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Attachment Security Among Mothers and Their Young Children Living in Poverty: Associations with Maternal, Child, and Contextual Characteristics

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In order to extend previous research and inform intervention programs, the goal of the present study was to further understand variability in mother-child attachment security among high-risk families living in poverty. Mothers (65% Hispanic) and their young children who were in a home visitor program ($n = 74$) to connect families with basic services or who were on the waiting list ($n = 27$) for the program were visited at home. Mothers completed the Attachment Q-Set, the Parenting Stress Index, and a questionnaire on beliefs about the role of play in children's development and parenting efficacy in either Spanish or English. Observers assessed maternal sensitivity and the presence of appropriate play materials. Results indicated that maternal, child, and contextual variables were significantly associated with attachment security. Furthermore, greater cumulative assets were related to more secure attachment relationships.

A review of research reveals substantial variability in the likelihood of mother-child attachment security within both high-risk and low-risk populations (Spieker & Booth, 1988; Susman-Stillman, Kalkoske, Egeland, & Waldman, 1996; Weinfield, Sroufe, & Egeland,

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2000). Furthermore, given that in many studies, the majority of infants in high-risk samples are securely attached (e.g., Susman-Stillman et al., 1996), poverty per se does not appear to be a determinant of insecure attachment. The goal of the present study was to further understand the variability in mother-child attachment security among high-risk families living in poverty. Using an ecological perspective (Bronfenbrenner, 1989), the present study seeks to extend previous research by simultaneously examining multiple factors from the domains of maternal, child, and contextual characteristics as determinants of attachment security (e.g., Belsky, 1996; Belsky & Isabella, 1988).

Maternal Characteristics

SENSITIVITY

Ainsworth theorized that a sensitive, responsive caregiver was crucial to the development of secure attachments during infancy (Ainsworth, Blehar, Waters, & Wall, 1978). In the past several decades, numerous studies have documented the association between sensitivity and attachment security, and two meta-analyses have confirmed this association (De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987). However, given that the effect sizes from these meta-analyses varied (r_s .16 to .24) depending upon which studies were included, maternal sensitivity is likely not the exclusive determinant of attachment security. These findings indicate that a multidimensional approach to understanding attachment may be useful and that findings from middle-class samples may not generalize to other populations. For example, in the De Wolff and van IJzendoorn meta-analysis, the association between sensitivity and attachment security was moderated by socioeconomic status; lower-class samples yielded a smaller effect size than did the middle-class samples. Accordingly, De Wolff and IJzendoorn suggested that greater attention to an evaluation of contextual factors may be necessary in order to examine the accumulation of stressors in lower-class samples. Thus, the present study examined a number of maternal characteristics, including maternal depression, beliefs, and efficacy, in addition to maternal sensitivity as correlates of attachment security in a diverse sample of women and their young children.

MATERNAL DEPRESSION

Given that maternal depression is linked to less-sensitive maternal behavior (Gelfand & Teti, 1990), one would expect maternal depression to be associated with higher rates of insecure attachments. In fact,

there appears to be a fairly reliable association between depression and insecure attachment when attachment is assessed at or after 15 months (DeMulder & Radke-Yarrow, 1991; Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Teti, Gelfand, Messinger, & Isabella, 1995). For example, Murray et al. (1996) found that maternal depression increased the likelihood of insecure attachment. Although maternal depression was associated with less competent maternal behavior, maternal behavior was not associated with attachment security. Thus, it remains unclear whether maternal depression is associated with factors other than maternal behavior that produce attachment insecurity. Murray et al. also found that mothers who experienced stress and depression simultaneously were more likely to have children who were insecurely attached than mothers who experienced either stress or depression alone. This finding indicates that cumulative risk factors may increase the likelihood of insecure attachment relationships.

MATERNAL EFFICACY AND BELIEFS

Parents who believe that their children are responsive to their parenting efforts may be more likely to invest time in effective parenting practices, thus increasing the likelihood of secure attachment. Mothers with higher self-efficacy may be more responsive and engaged with their children, and thus, efficacy may mediate the relationship between depression and maternal sensitivity (Teti & Gelfand, 1991). In fact, Spieker and Booth (1988) found that parental efficacy tended to predict the quality of mother-infant attachment relationship in a sample of mothers with low social support participating in an intervention program. Mothers with secure infants reported significantly more confidence in coping with motherhood tasks than did mothers with insecure-resistant infants.

In summary, a variety of maternal characteristics are associated with the quality of the mother-child relationship. Both maternal sensitivity and parental efficacy appear related to secure mother-child attachments. Moreover, maternal depression appears to limit maternal sensitivity and is associated with higher rates of insecure mother-child attachment. Parental efficacy is associated with secure attachment quality. Despite these findings, we have little empirical data on the individual and additive contributions of these variables to attachment security in families at risk due to low socioeconomic status. Therefore, the present study examined the associations among maternal sensitivity, maternal depression, maternal efficacy and beliefs about play, and attachment security among families living in poverty, many of whom were first-generation immigrants to the United States.

Child Characteristics

In addition to questions regarding the impact of maternal characteristics on attachment security, another debate in the attachment literature concerns the extent to which child characteristics, specifically child temperament, affect attachment quality. Attachment theorists have argued that temperament does not directly affect the quality of attachment (Sroufe, 1985), whereas others have argued that temperament affects attachment relationships by affecting caregiver-child interactions (e.g., Kagan, 1982). Empirical studies of the direct relationship between infant temperament and attachment as measured in the Strange Situation have resulted in mixed findings (Goldsmith & Harmon, 1994). However, a number of studies that have examined attachment security using Waters' (1995) Attachment Behavior Q-Set (AQS) found moderate correlations between difficult temperament and less secure attachment relationships (Hadadian & Merbler, 1996; Pederson et al., 1990; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996; Teti, Nakagwa, Das, & Wirth, 1991). For example, Seifer et al. (1996) found that observed and parent-rated difficult temperament were associated with lower security scores, even when controlling for maternal sensitivity. As in the Teti et al. (1991) and Pederson et al. (1990) studies, the present study examined maternal reports of child difficulty on the Parenting Stress Index (PSI) in relation to maternal sorts of the AQS. The present study extends the previous research by examining the predictive value of child characteristics to attachment security in the context of maternal and contextual characteristics.

