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Parenting Stress, Social Support, and Mother-Child Interactions in Families of Multiple and Singleton Preterm Toddlers

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Abstract

The study investigated family support as a buffer of stress in 153 mothers and preterm toddlers. Data were collected regarding maternal depressive symptoms, parenting stress, and family support; infant health; and videotaped mother-child interactions. Although more parenting stress related to less optimal child play, only information support functioned as a protective factor. Information support predicted positive play under high, but not low, maternal stress. Mothers of multiples reported more parenting stress than mothers of singletons.

Keywords

child; interactions; mother; preterm; stress; twins

The unprecedented number of multiple (i.e., twin, triplet, and higher order) births in the US during the past 30 years has had a major impact on the rate of preterm (< 37 weeks gestation) births (Martin, Hamilton, Sutton, Ventura, Menacker, & Mathews, 2009; Martin & Park, 1999; Russell, Petrini, Damus, Mattison, & Schwarz, 2003). Though stable over the past two years, the twin birth rate rose 70% between 1980 and 2004 – from 18.9 births in twin deliveries per 1000 to 32.1 per 1000 (Martin et al., 2009). Approximately 11% of singletons are born preterm and 1.6% are born very preterm (< 32 weeks gestation), whereas 60% of twins are born preterm and 12% are born very preterm (Martin et al., 2009). Though families with preterm infants face many immediate and ongoing challenges, the birth of premature multiples presents additional parenting demands. Yet few studies have

investigated how parenting stress in such families may interact with protective factors, such as family support, on children's well-being or interactions with parents. The purpose of this study was to investigate family support as a potential buffer of maternal parenting stress in families of preterm multiples and singletons that may facilitate resilience in mother-toddler interactions at 24-months postterm.

Resilience and Parenting Interactions

According to ecological models of development (e.g., Bronfenbrenner & Ceci, 1994), proximal processes such as parent-child interactions that occur in children's daily environments are particularly important for development, and may even be a key factor in promoting resilience in high-risk contexts. Resilience can be defined as the dynamic process of children's successful adaptation despite the experience of significant adversity (Masten, 2001). Because research using a resilience framework has identified parenting as one of the most robust predictors of positive outcomes (Masten, 2001), understanding predictors of positive parenting interactions in high-risk samples is crucial to promoting children's competence.

Previous research has examined group differences in parent-child interactions in preterm versus full-term infants and in families of singleton and multiple infants, thus documenting some of the difficulties faced by these families. Compared to full-term infants, preterm infants are less responsive, affectively positive, and cooperative, while their mothers are more intrusive and less sensitive during interactions compared to full-term dyads (Crnic, Ragozin, Greenberg, Robinson, & Basham, 1983; Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2006). Moreover, early parent-child interaction quality is implicated in subsequent developmental problems and competencies for preterm infants (e.g., Smith, Landry, & Swank, 2006).

As well as the risks associated with prematurity, several studies have found less positive involvement and developmental stimulation in mothers of multiples versus singletons (e.g., Holditch-Davis, Schwartz, Black, & Scher, 2007), with mothers of triplets displaying less sensitivity and lower levels of synchrony than mothers of twins or singletons for samples matched on prematurity and other key health variables (Feldman & Eidelman, 2004; Feldman, Eidelman, & Rotenberg, 2004). In a longitudinal study, multiple infants were left alone more and experienced less frequent parent-child interactions than singletons because of the added time and responsibility involved with caring for multiple infants; but few other differences in parenting and interactive behaviors were observed (Holditch-Davis, Roberts, & Sandelowski, 1999).

In addition to documenting group differences and risks for preterm infants and multiples, it is also important to examine predictors of parenting interactions in high-risk groups, including factors that may promote resilience processes and those that may protect children from risk (Masten & Coatsworth, 1998). Protective factors, often conceptualized as moderators or indirect effects, have a positive effect under stressful conditions. The current study examined family support as a potential protective factor that was expected to moderate the association between parenting stress (especially stress associated with prematurity and multiple birth) and mother-child interaction outcomes at 24-months postterm during free play and problem solving.

Parenting Stress in Mothers of Preterm Infants and Multiples

The construct of parenting stress varies across studies, but generally incorporates parent and child characteristics as well as situational factors that may be perceived as stressful by parents. Also included are temporal factors, such as the chronicity or acuteness of stressors,

as well as situational factors, such as normative or non-normative life events (Quittner, Glueckauf, & Jackson, 1990). Although the concept of parenting daily hassles is related, it focuses more on chronic and minor stressors associated with day-to-day parenting (Crnic & Greenberg, 1990).

Measures of parenting stress are often self-report instruments of parents' perception of stress (Crnic & Booth, 1991). The Parenting Stress Index (PSI) measures the degree of perceived stress in the parent-child system and helps identify when problematic parenting or child development may be likely (Abidin, 1983). It also incorporates child, parent, situational, and demographic factors (Abidin, 1983) and thus is often used as a measure of global parenting stress. In contrast, the Parenting Daily Hassles scale (PDH; Crnic & Greenberg, 1990) includes two primary domains of parenting daily stress: those associated with the child's everyday routine, and those associated with undesirable child behaviors.

