of the mothers' verbal communication to the child. Maternal statements constituted scaffolding statements if they were intended to help the child make associations or provided strategies to help the child solve a problem. Simple scaffolding included statements whereby the mother labeled her action or the child's action. Complex scaffolding included: statements that involve associating an object with a specific location; using 'like that' comparisons; describing objects (e.g., apples are red); defining the uniqueness, features, or function of an object; defining cause and effect emotions, senses, contrasts, or categories of objects; and linking nouns with nouns. The total simple and complex scaffolding scores were utilized as the (combined) scaffolding score for this study. Tapes were coded by three coders (last author and two graduate students) who maintained 90%

inter-rater reliability. Each tape was coded by two coders who obtained consensus, and a third coder independently coded every tenth tape.

2.2.3. Caregiver-Child Affect, Responsiveness, and Engagement Scale (C-CARES) [26]—The C-CARES coding system [26] is based on caregiver-child engagement during 10 minutes of videotaped free play. The C-CARES evaluates the quality of caregiver-child interactions, assessing the quantity and quality of caregiver behaviors, infant/child behaviors, and dyadic behaviors. For this study, a C-CARES version designed for 18 month old toddlers (and suitable for toddlers in our sample age range) was used, taking into account developmental level across all categories. This coding system was selected because it represents one of the few measures of dyadic interactions, includes global factors anchored in behavioral instances, and has been used with ethnically diverse populations [27-30]. In particular, the C-CARES system has been used to code parent-child interactions among Hispanic parents [27,30] and Native American parents [27].

For the current study, we were specifically interested in toddler emotion regulation, negative affect, and (dyadic) mutual enjoyment. Toddler emotion regulation reflects the child's ability to regulate all aspects of emotion, including controlling his/her excitability and stimulation during the interaction. High scores indicate a child who is generally content during the interaction. Low scores indicate a child who is unable to self-soothe, who is upset during much of the interaction, or who is hypersensitive or distractible and disrupted by the sights and sounds of the play session. Negative affect refers to the child's demonstration of negative attitude, or negative emotional tone, toward the caregiver and play activities. It characterizes the frequency of negative feelings displayed by the child to the caregiver and/or play activities, as evidenced through the child's facial expression and body positioning. Negative affect may be expressed outwardly, such as through angry behaviors (e.g., crying, yelling), or in more subtle ways, such as through depressed behaviors (e.g., frowning, pouting). Scores for (dyadic) mutual enjoyment reflect the shared pleasure between the dyad, evidenced by the amount of positive feelings expressed by the dyad. A high score reflects a positive interaction characterized by shared mutual affection and acknowledgement of each other's expressions of positive emotions (e.g., smiles, laughter). A low score reflects either a negative interaction in which the caregiver or the child appears bored or frustrated during interactions with each other, or an interaction in which neither caregiver nor child acknowledges the other's emotional expressions. The three individual scores from the C-CARES system used in the following analyses have been found to have sufficient variability and inter-rater reliability [28]. Behaviors are rated on a scale of 1 to 5, with 1 indicating "largely not observed" and 5 indicating "constantly observed." For each individual behavior, the coder is provided with examples as well as criteria for coding percentage of time observed (e.g. a toddler who engages in verbal behavior for 31-60% of the interaction would receive a code of "3" for the communication variable).

Each five minute segment of the videotaped play interaction was coded independently by two trained coders using the **CCARES**[26] coding system and discrepancies (i.e., anything more than a one point difference on any single item, all based on a 1-5 scale) were settled by a master coder. For purposes of inter-rater reliability, twenty percent of the tapes were randomly selected and coded by a master coder. Intraclass correlations across mother, child and dyad scales were 0.8 or better with a master coder.

2.3. Statistical Analysis

Associations between maternal scaffolding and toddler variables (emotion regulation, negative affect) and dyadic mutual enjoyment were compared with Fisher transformation of

Spearman correlations (preterm versus full term). This method was selected because it is more appropriate than ANCOVA for data with tied values.