Contextual Characteristics

For the most part, studies have focused on maternal and infant contributions to the dyadic relationship, ignoring contextual characteristics of the family (Belsky & Isabella, 1988). Viewing the attachment relationship as multiply determined means that both proximal and more "distal" (Belsky, 1996) correlates should be examined. Two such distal factors are maternal social support and the physical environment of the child.

SOCIAL SUPPORT

Several studies have documented a positive association between secure attachment and spousal support (Belsky & Isabella, 1988; Crnic, Greenberg, & Slough, 1986; Goldberg & Easterbrooks, 1984; Spieker & Booth, 1988; Teti et al., 1991). In a study of an at-risk population, the number of people in a parent's social network as well as the number of supportive people in a parent's social network predicted security of attachment in the mother-child relationship (Frodi et al.,

1984). Most studies, however, have not found a direct association between social support (defined separately from marital support) and mother-child attachment (for review see Berlin & Cassidy, 1999).

PHYSICAL ENVIRONMENT OF THE CHILD

A securely attached child is able to balance two distinct systems of behavior: exploratory behavior and attachment behavior (Ainsworth & Bell, 1974; Ainsworth et al., 1978). Attachment behavior keeps the attachment figure in proximity through behaviors such as signaling and proximity seeking, while the exploratory system allows the child to engage the environment through play, locomotion, manipulation, and visual investigation. Although traditional attachment theorists did not promote the importance of the physical environment, a push to examine the broader context when examining the parent-infant attachment relationship has been proposed (e.g., Belsky, 1999). For example, aspects of the physical environment may encourage the child to leave an attachment figure to explore, thereby promoting an optimal balance between attachment behavior and exploratory behavior. In fact, Ainsworth and Bell reported that the availability of toys was associated with greater infant competence. Thus, it seems reasonable to suggest that aspects of the physical environment that encourage exploratory behavior may be associated with attachment security.

Other evidence of the importance of the quality of the physical environment comes from studies conducted by Wachs (Wachs, 1990; Wachs & Camli, 1991). For example, Wachs and Camli (1991) found that the presence of more toys was associated with greater parental involvement and with more verbal responses to the child's vocalizations. In a different study, Wachs (1990) found that the number of audiovisually responsive toys predicted quality of play in 1-year-olds. In addition, children whose parents were uninvolved but had high numbers of objects available in the home showed higher quality play than children whose parents were uninvolved but did not have many objects and toys available. These findings suggest that the physical play environment, as well as social context, may be important contributors to security of attachment. Accordingly, this study will explore the role of the physical context, in terms of the availability of age-appropriate toys, for predicting mother-infant attachment security.

Cumulative Assets

Research on risk and resilience suggests that family resources or assets (such as social support) may buffer family stressors (e.g., maternal depression, child difficult temperament) (Garmezy, Masten, & Tel-

legen, 1984). Furthermore, multiple risk factors considered together often explain greater variance in child outcomes than any individual risk factor (Seifer, 1995). Therefore, it is important to know whether any individual risk factor accounts for unique variance in predicting child outcomes in the context of other risk variables (Seifer, 1995). However, much previous research has examined one or two predictors of attachment security without considering the larger context or the factor in combination with other factors.

Notable exceptions to the lack of research on the effect of multiple risks and assets on attachment quality include Belsky and Isabella (1988), Belsky, Rosenberger, and Crnic (1995), and Cicchetti, Rogosch, and Toth (1998). For example, Cicchetti et al. (1998) found that although maternal depression was a significant predictor of attachment security (as measured by mothers' sorts on the AQS), contextual risk was not. Given the high socioeconomic status of the sample, it may be that other, unmeasured protective factors buffered the attachment relationship from contextual risk factors. Another study examined the joint contribution of maternal personality, marital quality, and mother's perceptions of temperament to security of attachment (Belsky & Isabella, 1988). Scores on each variable that fell above the median were considered protective factors or assets, and those below the median were considered risk factors. In families where all three domains were protective, 92% of the infants were securely attached. Of those participants where all three domains fell below the median, only 17% were securely attached. These findings suggest that as stresses accumulate, the likelihood of insecure attachment also increases. A similar study with middle-class mothers and their sons also demonstrated that greater assets predicted greater attachment security (Belsky et al., 1995).

The only study to examine cumulative assets and stresses as predictors of attachment security in a low-income sample (Shaw & Vondra, 1993) found no significant associations between individual stressors and attachment security. They also found that families with two stressors were more likely than expected by chance to have secure infants, whereas families with three or four stressors were more likely to have insecurely attached infants. These studies indicate that understanding attachment security may depend upon a simultaneous consideration of multiple stressors and assets, rather than considering individual factors in isolation.

Present Study

In summary, the present study was designed to assess the associations among maternal, child, and contextual characteristics and the

quality of attachment in a low SES sample with a high percentage of immigrant and non-English-speaking mothers. We expected positive relationships between maternal sensitivity, maternal efficacy, and the provision of appropriate play materials and security of attachment. In contrast, parental stresses, such as maternal depression and difficult child temperament, were expected to predict insecure attachment quality. Finally, we expected cumulative resources of families to be positively related to attachment security and cumulative stressors to be associated with insecure attachment relationships.