Using parent report measures, numerous studies have documented elevated parental stress and psychological distress following the birth of a preterm (e.g., Feldman-Reichman et al., 2000; Pinelli, 2000) or very low birthweight (VLBW; < 1500g; e.g., Singer et al., 1999) infant, although such symptoms tend to decline over time (Miles, Holditch-Davis, Schwartz, & Scher, 2007; Poehlmann, Schwichtenberg, Bolt, & Dilworth-Bart, 2009). Moreover, studies suggest that parenting stress and distress adversely influence the maternal-infant relationship during the first year (e.g., Singer et al., 2003). For example, Muller-Nix, Forcada-Guex, Pierrehumbert, Jaunin, Borghini, and Ansermet (2004) found that mothers of preterm infants who experienced stress during the perinatal period were less sensitive and more controlling than mothers of term infants, which may lead to less optimal outcomes for preterm infants (Forcada-Guex et al., 2006).

Although the number of multiple births has increased significantly, there have been relatively few investigations of how families of twins and other multiples function after birth (Klock, 2004). Glazebrook, Sheard, Cox, Oates, and Ndukwe (2004) found that mothers of multiples conceived via in vitro fertilization (IVF) reported significantly higher scores for total parenting stress and parent-child dysfunctional interaction compared with mothers of singletons. Also, mothers of 2–5-year-old twins conceived by assisted reproduction reported higher levels of parenting stress, depression, and difficulty parenting compared to mothers of singletons conceived by assisted reproduction (Olivenness et al., 2005). But many studies comparing family reactions to multiples versus singletons have not controlled for infant prematurity (e.g., Ellison et al., 2005; Sheard, Cox, Oates, Ndukwe, & Glazebrook, 2007; Sutcliffe & Derom, 2006).

Yet because the rate of prematurity is high for multiple pregnancies (Blondel et al., 2002), mothers of multiples may be more prepared for parenting a preterm infant, and they may receive more support following delivery than mothers of singletons. Over time, however, the strain of caring for multiples (especially triplets, e.g., Feldman & Eidelman, 2004) may cause mothers of preterm multiples to experience less decline in levels of stress or depressive symptoms as children reach toddlerhood compared to mothers of preterm singletons.

Family Support

Social support has been posited as an important coping resource for mothers of premature infants (Singer, Davillier, Bruening, Hawkins, & Yamashita, 1996). Social support, defined as having one's needs met through the presence of and interaction with others, such as spouses or partners, family members, or friends (Kaplan, Cassel, & Gore, 1977), has been shown to lessen the negative impacts of stressful situations (Cobb, 1976). Some evidence suggests that the salience of social support increases as the stress of a situation increases

(Singer et al., 1996), thus making it especially important for families with premature infants. For example, in a study of families with infants in neonatal intensive care units (NICU), Pinelli (2000) found a positive correlation between social support and family adaptation to the stress of having a high-risk infant. Moreover, Singer et al. (1996) showed that social support is more important for mothers of preterm infants than for mothers of full-term infants in the short term.

Social support is often provided by family members. In a sample of preterm infants and their families, Rowe and Jones (2010) found that partners (i.e., husbands or wives) were a significant source of support both before and after an infant's NICU discharge. In an investigation of mothers of full-term and preterm twins, maternal grandmother support predicted maternal marital adaptation and, when the infant's temperament was difficult, predicted maternal mental health (Findler, Ben-Ari, & Jacob, 2007). Despite its importance, however, family support appears to be most available immediately after the birth of a preterm or high-risk infant and decreases over the next few months (Rowe & Jones, 2010; Pinelli, 2000). Furthermore, there are several types of social support, including emotional, informational, and instrumental (House & Kahn, 1985). Emotional support is the provision of love, understanding, and acceptance, whereas information support is the provision of knowledge and facts. Instrumental support is the provision of concrete resources, such as money or childcare. However, previous studies have not differentiated between these types of support, and little is known about the role of family support in facilitating mother-child interaction quality in families of preterm infants.

Maternal Characteristics and Resources

Parent characteristics and resources, key influences on the parenting system, include parental depressive symptoms and family socioeconomic (SES) status. Maternal depressive symptoms are associated with less optimal interaction quality and insecure attachment in dyads with a preterm infant (Poehlmann & Fiese, 2001; Poehlmann, Schwichtenberg, Bolt, Hane, Burnson, & Winters, 2011). Higher levels of depression have also been found in mothers of multiples compared to singleton mothers (Bryan, 2003; Choi, Bishal, & Minkovitz, 2009; Sheard et al., 2007; Thorpe, Golding, MacGillivray, & Greenwood, 1991).

Mothers with less education are more likely to use negative control and be less sensitive during interactions with their preterm or VLBW infants (Holditch-Davis, 2007). Mothers with more SES risks engage in less positive interactions with their preterm infants compared to mothers with fewer risks (Poehlmann et al., 2011), whereas mothers with more SES assets report less depression over time following a preterm birth compared to mothers with fewer assets (Poehlmann et al., 2009). Given these findings, we controlled for maternal depressive symptoms, SES assets, and marital status in our analyses. We also controlled for whether or not the target child was a first- or later-born infant.

Research Questions

In the present study, we examined maternal family support (emotional, information, and instrumental) as a potential protective factor, or moderator, of the association between maternal parenting stress and mother-child interaction quality in preterm singletons and multiples. In addition, multiple birth and prematurity were examined as predictors of parenting stress. Our hypotheses were as follows:

1. Mothers of multiples and more premature infants will report less family support and more parenting stress compared to mothers of other infants, controlling for maternal depressive symptoms, socioeconomic assets, marital status, and birth order.