3. Results

Statistical analyses revealed significant group differences for child's age at testing, with the preterm children's being older based on their adjusted age at testing ($t(129) = 3.48$, $p < 0.001$). Maternal education, maternal age, family income, and gender were not significantly different for the two groups. As expected, the preterm group had significantly lower birth weight ($t(127) = 31.51$, $p < 0.0001$) and significantly lower BSID-III Cognitive Scores ($t(127) = 5.59$, $p < 0.0001$).

In addition, mothers of toddlers born preterm used significantly less scaffolding ($t(129) = 2.66$, $p < 0.01$), had toddlers with less emotion regulation ($t(129) = 4.40$, $p < 0.0001$), more negative affect ($t(129) = 3.01$, $p < 0.01$), and preterm dyads exhibited significantly less mutual enjoyment during play ($t(129) = 4.53$, $p < 0.0001$) as presented in Table 1.

The associations between maternal scaffolding and toddler emotion regulation, negative affect, and dyadic mutual enjoyment were investigated with Spearman correlations by group (pre-term vs. full term). The association between maternal scaffolding and emotion regulation was significant for toddlers born preterm ($rho = 0.50$, $p < 0.0001$) and non-significant for toddlers born full term ($rho = -0.14$, ns; Fig. 1). The association between maternal scaffolding and negative affect was also significant for toddlers born preterm ($rho = -0.39$, $p < 0.001$) and non-significant for toddlers born full term ($rho = -0.02$, ns; Fig. 2). Both sets of correlations were statistically different ($z = -3.8$, $p < 0.0001$; $z = 2.19$, $p = 0.029$, respectively). In addition, although the correlations were not statistically different ($z = 1.52$, $p = 0.13$), the association between maternal scaffolding and mutual enjoyment was positive for toddlers born preterm ($rho = 0.46$, $p < 0.0001$) and non-significant for toddlers born full term ($rho = 0.21$, ns; Fig. 3). We reran these analyses and partialed out age at testing and BSID-III cognitive scores. Results remained substantively unchanged.

4. Discussion

Our findings highlight early differences in mother-child interactive style correlates of toddlers born preterm compared to those born full term. In this study, differences in emotion regulation, negative affect, and mutual enjoyment were observed in parent-child free play interactions between toddlers born full term and preterm. Compared to toddlers born full term, the play interactions of toddlers born preterm were characterized by lower levels of maternal scaffolding, lower levels of toddler emotion regulation, higher levels of toddler negative affect, and decreased mutual enjoyment within the parent-child dyad. These findings are congruent with prior research that indicates that infants born preterm display greater emotional reactivity and emotion regulation difficulties compared to infants born full term [31]. Across multiple contexts, prior studies have found that children born at younger gestational ages demonstrated poorer self-regulation at 2 and 4 years of age [20]. In addition, between group differences have been found on maternal scaffolding behaviors. Mothers of toddlers born preterm use significantly fewer verbal scaffolding behaviors in contrast to mothers of toddlers born full term [32,33].

The association between maternal scaffolding and toddler emotion regulation was positive for toddlers born preterm and non-significant for toddlers born full term. Similarly, the association between maternal scaffolding and negative affect was negative for toddlers born preterm and non-significant for toddlers born full term. Furthermore, the association between maternal scaffolding and mutual enjoyment was positive for toddlers born preterm

and non-significant for toddlers born full term. Our findings suggest that maternal scaffolding behavior may be uniquely associated with emotion regulation, decreased negative affect, and a positive dyadic encounter for toddlers born preterm. This is congruent with previous research that has demonstrated the importance of maternal scaffolding in enhancing cognitive, language, and social skills in children born prematurely [9-11].

We found that toddlers born preterm showed relatively less emotion regulation, including increased negative affect and less mutual enjoyment with their mothers. Although mothers of toddlers born preterm used less verbal scaffolding than mothers of toddlers born full term, increased parental scaffolding was associated with **higher functioning** in these areas in the preterm group only. These findings align with prior research that suggests children born preterm, who are at higher risk for delay, may be more reliant on, and sensitive to, the support and scaffolding they receive from their caregivers than typically developing children [15]. Thus, supportive parenting (and verbal scaffolding in particular) may be especially important for children born preterm. Koldewijn and colleagues [34] highlighted the importance of supportive intervention for the most vulnerable groups of children born preterm. In another study, increased levels of positive parenting were more strongly related to growth in cognitive and social skills in children born preterm compared to term [11]. A third study found that preterm infants who were more temperamentally prone to distress were shown to exhibit adverse outcomes in negative parenting environments, but had increased cognition and fewer behavior problems in positive parenting environments [35]. In general, young children who experience high distress have been found to be both more susceptible to the negative effects of poor parenting and are more strongly influenced by positive parenting [36]. Thus, for children born preterm, supportive parenting, including verbal scaffolding, may be especially beneficial.