Method

Participants

Participants were 101 mother-toddler dyads participating in a home visitor program ($n = 73$) or on the waiting list for the program ($n = 28$). Mothers' age ranged from 16 to 44 years, $M = 27.6$ years, $SD = 6.6$ years; children ranged in age from 12 to 57 months, $M = 33$ months, $SD = 11$ months. Thirty-one percent of children were first-borns; 53% percent were girls. The number of children in the household ranged from 1 to 8; $Mdn = 3$.

Thirty percent of the mothers had an 8th-grade education or less; 22% had completed more than 8th grade but less than a high school education; 31% had completed high school or had received a GED; 15% had completed some college or more. Twenty-six percent of the mothers were employed. Sixty-five percent of the mothers were Hispanic, 26% Caucasian, 6% Black, 2% Native American, and 1% Asian. Sixty percent of the mothers were born outside of the United States. Of those born outside of the United States, 86% were born in Mexico, 6% in Somalia, 4% in Guatemala, and 2% each in Peru and Brazil. Thirty-six percent of the mothers spoke English only; 41% spoke Spanish only; 23% were bilingual (all spoke Spanish and English, with the exception of one, who spoke Somalian and English). Sixty percent of the mothers were married; 32% were never married; 8% were divorced or separated. Fifty-four percent of the families had three or more adults in the home. Household income ranged from \$0–\$2,800 per month; $M = \$1,113$; $Mdn = \$1,200$; $SD = \$653$.

Procedure

Participants were recruited through a community agency providing home visitor services in three zip code areas within a large, western U.S. city. These zip code areas were targeted because they showed a

number of risk factors, including high rates of infant mortality and crime, and low rates of prenatal and health care. The purpose of the program was to connect clients to basic services, such as health care, and to meet the basic needs of families. Paraprofessional home visitors connected families with government and private nonprofit agencies. Program participants were assisted with transportation, food, clothing, and medical needs and were referred to English as a Second Language courses if interested. The program did not focus on improving parent-child relationships, but those who worked for the program were eager to learn about parent-child educational focuses that could be incorporated into their program.

Home visitors recruited families with children under the age of 5 for the program by canvassing zip code areas. To be eligible for the present study, families had to have a child between 12 and 57 months. Home visitors obtained clients' permission to be contacted by a research assistant. Potential study participants were informed that the information collected was confidential and that they could refuse to participate with no effect on the services they received. The participation rate among eligible clients was 83%. The waiting-list participation rate was 50%. Of those waiting-list families who were contacted, none actually refused participation, but 50% of the families were unable to make appointments or made appointments and did not keep them. Follow-up attempts to contact these families (because many families did not have telephones, researchers visited their homes at different times of day) were not successful.

Upon recruitment into the study, one or two research assistants visited mothers in their homes at the mothers' convenience. Interviews and questionnaires were completed in either Spanish or English, depending upon the mothers' preference. In all cases, researchers offered to read the instruments to the mothers. A subsample ($n = 45$) from the study indicated that the total amount of time spent in an individual's home ranged from 75 to 390 minutes, $M = 132$ minutes. The number of home visits required to complete the measures ranged from one to three, with a median of one appointment. Participants were given a gift certificate for \$10 to a local grocery store for each visit.

Measures

DEMOGRAPHIC INFORMATION

Mothers reported on the following demographic information: age of child, child's birth order, number of children in the home, maternal age, family income, marital status, education, ethnicity, birthplace, number of adults in the household, and employment status.

MATERNAL SENSITIVITY

The Home Observation for the Measurement of the Environment (HOME) inventory examines the intellectual and social environment of the child through direct observation and semistructured interview questions (Caldwell & Bradley, 1984). The HOME was used to measure parenting skills, specifically sensitivity and responsiveness of the mother, and the presence of appropriate play materials in the home. Each item was scored either "yes" or "no"; positively scored items were given 1 point, and items were worded so that higher scores represented more positive parenting. The infant version of the HOME was used for children ages 12–35 months and the preschool version for children ages 36–57 months. One of two researchers completed the HOME measure for all participants. Reliability (90% agreement) on the HOME was established on three visits; subsequently, 20% of the visits were checked for reliability between raters. Interrater reliability ranged from 82%–100% agreement, $M = 92%$ across observation items. Disagreements were resolved through conferencing.

For this study, 10 observation items reflecting responsiveness and sensitivity were used from both the infant and preschool version. Although two different versions of the HOME were used, each item reflected the same underlying construct, modified to be age appropriate. A sample item for mothers of younger children is: "Mother responds to child's vocalizations with a vocal or verbal response." For older children, the item reflected the better language skills of the children: "Mother answers child's questions or requests verbally." Thus, items from both versions were designed to assess the extent to which the mother responded appropriately to the child's signals and needs. Each item was scored on an occurrence ($= 1$)/nonoccurrence ($= 0$) basis. The average of the 10 items constituted the observed sensitivity score (see Table 1 for descriptive information). Bradley et al. (1989) also considered the preschool and infant versions equivalent because of a high degree of item overlap and because the correlation (.44) between the two versions given one year apart was similar to the one-year stability estimate for the infant version. Means and standard deviations for the infant and preschool versions were similar, and the median was identical ($Mdn = .80$) for both versions. Cronbach's alphas were acceptable ($\alpha = .76$ for both the infant and preschool versions).