2. Higher levels of parenting stress will predict less optimal mother-child interactions at 24 months, controlling for maternal depressive symptoms, SES assets, marital status, and birth order.
3. Family support will moderate the association between parenting stress and 24-month interaction outcomes. Specifically, at high levels of family support, parenting stress will not predict the quality of parent-child interactions; and that with low levels of family support, more parenting stress will predict lower quality parent-child interactions.

Methods

Participants

This report is based on 153 preterm infants (gestational age < 37 weeks) who participated in the 24-month data collection. A total of 181 mothers and their infants were initially recruited from three NICUs in southeastern Wisconsin between 2002 and 2005 as part of a larger longitudinal study focusing on infants born preterm or low birthweight (Poehlmann, Schwichtenberg, Bolt, & Dilworth-Bart, 2009). At each hospital, a research nurse invited families to participate in the study if they met the following criteria: (a) infants were born 35 weeks gestation OR weighing < 2500 grams, (b) infants had no known congenital problems, major neurological problems (e.g., Down Syndrome, periventricular leukomalacia (PVL), grade IV intraventricular hemorrhage (IVH)), or prenatal drug exposures, (c) mothers were at least 17 years of age, (c) mothers could read English, and (d) mothers self-identified as the child's primary caregiver. For multiple births, one infant was randomly selected to participate. Because the hospitals would not allow us to be "first contact" for families and only provided us with information about families who signed study consent forms, we were unable to calculate a participation rate. However, of the 186 mothers who signed consent forms, 181 (97%) participated in data collection. Data from four of the 181 families were removed because we later discovered that a grade IV IVH had occurred prior to NICU discharge and/or the child was diagnosed with cerebral palsy by 3 years of age and 5 additional cases were removed because the infants were low birthweight, but not preterm. Participating family characteristics paralleled the population of Wisconsin during the years of data collection. For example, 77% of Wisconsin mothers who gave birth in 2005 were White, 9% were Black, and 9% were Latina (Martin et al., 2007), while the rate of preterm birth is higher for Black (18.4%) than White (11.7%) infants (Hamilton, Martin, & Ventura, 2007). Our sample consisted of 66% White, 14% Black, 2% Latino, and 17% multiracial infants. In Wisconsin, 89% of mothers were between 20 and 39 years of age at birth, and an average of 16% of children lived in poverty between 2003 and 2005 (U.S. Bureau of Census, 2003–2005). Approximately 87% ($n = 149$) of study mothers were 20 to 39 years of age, and 22% ($n = 38$) were living in poverty. Of the 172 infants who participated at Time 1, birthweights ranged from 490g to 3328g ($M = 1711g$, $SD = 579$), gestational ages ranged from 23.7 to 35.9 weeks ($M = 31.3$, $SD = 3.0$), and NICU length of stay averaged 33 days. A significant proportion of neonates experienced respiratory issues during the NICU stay, including apnea ($n = 119$, 69%), respiratory distress syndrome ($n = 91$, 53%), chronic lung disease ($n = 18$, 11%), and mechanical ventilation ($n = 92$, 54%).

Ninety one (53%) infants were boys. At hospital discharge, mothers were an average of 29.6 years old ($SD = 6.3$), had obtained an average of 14.2 years of education ($SD = 2.7$), and most ($n = 118$, 69%) were married. The average household income was \$59,124 ($SD = \$52,989$).

Infants and their families were assessed at five time points: just prior to the infant's hospital discharge (Time 1) and at 4- (Time 2), 9- (Time 3), 16- (Time 4), and 24-months (Time 5),

corrected for prematurity. Corrected age was calculated on the basis of the infant's due date (DiPietro & Allen, 1991). In the present report, we used Time 1 and Time 5 data.

At Time 5, 153 families continued to participate in the study, resulting in a 14% attrition rate between NICU discharge and 24 months. There were no significant differences in attrited or continuing families for infant gestational age, birthweight, 1- and 5-minute Apgar scores, days hospitalized, a neonatal health risk index, number of children in the family, the father's age or education, family income, a sociodemographic risk index, or maternal depressive symptoms at Time 1. However, mothers lost to attrition were an average of 3.5 years younger, $F(1, 171) = 5.51, p < .05$, had completed an average of 1.3 fewer years of education, $F(1, 171) = 5.88, p < .05$, and were more likely to be single, $\chi^2(1) = 4.68, p < .05$, and non-white, $\chi^2(1) = 5.57, p < .05$, compared to mothers who completed the study. Our attrition is consistent with other longitudinal studies of high-risk infants (e.g., Miles et al., 2007).

Of the 153 preterm infants, 27 (17.6%) were multiples, and 86 (56%) were firstborn. When multiple birth occurred, one child was randomly selected to participate in the study.

Measures

Control Variables

Maternal and Family Socioeconomic Assets: Each mother completed a demographic questionnaire at Time 5 including maternal age and education, family income, and marital status ($1 = \text{parents married}$, $0 = \text{not married}$). To generate an index of maternal assets (Poehlmann et al., 2009), maternal age, education, and family income were standardized and summed. Cronbach's alpha was .71. Six mothers were missing income information.

Maternal Depressive Symptoms: The Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977) was used to assess maternal depressive symptoms. The CES-D, a 20-item self-report questionnaire, asks respondents to rate depressive symptoms during the past week on a 4-point scale ranging from rarely or none to most or all of the time. Scores of 16 and above are considered in the clinical range for depression. The CES-D has been used with a variety of populations, including mothers of young children. The Cronbach's alpha for the present study was .89. Three mothers did not finish the CES-D scale.