The complex processes and contexts by which emotion regulation relates to cognition, behavior, and ultimately developmental outcome are unclear. However, some studies have shown that scaffolding is especially important for children born preterm. Guided play has been linked to emotion regulation, which is critical for cognitive development. Children born preterm are delayed in both domains [15]. Thus, emotion based development, including emotion regulation, decreased negative affect, and increased mutual enjoyment, may be facilitated by parental scaffolding and may provide a foundation for later cognitive development.

A limitation of the current study is that emotion regulation, negative affect, and mutual dyadic enjoyment were examined in a brief parent-child play situation. Extending the play session observations, supplementing observed behavior with parent report of behaviors, and including more settings (i.e., home) may yield enhanced and more nuanced information about the relationship between parent behaviors and toddler emotion regulation. We investigated maternal verbal scaffolding and it would be interesting to include other non-verbal forms of teaching that parents use to enhance learning. Additionally, this study was cross-sectional, precluding conclusions about directionality or causality. In fact, it is possible that preterm toddlers who display greater emotion regulation and less negative affect facilitate the use of more scaffolding by their mothers. In addition, the full-term toddlers' mean emotion regulation scores were near the "high" end and the negative affect scores were near the "low" end of possible values, with limited variability, thereby potentially limiting the identification of significant associations with maternal scaffolding scores. In future studies, assessing scaffolding styles among fathers and among various ethnic groups, as well as investigating the directionality of associations, could help us obtain a more complete understanding of the nature of scaffolding and its correlates across different samples.

Our findings highlight early differences in mother-child interactive style correlates of children born preterm compared to those born full term. We found a unique association between mothers' verbal scaffolding during play and **increased** emotion regulation, reduced negative affect, and increased mutual enjoyment in toddlers born preterm. These relationships were not found in toddlers born full term. Thus, if directionality and causality are determined, maternal scaffolding could potentially be an effective way to enhance self-regulation, improve parent-child interactions, and enhance the developmental skills of toddlers born preterm. The current study furthers our understanding of the correlates of maternal scaffolding behaviors in children born preterm, which in turn may highlight potential areas of intervention in this vulnerable population.

Acknowledgments

The authors would like to thank Joy Van Meter BS for help with coding of the video tapes and Erica Montague Ph.D. for data entry. We would also like to thank the families who participated in our study.

This project was supported in part by the National Center for Research Resources and the National Center for Advancing Translational Sciences of the National Institutes of Health through Grant Number 8UL1TR000041, The University of New Mexico Clinical and Translational Science Center.

ABBREVIATIONS

VLBW	very low birth weight
BSID-II	Bayley Scales of Infant Development 2nd edition
BSID-III	Bayley Scales of Infant Development 3rd edition
MDI	mental Developmental Index
LBW	low birth weight
C-CARES	Caregiver-Child Affect, Responsiveness, and Engagement Scale

References

[1]. Elgen I, Johansson K, Markestad T, Sommerfelt K. A non-handicapped cohort of low-birthweight children: Growth and general health status at 11 years of age. Acta Paediatr. 2005; 94(9):1203–7. [PubMed: 16278985]

[2]. Litt J, Taylor G, Klein N, Hack M. Learning disabilities in children with very low birthweight: Prevalence, neuropsychological correlates, and educational interventions. J Learn Disabil. 2005; 38:130–141. [PubMed: 15813595]

[3]. Mulder H, Pitchford NJ, Hagger MS, Marlow N. Development of executive function and attention in preterm children: A systematic review. Dev Neuropsychol. 2009; 34(4):393–421. [PubMed: 20183707]

[4]. Aylward G. Cognitive and neuropsychological outcomes: More than IQ scores. Ment Retard Dev D R. 2002; 8(4):234–240.