The HOME was also used to measure the presence of basic, age-appropriate play materials in the home. Observers rated the presence/absence of these materials in the home. When observers were unable to identify the presence of the play material, mothers were asked in a semistructured interview about the presence of such items. Although

Table 1. Descriptive Statistics on Attachment Security and Maternal, Child, and Contextual Variables

<i>Variable</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Range</i>
Attachment security	0.32	0.20	-0.10 – .67
<i>Maternal characteristics</i>			
Efficacy	4.60	0.56	1.56 – 5.00
Beliefs	2.59	0.98	1.00 – 5.00
Depression	21.46	6.24	9.00 – 40.00
<i>Maternal behavior</i>			
Observed sensitivity	0.75	0.22	0.10 – 1.00
<i>Child characteristics</i>			
Difficult temperament	30.46	6.62	15.00 – 47.00
<i>Contextual characteristics</i>			
<i>Play materials</i>			
Infant version	6.19	2.32	2.00 – 9.00
Preschool version	6.74	2.08	0.00 – 11.00
Low social support	4.95	1.52	2.14 – 8.33

the individual items differed for the two versions, each version was designed to assess stimulation in the home through the provision of developmentally appropriate play materials. The infant version contained 9 items, whereas the preschool version contained 11 items. Although some of the individual items were not the same for the two versions, they both reflected the presence of developmentally appropriate toys (Bradley et al., 1989). Furthermore, Bradley et al. found that the correlation between the infant and preschool versions administered one year apart (.58) was similar to the one-year stability estimate for the infant version ($r = .55$). Items were coded on a presence (= 1) or absence (= 0) basis, then summed to create a composite score (see Table 1 for descriptive information). Cronbach's alphas were acceptable: for the infant version, $\alpha = .71$; for the preschool version, $\alpha = .67$. Given that there were different numbers of items in the composite scores for the infant and preschool versions, composite scores were converted to z -scores, and these scores were used for all analyses.

PARENTING STRESS

The Parenting Stress Index assesses the level of stress that the parent experiences in relation to his or her parenting role (Abidin, 1995). Parents respond on a 5-point Likert scale ranging from strongly agree

to strongly disagree. This study included items from both the long and short forms comprising the subscales that measure *depression*, *low partner support*, *isolation*, and *difficult child* (see Table 1 for descriptive information). Items for each subscale were averaged. The PSI was standardized for use with parents of children varying in age from 1 month to 12 years (Abidin, 1995). Thus, the age range of children in the present study is acceptable for the PSI. The Depression subscale, composed of 9 items, is a measure of maternal depressive symptoms. The Difficult Child subscale was composed of 12 items and assessed the parents' perceptions of difficult child temperament. The Low Partner Support subscale, consisting of 7 items, measures emotional and active support of the other parent in the area of child management. Items were worded to indicate support from the child's father, and higher scores indicated less support. The Isolation subscale, composed of 6 items, measures the extent of social isolation from peers, relatives, and other emotional support systems. To reduce the number of variables to preserve power, and because Low Partner Support and Isolation were correlated, $r(89) = .60, p < .001$, Low Partner Support and Isolation were combined to form a Low Social Support composite variable.

In the development of the Spanish PSI, four researchers initially translated the English version. Next, they revised the items to include simple and concise sentence structures and words common to the different dialects of Spanish. A back translation was then performed. In a study in which bilingual participants completed the PSI in both Spanish and English, researchers found high correlations and a similar factor analytic structure, indicating that the Spanish version is a good reflection of the English version (Solis & Abidin, 1991). Furthermore, the Spanish translation was able to discriminate between groups of low SES, immigrant mothers of disabled versus nondisabled children (Solis & Abidin, 1991) and between Puerto Rican mothers whose children had been clinically referred and mothers whose children had not been clinically referred (Perez, 1989). These findings indicate that the Spanish version shows construct validity. Replicating previous research using the PSI, Cronbach's alphas for the Parenting Stress Index subscales were acceptable and similar for the English and Spanish versions: Depression (.79 English, .84 Spanish), Low Social Support (.89 English, .76 Spanish), and Difficult Child (.69 English, .72 Spanish).

PARENTAL EFFICACY AND BELIEFS

The Parental Involvement and Efficacy scale (PIE) describes parental efficacy in the areas of children's health, social skills, and cog-

nitive development. Several items were adapted from scales of Luster and Rhoades (1989) on parental beliefs and parental efficacy. *Efficacy* in this measure was defined as a parent's belief that a child's learning and behavior are contingent on parental input. These items were scored on a 5-point Likert scale ranging from strongly disagree to strongly agree. Five of the items were reverse scored. Nine items were averaged to compute a composite score of maternal efficacy. A higher score on the measure indicates a stronger belief in parental efficacy and involvement. A sample item includes "I can do a lot to help my child be excited about learning." A second composite score, called *play beliefs*, was created from the mean of two items assessing beliefs about the role of playing in children's development: "Most of what children do in kindergarten is playing and not really learning," and "Most of what children do in preschool is playing and not really learning." Higher scores indicated greater belief in playing as an important part of learning. In order to derive the Spanish version of this measure, it was translated into Spanish, then back translated into English. Cronbach's alphas were acceptable and similar for both the English and the Spanish versions (efficacy: .88 for Spanish, .83 for English; beliefs: .64 for both Spanish and English versions).

ATTACHMENT SECURITY

The Attachment Behavior Q-Set (Waters, 1995) was used to measure security of attachment. This instrument includes 90 items describing a range of secure-base behavior of infants and young children, such as: "When child is near mother and sees something he wants to play with, he fusses or tries to drag mother over to it," and "Child readily shares with mother or lets her hold things if she asks to." Waters describes the instrument as appropriate for 1- to 5-year-olds.