Risk Variables—Infant medical records were reviewed to determine infant gestational age, birthweight, birth order (coded as $0 = \text{not firstborn}$, $1 = \text{firstborn}$), and whether or not the infant was part of a multiple birth (coded as $0 = \text{singleton birth}$, $1 = \text{multiple birth}$). Because infant birthweight and gestational age were highly correlated ($r = .88, p < .001$), we standardized and combined them. Lower scores reflected more prematurity.

Parenting Stress: Two measures were used to assess parenting stress. The first instrument, the PSI (3rd ed.; Abidin, 1995), is a 120-item self-report questionnaire that includes a 7-domain Child score, an 8-domain Parent score, and a Total Stress score. In the present report, we used the PSI-Total Stress score. The parent rates each item on a 5-point scale with $1 = \text{strongly disagree}$ to $5 = \text{strongly agree}$; higher scores indicate more parenting stress. The PSI includes items such as "My child does a few things which bother me a great deal" and "Most of my life is spent doing things for my child." The PSI has been widely used in behavioral research (e.g., Clark, Tluczek & Wenzel, 2003; Feldman, Weller, Sirota, & Eidelman, 2003), and reliability coefficients for the total score tend to be high (e.g., Zareski, 1983, reported .88). For the present study, Cronbach's α for the PSI-Total Stress score was .93. Six PSI scores were missing because mothers did not complete all items.

The second parenting stress measure, the PDH (Crnic & Greenberg, 1990) scale is a 20-item questionnaire designed to assess parental stress associated with routine parenting interactions. Parents rate the Frequency and Intensity of 20 common parenting events or activities. The Frequency dimension assesses the frequency that an event or activity occurs, ranging from 1 = *never* to 5 = *constantly*. The Intensity dimension assesses the degree of hassle that the parent perceives the event or activity to be, ranging from 1 = *not a hassle* to 5 = *big hassle*. The Frequency and Intensity dimension scales are also highly correlated with one another ($r = .78$) (Crnic & Greenberg, 1990), so we combined them in the present study. Examples of items include, “Babysitters are difficult to find” and “The kids resist or struggle over bedtime with you”. The PDH has been used with parents of toddlers and preschool age children to assess parental perception of stress (Belsky, Crnic, & Gable, 1995; Jain, Belsky, & Crnic, 1996). In the present sample, Cronbach’s alpha for the PDH combined scale was .88. Because the PDH parenting hassle measure was added to the study at a later time, it was not given to the first 15 (10%) mothers and an additional five forms were missing items.

Moderator Variable

Maternal Social Support: Maternal report of social support was assessed using the Maternal Support Scale (Infant-Parent Interaction Lab, 2009) because it allowed us to examine specific types of family support, rather than focusing on global satisfaction with support. It consists of 21 questions that begin with, “Do you receive any support from ...?” Mothers report whether support was received or not from the baby’s father, the mother’s parents, and the baby’s father’s parents. Mothers answered yes or no across seven choices: emotional, information, and instrumental (household, childcare, financial, rest). We created an *Emotional Support* scale by summing emotional support items endorsed across family members (3 items, $\alpha = .60$), an *Information Support* scale by summing the information support items endorsed across family members (3 items, $\alpha = .65$), and an *Instrumental Support* scale by combining the household, childcare, financial, and rest items across family members (12 items, $\alpha = .75$). In the larger study, internal consistency estimates for support scales ranged from .60 to .87 for infants ranging in age from birth to 24-months. Test-retest correlations for maternal report of support between the child’s birth and 4-, 9-, 16-, and 24-months ranged from .55 to .86. The three support scales also significantly correlated with the intimate relationship satisfaction and family satisfaction scales of the Social Support scale of the Inventory of Parent Experiences (Crnic et al., 1983) administered at 16-months (r s ranged from .26 to .37, $p < .01$).

24-month Interaction Outcomes

Toddler-Mother Free Play Interactions: Videotapes of children’s interactions with their mothers during naturalistic play were rated using the Parent-Child Early Relational Assessment (PCERA; Clark, 1985), an observational rating scale designed to assess the amount, duration, and intensity of adaptive parent and child behavior (Clark, 1999; Clark et al., 1997). The present report used the 28 child variables, which included child attention, motor and communicative skills, social initiative, and responsiveness. Each variable is rated on a 5-point scale, with higher scores representing more adaptive behaviors (Clark et al., 1997). Discriminate validity was demonstrated by comparing healthy and high-risk dyads (Clark et al., 1997). At least two research assistants independently coded 15% of the sample, and interrater reliability was acceptable (kappas for individual codes ranged from .60 to 1.0, with a mean of .83). The PCERA child items were averaged to obtain a total child score (Cronbach’s $\alpha = .86$).

Maternal Scaffolding During Problem Solving: A problem solving task was presented to children when both the child and mother were in the playroom. Children were presented with a large clear plastic box that had a prize inside; children had to use a block to weight

down one end of a lever in order to get the prize (as it rose on the other end of the level, through a small hole in the top of the box). The problem was impossible for children to solve without adult assistance. Mothers were instructed to first let the child try to figure out the solution on his own and then give the child any help that he needed. The task was videotaped and coded according to the maternal scaffolding scheme presented in Hoffman, Crnic, and Baker (2006). Fifteen items were coded on a 1 to 5 scale focusing on mothers' *technical*, *emotional*, and *motivational* scaffolding during the first 10 minutes of the task. Technical support was characterized by mothers' ability to structure the task in a way that children could successfully complete it. The mothers' emotional support was rated based on their willingness to create both a positive and enjoyable experience for their child, while motivational support consisted of the mothers' encouragement and their ability to keep the child engaged and enthusiastic towards the task. Higher scores indicated more effective scaffolding. In their sample of typically developing and developmentally delayed 4-year-olds, Hoffman et al. (2006) found that depressed mothers engaged in less effective scaffolding than non-depressed mothers. Cronbach's alpha for the present sample was .98 for the total scaffolding score. Interrater reliability was calculated across 22 (14.5%) videotaped segments, with .88 agreement within 1 point.