[5]. Kilbride HW, Thorstad K, Daily DK. Preschool outcome of less than 801-gram preterm infants compared with full-term siblings. Pediatrics. 2004; 113(4):742–7. [PubMed: 15060222]

[6]. Spittle AJ, Treyvaud K, Doyle LW, Roberts G, Lee KJ, Inder TE, et al. Early emergence of behavior and social-emotional problems in very preterm infants. J Am Acad Child Adolesc Psychiatry. 2009; 48(9):909–918. [PubMed: 19633579]

[7]. Landry SH, Miller-Loncar CL, Smith KE, Swank PR. The role of early parenting in children's development of executive processes. Dev Neuropsychol. 2002; 21(1):15–41. [PubMed: 12058834]

[8]. Vygotsky, LS. Mind in society: The development of higher psychological processes. Harvard University Press; Cambridge, MA: 1978.

[9]. Landry SH, Smith KE, Swank PR, Guttentag C. A responsive parenting intervention: the optimal timing across early childhood for impacting maternal behaviors and child outcomes. Dev Psychol. 2008; 44(5):1335–1353. [PubMed: 18793067]

[10]. Dietrich SE, Assel MA, Swank P, Smith KE, Landry SH. The impact of early maternal verbal scaffolding and child language abilities on later decoding and reading comprehension skills. J Sch Psychol. 2006; 43:481–494.

[11]. Landry SL, Smith KE, Swank PR, Assel MA, Vellet S. Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? Dev Psychol. 2001; 37(3):387–403. [PubMed: 11370914]

[12]. Lacroix V, Pomerleau A, Malcuit G, Séguin R, Lamarre G. Language and cognitive development of the child during the first three years in relation to the duration of maternal vocalizations and the toys present in the environment: Longitudinal study of populations at risk. Can J Behavioral Sci. 2001; 33:65–76.

[13]. Landry SH, Smith KE, Swank PR, Miller-Loncar CL. Early maternal and child influences on children's later independent cognitive and social functioning. Child Dev. 2000; 71:358–375. [PubMed: 10834470]

[14]. Diamond LM, Aspinwall LG. Emotion regulation across the life span: An integrative perspective emphasizing self-regulation, positive affect, and dyadic processes. Motiv Emot. 2003; 27(2):1–6.

[15]. Landry SH, Taylor HB, Guttentag C, Smith KE. Responsive parenting: Closing the learning gap for children with early developmental problems. Int Rev Res Ment Retard. 2008; 36:27–60.

[16]. Bell MA, Wolfe CD. Emotion and Cognition: An Intricately Bound Developmental Process. Child Dev. 2004; 75(2):366–370. [PubMed: 15056192]

[17]. Ruff, HA.; Rothbart, MK. Attention in early development: Themes and variations. Oxford University Press; New York: 1996.

[18]. Cole PM, Martin SE, Dennis TA. Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. Child Dev. 2004; 75(2):317–333. [PubMed: 15056186]

[19]. Landry SH, Smith KE, Swank PR. Responsive parenting: Establishing early foundation for social, communication and independent problem-solving skills. Dev Psychol. 2006; 42:627–642. [PubMed: 16802896]

[20]. Clark CA, Woodward LJ, Horwood LJ, Moor S. Development of emotional and behavioral regulation in children born extremely preterm and very preterm: Biological and social influences. Child Dev. 2008; 79(5):1444–62. [PubMed: 18826535]

[21]. Bayley, N. Bayley Scales of Infant Development, II. Psychological Corporation; New York: 1993.

[22]. Bayley, N. Bayley Scales of Infant Development, III. Psychological Corporation; New York: 2005.

[23]. Lowe JR, Erickson SJ, Schrader R, Duncan AF. Comparison of the Bayley II Mental Developmental Index and the Bayley III cognitive scale: Are we measuring the same thing? Acta Paediatr. 2013; 102(1):72–7. [PubMed: 23009657]

[24]. Landry SH, Miller-Loncar CL, Smith KE, Swank PR. The role of early parenting in children's development of executive processes. Dev Neuropsychol. 2002; 21(1):15–41. [PubMed: 12058834]

[25]. Smith KE, Landry SH, Swank PR. Does the content of mothers' verbal stimulation explain differences in children's development of verbal and nonverbal cognitive skills? J Sch Psychol. 2000; 38:27–49.