Mothers were trained to complete the Q-set and supported by the research assistant as they sorted the cards. Research assistants answered questions, clarified items, and read items to mothers. The decision to have mothers complete the AQS was made for a number of reasons: First, some have argued that mothers' sorts may be better than observers' sorts because mothers have access to the most representative sample of their child's secure base behavior (Teti & McGourty, 1996). Second, given that the population had a high mobility rate, that families were difficult to contact because of the lack of phones in many homes, and that they often did not keep appointments, we expected it would be difficult for observers to complete the multiple home visits required to obtain a representative sam-

ple of the children's secure-base behavior. Third, research using mothers' and observers' sorts indicate moderate associations between mothers' and observers' security scores based on the AQS (Teti & McGourty, 1996; Pederson & Moran, 1995) and stronger associations when observers obtain representative samples of child secure base behavior (Teti & McGourty, 1996). Evidence of the validity of mothers' sorts comes from studies showing that infants rated as insecurely attached in the Strange Situation show lower security scores on mothers' sorts on the AQS (Pederson, Gleason, Moran, and Bento, 1998). Moreover, other research has indicated that maternal sorts on the AQS show predictive validity consistent with attachment theory. For example, preschooler attachment security (using maternal sorts on the AQS) is associated with children's greater compliance (Laible & Thompson, 2000), with less negativity and greater sociability (Teti et al., 1991), with greater understanding of negative emotions (Laible & Thompson, 1998), and with greater maternal warm and supportive parenting (Frosch, Mangelsdorf, & McHale, 2000; Teti et al., 1991). Furthermore, observers' ratings of maternal sensitivity were correlated with attachment security four months later using mothers' sorts on the AQS (Pederson & Moran, 1995). Thus, the decision to use mothers' sorts on the AQS was made for both practical and conceptual reasons.

The AQS requires a fixed distribution. Initially, mothers sorted the 90 items into three piles of approximately 30 cards, indicating which ones were least like their child, somewhat like their child, and most like their child. These three groups of cards were each divided again into three subgroups. Items were adjusted until there were 10 items in each of 9 categories, resulting in a 9-point Likert scale. The placement of each item by the mother was then correlated with a criterion sort of the "most secure child" developed on the basis of experts' sorts of the items. The resulting coefficient ranges from -1 to $+1$, with $+1$ representing the most secure attachment possible.

A Spanish version of the Q-sort (Posada et al., 1995), developed for use with a low-income, poorly educated mothers, was used with those clients who preferred Spanish. The researcher was familiar with both the English and Spanish versions, and Waters' explanations of each item, in order to clarify items for the respondents. Posada et al. used the AQS across diverse cultures (and languages) and found that experts' descriptions of secure-base behavior on the AQS were very similar (r s from .74 to .93) across the seven countries studied. These findings indicate that the AQS is valid across cultures and languages and that diverse cultures can use the same criterion sort for security.

Results

The objective of this study was to examine the relationships among maternal and child characteristics (e.g., maternal depression and child temperament), contextual variables (e.g., social support and play materials), and mother-child attachment security. First, preliminary analyses were conducted to determine the demographic variables that would be used as control variables in the regression analyses. Second, an examination of correlations among the seven predictor variables (i.e., maternal efficacy, beliefs, depression, and sensitivity, child difficult temperament, provision of play materials, low social support) and attachment security provided a preliminary test of hypotheses regarding their relationship to attachment security. Next, sequential regression analyses were conducted to determine the joint effect of maternal characteristics, child temperament, and available play materials on attachment security, controlling for education and ethnicity. The final set of analyses involved the examination of the relation between cumulative family assets and attachment security. An alpha level of $p < .05$ was used for all analyses.

Preliminary Analyses

Analyses were conducted to determine whether waiting-list participants differed from program participants on demographic characteristics. A multivariate analysis of variance (MANOVA) with education, client age, income, and number of adults in the household as the dependent variables and program status as the independent variables was significant, $F(4,87) = 2.56, p = .04, \eta^2 = .11$. Follow-up univariate analyses of variance indicated that participants on the waiting list for the program were less educated, $M = 8.66$ years, $SD = 3.66$, than participants in the program, $M = 10.23$ years, $SD = 3.08, F(1,90) = 4.55, p = .04, \eta^2 = .05$. Furthermore, chi-square analyses revealed that participants on the waiting list were more likely to be born outside of the United States, $\chi^2(1, N = 84) = 7.05, p = .005$, Goodson and Kruskal $\tau = .10$, and to be Hispanic, $\chi^2(3, 98) = 8.38, p = .03$, Goodson and Kruskal $\tau = .09$. However, there were no significant differences in client age ($p = .19$), income ($p = .24$), or number of adults in the household ($p = .08$) between waiting-list and intervention participants. A MANOVA examining child age, number of children in the home, and birth order indicated no significant differences between waiting-list participants and those in the program, $F(3,96) = 1.11, p = .35$. Nonsignificant chi-square analyses indicated that program participants and those on the waiting list did not differ on marital status ($p = .85$), employment status ($p = .66$), or receipt of government aid ($p = .26$).

In addition to examining differences between program participants and those awaiting services, preliminary correlations and MANOVAs were conducted to examine whether demographic variables (i.e., income, education, maternal age, child age, ethnicity, and child birth order) were associated with the predictor variables and attachment security. These analyses revealed that higher maternal education was associated with greater belief in the importance of preschool and kindergarten as a learning tool, $r(97) = .46, p < .001$; less depression, $r(89) = -.41, p < .001$; greater social support, $r(89) = -.28, p < .01$; perceptions of children as less difficult, $r(88) = -.38, p < .001$; and greater attachment security, $r(96) = .30, p < .01$. A MANOVA with ethnicity (Latino, non-Latino) as the between subjects factor and the Parenting Stress subscales as the dependent variables was significant, $F(3,83) = 4.71, p = .004, \eta^2 = .15$. Follow-up univariate F tests indicated that Latino mothers were less depressed than non-Latino mothers, $F(1,85) = 8.30, p < .01, \eta^2 = .09$. A MANOVA with ethnicity as the between subjects factor and parenting beliefs and efficacy as the dependent variables indicated that ethnicity was related to parenting beliefs, $F(2,95) = 6.74, p < .01, \eta^2 = .12$. Follow-up univariate F tests showed that Latino mothers were less likely to believe in the importance of play in preschool and kindergarten as promoting learning than were non-Latino mothers, $F(1,96) = 13.21, p < .001, \eta^2 = .12$. Income, maternal age, child age, child gender, and birth order were not related significantly to the predictor variables (i.e., maternal efficacy, beliefs, depression and sensitivity, child difficult temperament, provision of play materials, low social support) or attachment quality, and thus, were not included in further analyses.