Procedure

Families were enrolled in the study through three hospitals in southeastern Wisconsin following Institutional Review Board approval from the University of Wisconsin and each hospital. A research nurse from each hospital described the study to eligible families, and interested mothers signed informed consent forms. A researcher met the mother in the NICU just prior to discharge to collect Time 1 data, and mothers completed questionnaires including a demographic form. Each mother was given a list of clinics and agencies that could assist her if she felt distressed, and if a mother reported clinically significant depressive symptoms at any timepoint, the study principal investigator (a licensed psychologist) called the mother to offer referral information. Nurses completed a history of hospitalization form by reviewing the infant's NICU medical records. Home visits were conducted with families when infants were 4- and 9-months corrected age. When infants were 16- and 24-months postterm, families visited our laboratory playroom. Mothers and children were videotaped playing together and solving the impossible box task (described above), and mothers completed self-administered questionnaires while a researcher administered a developmental assessment to the child. Mothers completed the parenting stress measures and the CESD. Each of the laboratory visits lasted approximately 1.5 to 2 hours. Mothers were paid \$65 at the 16-month visit and \$80 at the 24-month visit. Children were given an age-appropriate book or toy at the end of each visit.

Statistical Methods—Screening of variables revealed normal or near-normal distributions, and other multiple regression assumptions (e.g., homoscedasticity, residuals uncorrelated with predictors), examined via residual analysis and plots, were not violated. Table 1 presents means, standard deviations, and bivariate correlations for continuous variables.

As noted in the Measures section, missing values existed for some variables. To address this, we used a multiple imputation procedure that generated five datasets, in which missing values were randomly generated conditional upon all other variables in the analysis (SPSS v. 17.0). Subsequent analyses were applied to all five datasets, with aggregated results reported for the final models. Mother-child interaction outcome variables were not imputed. Final analyses were based on 152 dyads.

Three sets of hierarchical multiple regression analyses were conducted to test the study's hypotheses. In all analyses, the maternal assets index, maternal marital status, infant birth order, multiple birth, infant prematurity, and maternal CES-D were entered in the first step. Separate equations were calculated for each stress variable and each outcome. When an interaction term was statistically significant ($p < .05$), we performed post-hoc analyses to determine the nature of the interaction term, as outlined by Aiken and West (1991) and Cohen, Cohen, West, and Aiken (2003). We ran simple regressions looking at the support slopes predicting parent-child interaction at high and low levels (one standard deviation $\pm$ the mean) of the stress variable.

Results

Predictors of Parenting Stress and Family Support

Parenting Stress—In the first set of regressions, maternal assets, maternal marital status, birth order, multiple birth, infant prematurity, and maternal depressive symptoms were examined as predictors of 24-month parenting stress (i.e., PDH, PSI-Total). Mothers of preterm multiples reported experiencing significantly more stress on the PSI-Total scale, $\beta = .157, p < .05$ and slightly more parenting daily hassles, $\beta = .235, p = .068$, than mothers of preterm singletons. In addition, mothers of more premature children reported fewer parenting daily hassles than mothers of less premature children, $\beta = .183, p < .01$, but they did not differ on the PSI, $\beta = .050, p = .51$. Compared to mothers of later-born children, mothers of firstborns reported fewer parenting daily hassles, $\beta = -.283, p < .01$, but similar scores on the PSI, $\beta = -.053, p = .38$. In addition, mothers with elevated depressive symptoms reported more parenting stress compared to mothers with fewer depressive symptoms ($\beta = .306, p < .01$ for the PDH scale and $\beta = .496, p < .01$ for the PSI-Total scale).

Family Support—The second set of regressions focused on predictors of 24-month family support. Married mothers reported receipt of more information, $\beta = .301, p < .01$, emotional, $\beta = .251, p < .01$, and instrumental, $\beta = .356, p < .01$, support from family members compared to unmarried mothers. Mothers of firstborn infants reported receipt of more information, $\beta = .268, p < .01$, and more instrumental support, $\beta = .228, p < .01$, than mothers of later-born infants. However, multiple birth was only associated with instrumental support at a trend level, $\beta = .147, p = .08$. Maternal SES assets and prematurity were not associated with family support variables.

Predictors of Mother-Child Interactions

In the third set of regressions, which tested the moderator function of family support, predictors of 24-month PCERA child play and maternal scaffolding during problem solving were examined. Maternal assets, maternal marital status, birth order, multiple birth, infant prematurity, and maternal depressive symptoms were entered in the first step. Parenting stress (i.e., PDH, PSI-Total) and support variables (i.e., emotional, information, and instrumental) were entered in the second step, and the stress X support interaction terms were entered in the third step. Post-hoc tests were conducted on significant interactions, as described above.