[26]. Tamis-LeMonda, CS.; Ahuja, P.; Hannibal, B.; Shannon, J.; Spellmann, M. Unpublished manuscript. New York University; New York, NY: 2001a. Caregiver-Child Affect, Responsiveness, and Engagement Scale (C-CARES).

[27]. Lowe J, Erickson SE, MacLean P, Duvall SW. Early working memory and maternal communication in toddlers born very low birth weight. Acta Paediatr. 2009; 98(4):660–3. [PubMed: 19154525]

[28]. Shannon JD, Tamis-Lemonda CS, London K, Cabrera N. Beyond rough and tumble: Low-income fathers' interactions and children's cognitive development at 24 months. Parent Sci Pract. 2002; 2:77–104.

[29]. Tamis-Lemonda CS, Briggs RD, McClowry SG, Snow DL. Maternal control and sensitivity, child gender, and maternal education in relation to children's behavioral outcomes in African American families. J Appl Dev Psychol. 2009; 30:321–331. [PubMed: 20161193]

[30]. Gamble WC, Ramakumar S, Diaz A. Maternal and paternal similarities and differences in parenting: An examination of Mexican-American parents of young children. Early Child Res Q. 2007; 22:72–88.

[31]. Eckerman CO, Hsu HC, Molitor A, Leung EHL, Goldstein RF. Infant arousal in an en-face exchange with a new partner: Effects of prematurity and perinatal biological risk. Dev Psychol. 1999; 35:282–293. [PubMed: 9923482]

[32]. Donahue ML, Pearl R. Conversational interactions of mothers and their preschool children who had been born preterm. J Speech Hear Res. 1995; 38(5):1117–25. [PubMed: 8558880]

[33]. Lowe J, Erickson SE, MacLean P, Schrader R, Fuller J. Association of maternal scaffolding to maternal education and cognition in toddlers born preterm and full term. Acta Paediatr. 2013; 102(1):72–77. [PubMed: 23009657]

[34]. Koldewijn K, Wassenaer A, Wolf M, Meijssen D, Houtzager B, Beelen A, et al. A neurobehavioral intervention and assessment program in very low birth weight infants: Outcome at 24 months. J Pediatr. 2010; 156:259–65. [PubMed: 19818453]

[35]. Poehlmann J, Hane A, Burnson C, Maleck S, Hamburger E, Shah PE. Preterm infants who are prone to distress: Differential effects of parenting on 36-month behavioral and cognitive outcomes. J Child Psychol Psychiatry. 2012; 53(10):1018–25. [PubMed: 22582942]

[36]. Ellis B, Boyce WT, Belsky J, Bakermans-Kranenburg M, van Ijzendoorn M. Differential susceptibility to the environment: An evolutionary-neurodevelopmental theory. Dev Psychopathol. 2011; 23(1):7–28. [PubMed: 21262036]