Intervention Effects

Given that the home visitor program did not focus on parenting strategies, we did not expect the intervention and waiting-list groups to differ. However, to test for such differences, a series of multivariate analyses of covariance (MANCOVAs) were conducted, with intervention program as the between subjects variable. Since the waiting-list participants were less educated than participants in the intervention program, education was included as a control variable in these analyses. These analyses indicated that once education was controlled, there were no significant differences between the groups on attachment security or the predictor variables (efficacy, beliefs, depression, low social support, sensitivity, play materials, or difficult temperament). Thus, all further analyses combined the two groups of participants.

Bivariate Correlations Among Predictor Variables and Attachment Security

The next set of analyses examined intercorrelations among predictor variables and between these predictors and attachment security (see Table 2). An examination of associations among predictor variables indicated that perceptions of difficult temperament were associated with greater depression, less social support, and the belief that preschool and kindergarten were important for learning. Furthermore, maternal depression was related to lower levels of maternal sensitivity and less social support.

Analyses examining the correlations between predictor variables and attachment security revealed that greater attachment security was associated with greater beliefs in preschool and kindergarten as a learning tool, greater observed maternal sensitivity, the presence of appropriate play materials in the home, lower levels of maternal depression, and perceptions of less difficult child temperament.

Predicting Attachment Security from Maternal, Child, and Contextual Characteristics

The next set of analyses examined the joint contributions of demographic variables and maternal, child, and contextual characteristics to attachment security using a sequential regression model. Sequential regression was chosen because it allows independent variables (or sets of variables) to be entered into the equation in an order specified by the researcher. Maternal education was included in the model because it was related to attachment security and because the intervention and waiting-list groups differed on education levels. Similarly, because Latino and non-Latino participants differed on maternal depression, ethnicity was included as a control variable in the regression equations. Maternal, child, and contextual characteristics were chosen to be included in the regression equation on the basis of significant bivariate correlations. Thus, the final set of predictors for the regression models included maternal education, ethnicity, sensitivity, depression, and beliefs; difficult child temperament; and provision of play materials.

Order of entry was determined by a priori conceptualization. We entered the independent variables in steps: the demographic variables of education and ethnicity were entered first in the preliminary step (see Table 3). Together, these variables explained 8% of the variance in attachment security. Maternal education was a significant predictor of attachment security.

Table 2. Bivariate Correlations Among Attachment Security, Maternal, Child, and Contextual Variables

Variable	2	3	4	5	6	7	8
1. Attachment security	.17	.31**	-.37***	.21*	-.33**	.43***	-.12
Maternal characteristics							
2. Efficacy	—	.08	.07	-.02	-.01	.13	.08
3. Beliefs	—	—	.27**	.05	.24*	-.24*	.12
4. Depression	—	—	—	-.25*	.57***	-.19	.49***
Maternal behavior							
5. Observed sensitivity	—	—	—	—	-.19	.14	-.15
Child characteristics							
6. Difficult temperament	—	—	—	—	—	-.16	.31**
Contextual characteristics							
7. Provision of play materials	—	—	—	—	—	—	-.04
8. Low social support	—	—	—	—	—	—	—

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

Table 3. Sequential Regression Model Predicting Attachment Security from Maternal, Child, and Contextual Characteristics

<i>Independent variable</i>	<i>Beta values</i>
<i>Demographic variables</i>	
Ethnicity	.15
Maternal education	.37**
Adjusted $R^2 = .08$, $F(2,67) = 4.07^*$	
<i>Maternal characteristics</i>	
Sensitivity	.21
Adjusted $R^2 = .11$, $F(3,66) = 3.91^*$, $F\text{ Change}(1,66) = 3.31$	
Depression	-.25*
Beliefs	.24
Adjusted $R^2 = .20$, $F(5,64) = 4.34^{**}$, $F\text{ Change}(2,64) = 4.39^*$	
<i>Child characteristics:</i>	
Difficult temperament	-.11
Adjusted $R^2 = .19$, $F(6,63) = 3.63^*$, $F\text{ Change}(1,63) = 0.76$	
<i>Contextual characteristics:</i>	
Play materials	.31**
Adjusted $R^2 = .26$, $F(7,62) = 4.40^{***}$, $F\text{ Change}(1,62) = 6.47^{**}$	

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

Maternal characteristics were entered next. Because attachment theorists consider maternal sensitivity a primary determinant of the attachment relationship and the mother to have a greater influence than the child on the attachment relationship (Ainsworth, 1973), maternal sensitivity was entered first before other maternal, child, and contextual characteristics. Results indicated that there was a nonsignificant trend for maternal sensitivity to account for additional variance, beyond that accounted for by maternal education and ethnicity. Together, maternal ethnicity, education, and sensitivity accounted for 11% of the variance in attachment security. Given that caregivers are thought to be more influential than children in determining the quality of the attachment relationship, the other maternal characteristics were entered in the next step. Results indicated the maternal education, ethnicity, sensitivity, depression, and beliefs together accounted for 20% of the variance in attachment security. Furthermore, maternal depression accounted for additional variance beyond that accounted for by

maternal sensitivity. Maternal beliefs were a marginally significant predictor of attachment security (see Table 3).

The fourth step added child difficult temperament to the previous predictors. The nonsignificant F change indicated that maternal reports of difficult temperament did not account for additional significant variance beyond that accounted for by maternal characteristics in predicting attachment security. Finally, the last step added the contextual characteristic of play materials (see Table 3). The addition of play materials accounted for an additional seven percent of the variance in attachment security beyond that accounted for by maternal and child characteristics. The overall equation predicting attachment security from maternal, child and contextual characteristics was significant, $F(7,63) = 4.36, p < .001$, and accounted for 26% of the variance in attachment security.