Free Play Interactions—In analyses predicting PCERA child scores, multiples, $\beta = .141, p < .05$, and infants who were less premature, $\beta = .171, p < .05$, engaged in more positive interactions than other children. In addition, children of mothers who reported more PSI-Total stress engaged in less positive interactions than children of mothers with less parenting stress, $\beta = -.196, p < .05$. Also, there was a significant interaction between PSI-Total X information support, $\beta = .276, p < .05$ (Table 2). At low stress levels, post-hoc tests

indicated there was no relation between information support and child play, $\beta = -.100$, $p = .40$, but at high levels of stress, more information support was related to more positive child play, $\beta = .325$, $p < .01$).

Maternal Scaffolding During Problem Solving—In the first step, multiple birth, $\beta = .194$, $p = .40$, and prematurity, $\beta = -.153$, $p = .40$, did not contribute to the model. In the second step, more instrumental support predicted more effective maternal scaffolding, $\beta = .163$, $p < .05$, whereas more emotional support predicted less effective scaffolding, $\beta = -.173$, $p < .05$. No interaction terms were statistically significant (Table 3).

Discussion

In this study of families of children born preterm, we tested a resilience model focusing on family support as a potential buffer of the relation between parenting stress and mother-child interactions. Although more parenting stress predicted less optimal child play behaviors, only one of these associations was affected by family support. For mothers who described greater parenting stress, there was a significant association between information support and positive child play; for mothers who reported less stress, there was no such association. This finding suggests that mothers who perceive more stressors related to parenting may benefit more from information support, as reflected in their child's interactive behaviors.

Although most twins and triplets are born prior to term (Martin et al., 2009), few studies examining differences in families of multiples compared to singletons have controlled for infant prematurity or birthweight (e.g., Ellison et al., 2005; Sheard et al., 2007; Sutcliffe & Derom, 2006). Therefore, it is difficult to know if parents of multiples may experience elevated stress because of having more than one infant or because of having more than one *premature* infant. In the present study, mothers of preterm multiples reported more total parenting stress and slightly more daily hassles than mothers of preterm singletons. However, the picture for families with premature multiples that emerged was complex, with areas of both strength and challenge. There were no significant differences in reported levels of emotional and information support between mothers of preterm multiples and singletons, and mothers of multiples reported only slightly more instrumental support. Considering the added parenting responsibilities and unique challenges involved in parenting multiple preterm infants, this finding was somewhat surprising. Previous studies have found that family support declines over time in families of preterm infants (Rowe & Jones, 2010; Pinelli, 2000), which may be particularly difficult for families of multiples. Yet we do not know the effects of non-familial supports, as we only assessed support from family members; we did not measure support provided by others, including professionals or peer support networks that may be important for preterm infants and multiple birth families.

We also found that premature multiples were more likely to engage in positive behaviors during play than preterm singletons, although maternal scaffolding during problem solving did not differ. These findings suggest that preterm multiples may become increasingly socially competent during play by two years of age, as they may have experienced many social interactions, not only with their parents but also with their same-age siblings, by that time. Our findings are consistent with Holditch-Davis et al. (1999), who documented few differences in parent-child interaction in families of premature multiples and singletons.

Although characteristics of young children are thought to play a lesser role in determining parenting quality compared to parent characteristics and context, level of prematurity or neonatal risk may be an important consideration for families raising preterm multiple or singleton infants (Bhutta, Cleves, Casey, Cradock, & Anand, 2002), though the direction of this association is not clear. Some studies have found that more medically fragile preterm

infants or those who were born earlier experience *less* positive mother-child interactions when compared to healthier preterm infants or those born closer to term (e.g., Muller-Nix et al., 2004; Singer, Fulton, Daullier, Koshy, Salvator, & Baley, 2003), but other studies have found the opposite effect (Poehlmann et al., 2011; Holditch-Davis, Cox, Miles, & Belyea, 2003). In the present study, preterm toddlers who were born earlier and at lower birthweights exhibited less responsiveness during free play with their mothers, consistent with the former group of studies. The variation in findings across studies may result from methodological differences; some studies included full-term comparison groups and others had within-group designs, including only preterm infants, such as the present study. Such variation may also reflect developmental differences resulting from the age at which children's interactive behaviors were assessed, with more problems in interactional capacities found at younger ages, including the toddler period. Indeed, previous studies have found that preterm infants' social interaction skills improve over time (e.g., Poehlmann et al., 2011). Quality of a preterm child's interactive behavior may also be predicted by variations in the family context, such as parental stress.

Our findings regarding parenting stress varied depending on the assessment tool used to capture such stress. Compared to parents of singleton preterm infants, parents of multiple preterm infants reported significantly greater global parenting stress as measured by the PSI, yet only slightly more daily stress on the PDH. In addition, mothers of more premature children and firstborn children reported fewer parenting daily hassles compared to mothers of less premature children and later born children, but the groups did not differ on the PSI. We suggest several reasons for these findings. First, a multiple premature birth is a non-normative event, which may be reflected in the PSI more than the PDH. Second, parents of more preterm infants may be aware of and therefore more understanding of day-to-day challenges associated with caring for a very preterm child, whereas global parenting stress may be similar, regardless of prematurity level. Third, when a firstborn child is preterm, fewer day-to-day stressors may occur for parents relative to those occurring when older children are in the home interacting with, and sometimes conflicting with, the preterm toddler.