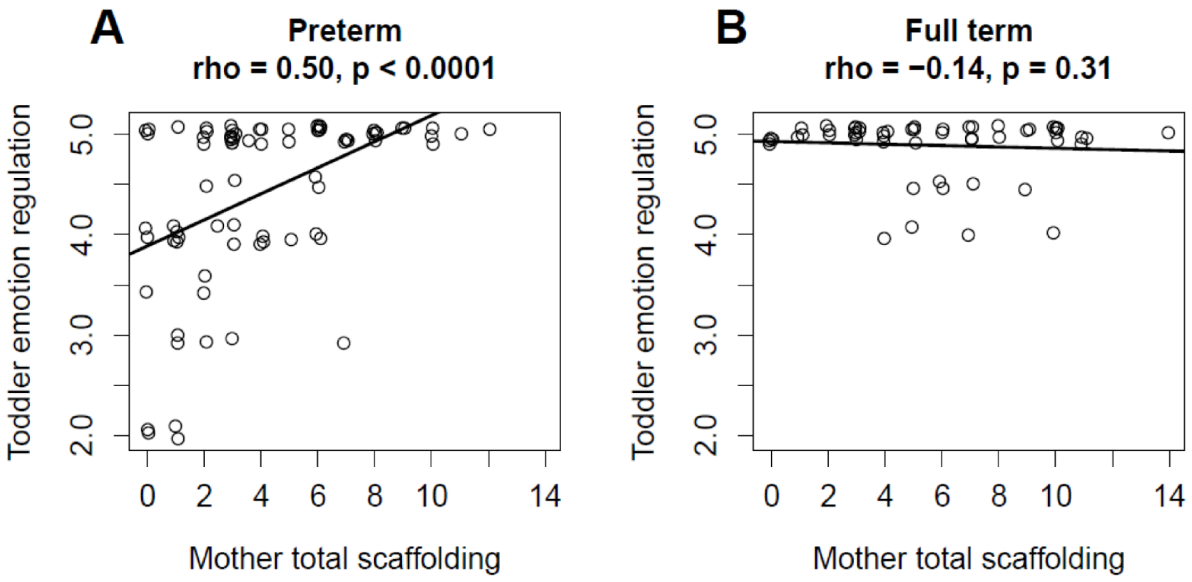

Figure 1.
Maternal verbal scaffolding plotted in relation to toddler emotion regulation by preterm versus full term.

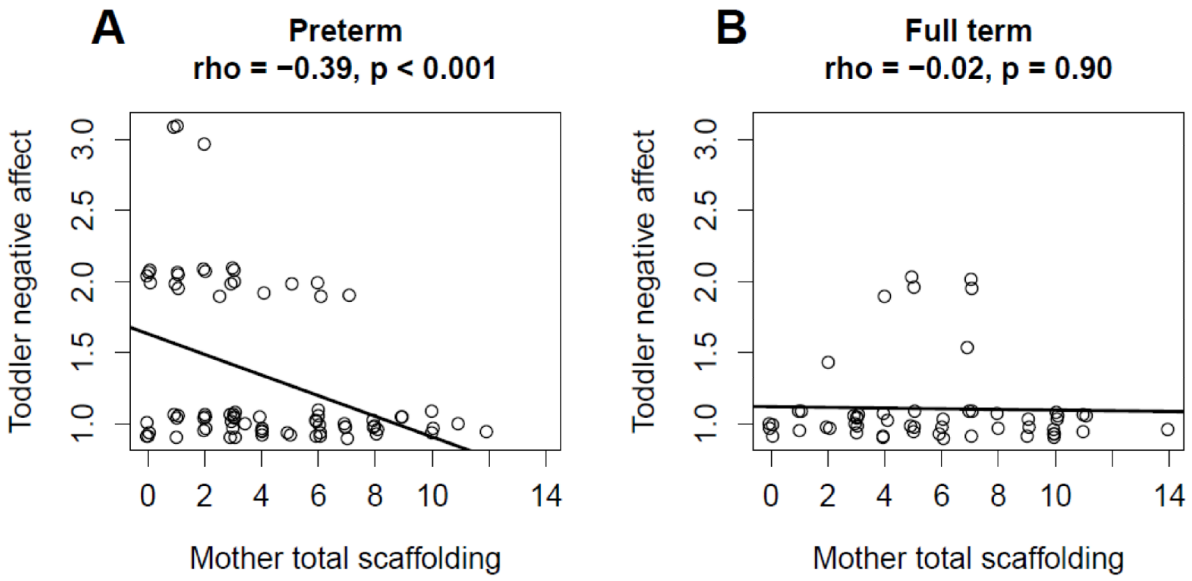

Figure 2.
Maternal verbal scaffolding plotted in relation to toddler negative affect by preterm versus full term.