Cumulative Assets

Even among families living in poverty, there is substantial variation in security of attachment. This variation may be associated with the extent of cumulative resources or assets of the family. Thus, our final set of analyses examined the associations between the cumulative assets of the family and mother-infant attachment security. In order to determine the cumulative assets of each family, each predictor variable was standardized. Next, the standardized scores were summed (for variables scaled so that higher scores indicated more positive values) and subtracted (for variables scaled so that higher scores indicated lower assets, such as low social support and higher depression) to produce a total number of assets score. Participants with higher scores had higher cumulative assets than those with lower scores.

Participants' total asset scores were then correlated with attachment security. This correlation revealed that, as predicted, higher assets were related to greater attachment security, $r(70) = .41, p < .001$. In order to further investigate the relationship between family assets and attachment security, we divided the total assets score into thirds to form three separate groups of participants. Participants with the scores that fell in the lower third of the distribution on total assets formed the first group ($n = 23$); participants in the middle third formed the second group ($n = 23$), and participants in the highest third of the distribution formed the third group ($n = 24$). Next, a one-way analysis of variance was conducted with attachment security as the dependent variable and family asset group as the between subjects variable. This analysis indi-

cated that the family asset grouping variable was significantly related to mean security scores, $F(2,67) = 4.06, p = .02, \eta^2 = .11$. Tukey's post hoc tests revealed that dyads with the highest total assets scored significantly higher on attachment security ($M = .40, SD = 0.16$) than those in the lowest asset group ($M = .24, SD = 0.20$), $p = .02$. Participants in the middle asset group ($M = .31, SD = .21$) did not differ significantly from the other two groups.

Discussion

The results of the present study highlight the utility of a contextual approach to understanding the correlates of attachment security in an at-risk sample. At the level of the individual variable, maternal, child, and contextual characteristics were significantly associated with attachment security, consistent with theoretical predictions. More specifically, maternal depression and perceptions of a difficult child were associated with less secure attachment relationships, whereas maternal sensitivity, beliefs about play, and the provision of age-appropriate play materials were associated with more secure attachment relationships. When these variables were considered simultaneously, maternal and contextual characteristics significantly predicted attachment security and accounted for over a quarter of the variance in attachment security. Child characteristics did not account for additional variance in attachment security after accounting for maternal characteristics. Importantly, results indicated that cumulative risk factors increased the likelihood of insecure attachment relationships, and greater cumulative assets were related to greater attachment security.

Consistent with past research on middle class samples (Cicchetti et al., 1998), maternal depression appeared to be a risk factor for less secure attachments. Depression was significantly associated with a constellation of other factors, including lower levels of maternal sensitivity, perceptions of a more difficult child, and lower social support, in addition to less secure mother-child relationships. Attachment theory proposes that depression is problematic to the parent-child relationship because it interferes with sensitive caregiving. In the present study, maternal depression was a significant predictor of attachment security even after accounting for maternal sensitivity, indicating that the effects of depression on sensitivity may not entirely account for the greater risk of insecurity. These findings indicate that a consideration of the context within which depression

occurs is important in order to understand why depression is a risk factor (Seifer, 1995).

Consistent with research using the Strange Situation to assess attachment security, the mean AQS score in the present sample of low-income, low-education mothers was lower than that which has been reported for the AQS in middle-class samples. For example, Pederson et al. (1990) reported a mean of .40 ($SD = .17$) using the average of observers' and mothers' AQS scores. Similarly, Jarvis and Creasey (1991) reported a mean of .39 ($SD = .18$) and Teti and McGourty (1996) reported a mean of .51 ($SD = .16$) from mothers' sorts. The mean for the current sample was .32 ($SD = .20$). Thus, overall, SES appears to be a risk factor for less secure mother-child attachment relationships. Yet when dyads were grouped according to the number of assets they had in the maternal, child, and contextual domains, one subgroup of dyads (nearly a third of the sample) in the present study had AQS scores comparable to those in middle-class, well-educated, low-risk dyads. Those dyads with greater resources in the domains of maternal, child, and contextual characteristics looked comparable in terms of mean level of attachment security to middle-class, well-educated dyads. Thus, even in an at-risk sample, there is considerable diversity in attachment security.

As predicted, perceptions of child difficulty were associated with lower levels of attachment security. Mothers who perceived their children as more difficult had less secure mother-child relationships. This finding is consistent with previous research. Moreover, we advance the literature here by showing that despite the significant bivariate correlation, when child difficulty was added to the model including maternal characteristics, the effect of child difficulty on attachment security was not significant. Thus, the apparent correlation between mothers' reports of child difficulty and attachment was accounted for by a combination of other variables. In this study, mothers who perceived their children as more difficult were also less sensitive. One possibility is that insensitive mothers may behave in ways that make their children exhibit characteristics of difficult temperament, such as frequent crying. In fact, there is some empirical evidence linking maternal behavior to changes in child emotionality (Belsky, Fish, & Isabella, 1991). Alternatively, it may be more difficult to behave sensitively toward a difficult child. Given that all variables were assessed concurrently, it is impossible to determine whether difficult children elicit unresponsive parenting or whether unresponsive parenting makes children more difficult. Future longitudinal designs should examine bidirectional effects using an ecological approach.