On a related note, our data also showed that global stress, as reflected in maternal report on the PSI, may have stronger implications for children's interactions with their mothers than daily parenting stressors. Children of mothers reporting more stress on the PSI engaged in less positive interactions than children of mothers reporting less parenting stress, yet this relation was not present for the PDH. These findings suggest that non-normative stressors or general reactions to life events, such as those measured by the PSI, may be reflected in less child responsiveness, whereas daily challenges from prematurely-born toddlers may be expected or relatively normative and thus have fewer effects on child responsiveness. Moreover, the PSI includes a subscale focusing on children's difficult behaviors (as perceived by parents), which may also reflect child characteristics that are related to responsiveness during social interactions. Finally, although parents who described more PSI stress and who reported higher levels of information support had children who engaged in more positive play behaviors than other families, this interaction was not significant with the PDH. Information support from family members may help parents cope with more non-normative events or global stressors (as reflected in the PSI) but may be less relevant or helpful for the normative, challenging, day-to-day behaviors that are captured in the PDH. In other words, it appeared that information support provided by family members functioned as a protective factor for mothers experiencing high levels of global stress but not daily parenting hassles. Future research should examine specific areas of stress that could be buffered by information support in families of preterm multiples and singleton infants as they grow older.

Implications for Practice and Policy

These findings have implications for practitioners working with children born preterm. Assessment of global parenting stress may be important in helping to determine risk factors for more challenging parent-child interactions during the toddler period. Since most multiples are born preterm, anticipatory guidance in the prenatal and early postpartum period concerning the added parenting demands and support needs that continue beyond infancy may help decrease parenting stress in the toddler period. Referral to professional and lay community support organizations targeting multiple births can also provide important information and emotional support for multiple birth families (Bryan, 2003; Leonard & Denton, 2006) and should be investigated as important sources of support in future studies.

Consistent with our resilience model, more information support related to more positive child play behaviors at high levels of parenting stress, whereas there was no relation between information support and child play interactions at low levels of parenting stress. In addition, instrumental support predicted more effective maternal scaffolding during problem solving interactions. Because early parent-child interaction quality predicts subsequent developmental competencies for infants born preterm (e.g., Smith et al., 2006), identification of early predictors of interaction quality may direct intervention efforts to families of the most vulnerable preterm children and increase our understanding of resilience processes in a high-risk group.

This finding suggests that future interventions might focus on providing information support to high-risk families, especially for mothers of preterm infants likely to experience global parenting stress. Provision of instrumental support is important as well, including assistance with child care. Future research should also examine non-familial sources of information support, such as information from physicians or other professionals, and how this may have similar or different effects for mothers of preterm singleton and multiples. Research is also needed examining whether certain types of information are more effective in moderating the relation between parenting stress and parent-child interaction quality.

Further, since preterm multiple births are increasingly common, qualitative and quantitative studies of the unique and complex contexts and consequences of multiple preterm birth are urgently needed. Specifically, investigations of the effects of multiple birth, prematurity, and social support on parenting stress and parent-child relationships over time is essential. Future studies also should assess fathers in order to better understand their unique experience of stressors and support needs. Finally, interdisciplinary research on the family consequences of preterm birth, including preterm multiples, as well as the implications of new medical technologies, including assisted reproduction, and evolving health practices, are vital to the development of effective interventions and public policies that limit the adverse consequences of preterm birth on children and families (IOM, 2007).

Limitations

The limitations of our study should be noted when interpreting our findings. Although the attrition rate was relatively low, families that remained in the study were slightly more socioeconomically advantaged than ones who dropped out of the study. Thus, appropriate caution should be used in generalizing the findings to more socioeconomically stressed families. Given the large number of betas estimated in this study, caution should be used in interpreting trends. Though the study used multiple methods to collect data, maternal report of parenting stress and social support could have resulted in spurious findings because of shared method variance. Also, given the range of intervention services available for preterm infants, measuring family support without measuring formal supports (i.e., therapists) or satisfaction with support is a limitation of the study. Another limitation is our focus on

mother-child interactions rather than including measures of father-child interaction. This will be an important area of future research because father-child interaction plays a unique role in the development of infants, related to but distinct from that of the maternal role (Feldman, 2007). Finally, we did not assess whether mothers used assisted reproduction, which is important to include in future studies.

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Table 1

Bivariate Correlations and Descriptive Statistics (N = 152)

	1	2	3	4	5	6	7	8	9	10	11
1. Infant prematurity	--										
2. Maternal SES	.056	--									
3. Maternal CESD	-.008	-.344**	--								
4. PSI total	.065	-.171*	.514**	--							
5. PDH total	.250**	-.005	.268**	.546**	--						
6. Information support	.050	.222**	-.311**	-.212**	-.220**	--					
7. Emotional support	.009	.267**	-.276**	-.160*	-.090	.676	--				
8. Instrumental support	-.024	.219**	-.299**	-.225**	-.155	.566	.554	--			
9. PCERA child	.177	.315**	-.187*	-.218**	.023	.138	.032	.148	--		
10. PCERA parent	.176	.464**	-.325**	-.138	.100	.212	.118	.233	.504	--	
11. Scaffolding total	-.073	.380**	-.175*	.007	.063	.178	.081	.255	.281	.395	--
Range	-4.39 – 3.90	-4.49 – 9.89	0–51	135–354	12–121	0–3	0–3	0–9	3.00–4.70	2.17–4.07	15–75
Mean	0.06	0.07	8.69	217.75	56.42	1.86	2.10	4.39	4.01	3.17	47.29
S.D.	1.93	2.36	7.91	35.39	18.21	1.06	0.99	2.38	0.37	0.43	14.98

Note.