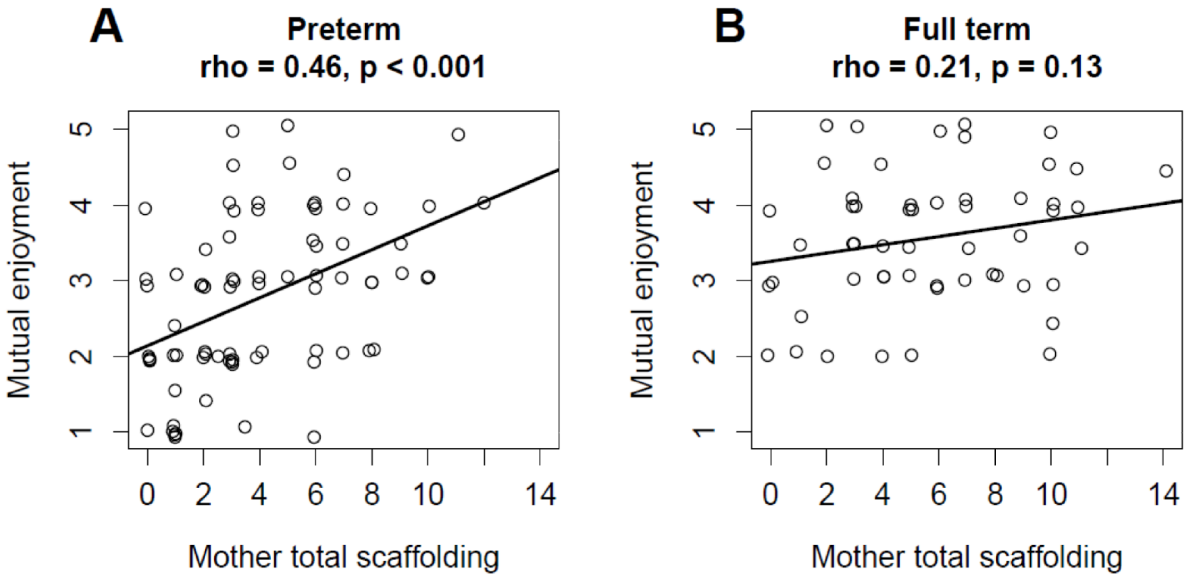

Figure 3.
Maternal verbal scaffolding plotted in relation to dyadic mutual enjoyment by preterm versus full term.

Table 1
Demographic Characteristics of Preterm and Full Term Groups

	Preterm n = 77	Full Term n = 54
Factor	**Mean (SD)**	**Mean (SD)**
Test Age (months) ***	20.12 (1.25)	19.26 (1.49)
Birth weight (grams) ****	937.70 (229.0)	3365.70 (486.3)
Maternal age (years)	29.64 (6.85)	27.35 (6.22)
Gender		
Male	50.65%	61.11%
Child Ethnicity	Frequency (%)	Frequency (%)
White	20 (27%)	13 (24%)
Native American	18 (24%)	6 (11%)
Hispanic/Latino	33 (45%)	33 (61%)
other	3 (4%)	2 (4%)
♦ Maternal Education	1.78 (1.54)	1.63 (1.76)
□Household Income	1.97 (1.93)	2.09 (2.26)
△BSID-III Cognitive Score ****	97.56 (10.0)	105.80 (6.75)
»Verbal Scaffolding Scale **	4.01 (3.04)	5.67 (3.48)
+Toddler Negative Affect **	1.34 (0.55)	1.11 (0.30)
+Toddler Emotion Regulation ****	4.42 (0.84)	4.88 (0.29)
+Dyadic Mutual Enjoyment ****	2.79 (1.07)	3.56 (0.87)

Note:

♦0- <H.S., 1- H.S. graduate; 2- HS+ 1 yr college; 3-Associate degree; 4-Bachelor degree; 5-Some graduate school, 6- Masters degree and higher

□0-<$10,000; 2- $10,000-$20,000; 3- $20,000-$30,000; 4- $30,000-$40,000; 5- $40,000- $50,000; 6- $60,000-$70,000; 7- $70,000+

+Subscales from the Caregiver-Child Affect, Responsiveness, and Engagement Scale (C-CARES; Tamis-LeMonda et al., 2001).

△The BSID-III Cognitive score was calculated as a measure of cognition for all participants [33_35]

»Verbal scaffolding scale [24]

** = p<0.01

*** = p<0.001

**** = p<0.0001