The present study is also unique in examining both social and physical aspects of the home environment as correlates of attachment security. In fact, the provision of play materials accounted for additional variance in attachment security beyond that accounted for by maternal and child characteristics. The findings presented here suggest that the lack of very basic toys may inhibit a child's exploratory behavior or prohibit the child from using the mother as a secure base from which to explore. Alternatively, playful mothers may be more likely to provide play materials and to have children higher on attachment security (Blehar, Lieberman, & Ainsworth, 1977). Although the presence of play materials was not significantly related to maternal sensitivity in the present study, past research has shown that the availability of play materials is associated with other dimensions of parenting (Wachs & Camli, 1991). Further research should attempt to replicate this finding and explore the meaning of a lack of basic toys in the home. Some of the families in the present study had few toys other than videos. Thus, it may be that our measure of presence of basic play materials actually reflected the degree to which the family was invested in the child or able to meet the child's basic needs. Provision of age-appropriate toys may also indicate a more sensitive parent, who is aware of the need for developmentally appropriate toys, rather than the importance of play materials per se. Although provision of play materials was not associated with the social support measure, perhaps families with more toys have family members or friends who purchase toys for their children. Furthermore, given that the HOME measure assesses the presence of basic toys available in most middle-class homes, it is less likely that the presence of play materials in middle-class homes would be related to attachment security.

The results from the present investigation suggest that interventions should focus on multiple domains within families, not just on the mother, or the child, in order to improve security in the maternal-child dyad. Given that there were no differences between the waiting-list and intervention participants in terms of mother-child attachment quality, interventions should focus on teaching parenting skills, in addition to helping families meet basic needs. Interventions that focus primarily on connecting families to basic resources (food, healthcare, etc.), such as the one used to recruit participants in the present study, might reduce some barriers, but they may not be intensive enough to affect children's socioemotional outcomes. It may also be that the present study did not have enough power to detect small effects of the intervention program. In addition to receiving information on parent-

ing techniques, mothers should receive mental health services in order to reduce depression. Interventions serving families living in poverty may also want to consider providing families with basic, developmentally appropriate toys.

Limitations and Directions for Future Research

Despite the contributions of this study, a few limitations should be acknowledged. Although the present study included a sample of women underrepresented in attachment research (very poor, low-educated women, many of whom were Hispanic), the sample is also limited in several dimensions. For example, given that nearly half of the mothers in the present study were single, the present study included mothers, but not fathers. However, future research should make an effort to examine correlates of attachment security in at-risk fathers and their children. Research indicates that in low-risk samples, cumulative assets are predictive of father-child attachment security (e.g., Belsky, 1996); however, the present study was unable to extend this finding to at-risk fathers. Furthermore, given that father-child attachment security is related to child outcomes (e.g., Lieberman, Doyle, & Markiewicz, 1999), research should include fathers. Another limitation of the sample involves the large age range of the children in the study. Although child age was not related in a linear manner to predictor variables, nor to attachment security, future research should investigate whether the findings are equally applicable to younger toddlers and older preschool-age children. The sample size represents another limitation, in that, in terms of the bivariate relationships, the sample size was likely large enough to detect medium and large effect sizes (correlations from the .30-.50 range), but not large enough to detect small effect sizes (i.e., r s in the .10 range), according to guidelines provided by Cohen (1992). A sample size of 700 would be required to detect small effect sizes; thus, future research will need to substantially increase sample sizes to detect smaller effects.

As noted previously, the results of the present study reflect concurrent associations. Longitudinal data could provide important information regarding the temporal ordering of variables. Although the present study accounted for over one quarter of the variance in attachment security, an effect size considered large by Cohen (1992), nearly two-thirds of the variance was unaccounted for. Future research might consider other variables likely to influence attachment security, includ-

ing maternal personality variables, work-family interface, and positive child temperamental characteristics (Belsky, 1996).

Third, because mothers completed both the AQS and reported on child difficulty and maternal characteristics, shared method variance may have contributed to some of the associations reported. However, given that results were consistent with predictions (e.g., more sensitive parenting, as rated by observers, was associated with greater attachment security, as was availability of appropriate play materials) and that those measures based on observers' ratings also fit predictions, shared method variance is unlikely to account for all of the findings. Further, the Q-set methodology is designed to reduce response biases by requiring that items are sorted into a fixed distribution. Moreover, mothers are not aware of the construct they are describing when sorting the AQS (Teti & McGourty, 1996; Teti et al., 1991). Thus, acquiescence bias and number use artifacts were not a factor in the Q-sort. Furthermore, in a study that examined mothers' sorts of their own children with mothers' sorts of the "ideal" child using the AQS, they found only moderate correlations between these two sorts, indicating that mothers' sorts provided information that was different than their perceptions of how they would like their child to be (Posada et al., 1995). They also found that the mean security scores of "ideal" children were significantly higher than those of actual children (Posada et al., 1995). Together, these findings indicate that mothers' sorts are not simply reflections of social desirability bias. Finally, although some researchers have cautioned against the use of mothers' sorts on the AQS in high-risk samples (Teti et al., 1991), these same researchers have suggested that mothers' sorts may be acceptable when training is given to mothers and tailored to their needs. Furthermore, Hadadian and Merbler (1996) used mothers' sorts with an at-risk population and found results consistent with attachment theory, indicating that mothers' sorts of the AQS may be valid even in lower education samples. In the present study, we reduced the need for literacy skills by having a researcher read each item to the mother and by explaining and supporting her throughout the Q-set procedure. Our findings support the validity of this procedure.

In summary, findings indicated that maternal characteristics, child characteristics, and contextual factors were associated with attachment security of young children in a sample of low-income, at-risk families. These findings point to the utility of a contextual approach in understanding attachment security (Belsky, 1999). Even among dyads with

fairly low education levels and low incomes, there was considerable diversity in attachment security. Those dyads with more assets in terms of maternal, child, and contextual characteristics were significantly higher in attachment security and demonstrated levels of security comparable to those reported in middle-class, well-educated samples. Increasing resources available to low-income mothers and their children may be one positive step toward the promotion of secure relationships in high-risk samples.

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