* $p < .05$,

** $p < .01$.

SES; Socioeconomic status; CESD; Center for Epidemiological Studies-Depression; PSI; Parenting Stress Index; PDH; Parenting Daily Hassles; PCERA; Parent-Child Early Relational Assessment

Table 2
Parenting Stress X Family Support Interactions Predicting 24-month PCERA Child Scores

Step	Predictor	Results with PDH Parenting Stress as a Predictor				Results with PSI Parenting Stress as a Predictor			
		β	<i>t</i>	Sig.		β	<i>t</i>	Sig.	
1	Maternal SES assets	.217	1.896	.068		.228	1.896	.068	
	Maternal marital status	.022	.408	.684		.038	.408	.684	
	Child is first born	.029	.112	.911		-.021	.112	.911	
	Maternal CESD	.007	-.510	.610		.068	-.510	.610	
	Multiple birth	.141*	2.561	.010		.203*	2.561	.010	
	Infant prematurity	.171*	2.315	.021		.152*	2.315	.021	
2	Maternal SES assets	.248	2.041	.051		.247*	2.097	.045	
	Maternal marital status	.012	.195	.845		.011	.231	.818	
	Child is first born	-.002	-.177	.860		-.062	-.337	.736	
	Maternal CESD	.008	-.479	.632		.140	.525	.600	
	Multiple birth	.150*	2.427	.015		.231*	2.934	.003	
	Infant prematurity	.161*	2.072	.038		.155*	2.357	.018	
	Parenting stress	.001	.301	.764		-.167*	-1.999	.046	
	Information support	.244	1.466	.143		.168	1.349	.177	
	Emotional support	-.288	-1.931	.053		-.187	-1.824	.068	
	Instrumental support	.022	.718	.473		.042	.462	.644	
3	Maternal SES assets	.237	1.847	.079		.252*	2.205	.036	
	Maternal marital status	-.018	-.008	.994		-.016	-.074	.941	
	Child is first born	-.035	-.473	.636		-.097	-.609	.543	
	Maternal CESD	.007	-.570	.569		.167	.831	.406	
	Multiple birth	.144*	2.190	.029		.254*	3.105	.002	
	Infant prematurity	.172*	2.025	.043		.138*	2.208	.027	
	Parenting stress	.014	.575	.565		-.196*	-2.275	.023	
	Information support	.206	1.282	.200		.149	1.234	.217	

Step	Predictor	Results with PDH Parenting Stress as a Predictor			Results with PSI Parenting Stress as a Predictor		
		β	<i>t</i>	Sig.	β	<i>t</i>	Sig.
	Emotional support	-.249	-1.697	.090	-.160	-1.634	.102
	Instrumental support	.028	.703	.482	.041	.445	.656
	Parenting stress X information support	.224	1.452	.148	.276*	1.997	.049
	Parenting stress X emotional support	-.162	-1.196	.233	-.173	-.555	.584
	Parenting stress X instrumental support	-.059	.943	.351	.036	-.164	.871

Note.

* $p < .05$.

Table 3
Parenting Stress X Family Support Interactions Predicting 24-month Maternal Scaffolding

Step	Predictor	Results with PDH Parenting Stress as a Predictor			Results with PSI Parenting Stress as a Predictor		
		β	<i>t</i>	Sig.	β	<i>t</i>	Sig.
1	Maternal SES assets	.266*	2.645	.008	.276*	2.645	.008
	Maternal marital status	.190	1.746	.081	.174	1.746	.081
	Child is first born	.134	.945	.344	.096	.945	.344
	Maternal CESD	.117	-.046	.963	.136	-.046	.963
	Multiple birth	.218	.834	.404	.194	.834	.404
	Infant prematurity	-.117	-.848	.397	-.153	-.848	.397
2	Maternal SES assets	.276*	2.895	.004	.300*	3.092	.002
	Maternal marital status	.161	1.256	.209	.146	1.146	.252
	Child is first born	.127	.840	.401	.082	.425	.671
	Maternal CESD	.091	-.309	.758	.080	-.636	.525
	Multiple birth	.178	.309	.757	.150	.298	.766
	Infant prematurity	-.122	-1.254	.210	-.142	-.918	.359
	Parenting stress	.090	1.644	.104	.096	1.604	.109
	Information support	.098	1.254	.210	.009	1.106	.269
	Emotional support	-.207*	-2.395	.017	-.173*	-2.300	.021
	Instrumental support	.154*	2.127	.033	.163*	2.212	.027
3	Maternal SES assets	.285*	2.956	.003	.299*	3.119	.002
	Maternal marital status	.164	1.309	.191	.154	1.150	.250
	Child is first born	.131	.954	.340	.092	.494	.621
	Maternal CESD	.076	-.430	.667	.075	-.560	.576
	Multiple birth	.192	.785	.433	.149	.273	.785
	Infant prematurity	-.109	-1.065	.287	-.140	-.877	.381
	Parenting stress	.085	1.633	.104	.094	1.479	.139
	Information support	.098	1.285	.199	.011	1.068	.286
	Emotional support	-.207*	-2.351	.019	-.177*	-2.267	.023

Step	Predictor	Results with PDH Parenting Stress as a Predictor				Results with PSI Parenting Stress as a Predictor			
		β	<i>t</i>	Sig.		β	<i>t</i>	Sig.	
	Instrumental support	.158*	2.108	.035		.160*	2.178	.029	
	Parenting stress X information support	-.029	-.396	.696		-.021	-.083	.934	
	Parenting stress X emotional support	-.053	-.797	.430		.060	.540	.590	
	Parenting stress X instrumental support	-.040	-.259	.797		-.085	-.635	.526	

Note.

* $p < .05$.