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J Appl Dev Psychol. Author manuscript; available in PMC 2008 May 21.

Published in final edited form as:
J Appl Dev Psychol. 2007 December ; 28(5-6): 515–535.

Early Childhood Anxious Solitude and Subsequent Peer Relationships: Maternal and Cognitive Moderators

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Abstract

It was hypothesized that the relation between early anxious solitude and subsequent peer relation would be moderated by early relational (maternal sensitivity) and individual factors (child school readiness). Participants were 1,364 children from the National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development. Anxious solitude was assessed by child care providers from 2 to 4.5 years, maternal sensitivity was observed during mother–child interactions from 2 to 4.5 years, school readiness was tested at 3 years, children's interactions with a friend were observed at 4.5 years, and friendship quantity and peer rejection were assessed by first grade teachers. Results indicate that anxious solitary children who had experienced high versus low early maternal sensitivity contributed significantly more actively to positive interaction and less actively to negative interaction with a friend at 4.5 years (these results were contingent on school readiness), and had more friends and were less rejected by peers in first grade. Although high school readiness predicted interactive competency and positive peer relationships in children low in anxious solitude, these benefits were suppressed in anxious solitary children.

Keywords

Social withdrawal; Social anxiety; Shyness; Peer relationships; Maternal sensitivity; School readiness; Childhood

1. Introduction

When children with socially anxious, solitary tendencies attend school and day care contexts, they face the daily challenge of peer interaction. Some anxious solitary children meet this challenge by developing positive interaction patterns with friends, while others rapidly encounter peer adversity (e.g., rejection, exclusion) (Gazelle & Ladd, 2003). We frame risk for peer adversity as a function of both child and environment. Previous work supports the importance of the concurrent environment in which peer adversity takes place; children with an early childhood history of anxious solitude were more likely to become rejected in first grade if their classrooms were characterized by a negative emotional climate at school (Gazelle, 2006). In the present investigation, we examine whether individual and relational factors that predate school entry contribute to differential success with peer relationships. The purpose of this investigation was to examine heterogeneity among anxious solitary children in (1)

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interactive competency with friends just prior to school entry and (2) friendship quantity and peer rejection in first grade, and (3) to predict this heterogeneity from earlier patterns of maternal care and cognitive development.

Children are identified as anxious solitary when they display shy, verbally inhibited, and reticent behavior (onlooking and unoccupied solitary behavior) among familiar peers (Coplan, 2000; Coplan & Rubin, 1998). Evidence suggests that these behaviors are manifestations of social anxiety and social evaluative concerns (i.e., worry about how one may be evaluated and treated by others) (Coplan, Rubin, Fox, Calkins, & Stewart, 1994). Anxious solitary children are conceptualized as desiring contact with peers, but paradoxically keeping a distance from peers due to fear of poor social performance, negative peer evaluations, and peer mistreatment. Because school regularly brings children in contact with familiar peers, anxious solitary children are typically identified in this context. However, anxious solitary behavior may be observed in any context in which familiar peers are available and children are able to engage in free play. Thus, anxious solitude also occurs in many child care settings.

Although a substantial amount of research has contrasted anxious solitary children with other children, little attention has been focused on within-group variation among anxious solitary children. In particular, little is known about factors that may increase or buffer anxious solitary children's risk for subsequent interpersonal and emotional difficulties. In recent work on this issue, peer exclusion in the early school years has been found to forecast divergent adjustment trajectories among anxious solitary children throughout middle childhood (Gazelle & Ladd, 2003). Specifically, anxious solitary children who became excluded by peers in the early school years demonstrated greater stability of anxious solitude and more elevated depressive symptoms from kindergarten through the fourth grade. In contrast, their nonexcluded anxious solitary counterparts demonstrated less stability in anxious solitude and improving depressive symptoms over the same period. Given these enduring consequences of early peer difficulties for anxious solitary children, there is a critical need to examine early childhood factors that may increase or buffer their vulnerability to peer difficulties in the early school years.

The most commonly studied moderator of anxious solitary children's risk for peer adversity is child sex. There is some evidence of greater risk for peer adversity among anxious solitary boys than girls (e.g., Gazelle & Ladd, 2003; Morison & Masten, 1991), and it has been suggested that such findings are due to the incongruence of anxious solitude with the male gender role (Caspi, Elder, & Bem, 1988). However, this sex difference appears to be one of relative strength rather than a difference in the fundamental relation between anxious solitude and risk for peer adversity—anxious solitary girls are clearly at risk for peer difficulties (Gazelle et al., 2005). Further, sex differences in anxious solitary youth are a function of developmental period and outcome of interest (Gazelle & Rudolph, 2004). Thus, in the present investigation, it was expected that anxious solitary children of both sexes would be at risk for peer difficulties in the preschool and early school years. Moreover, after accounting for any potential sex difference, we expected that substantial variation in anxious solitary children's risk for peer adversity would remain unexplained.

1.2. Multilevel Early Childhood Moderators of Anxious Solitary Children's Risk for Peer Difficulties in the Early School Years

1.2.1. Relational-level moderation: Maternal sensitivity—Children's anxious solitary affective-behavioral tendencies may be most likely to lead to adaptational difficulties when they develop in contexts that are unresponsive to their needs. Because anxious solitude is believed to have multilevel biological and environmental determinants (e.g., Rubin, Burgess, & Hastings, 2002), it was expected that anxious solitary children would be exposed to a wide range of maternal sensitivity. The extent of maternal sensitivity experienced by anxious solitary children prior to forming peer relationships may ameliorate or exacerbate their risk for peer

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difficulties. A child who tends to be inhibited with most social partners (i.e., hesitant, slow to commence interaction, and cautious during interaction) may nevertheless learn foundational communicative skills through interaction with a sensitive mother. The hallmark of sensitivity is the ability of a mother to accurately read her child's cues and establish a synchronous interaction pattern in which her child learns that the mother will reliably respond to his or her signals (National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN], 1999). The child, in turn, learns not only to expect a contingent response to his or her social actions, but also to detect and respond to the mother's signals to participate in the give-and-take of communication. Therefore, anxious solitary children who have experienced a history of sensitive caregiving may have the fundamental interaction skills required to hold up their end of an interaction when the opportunity to interact with peers arises, even if they are less likely than other children to seek out or initiate peer interactions.

Although little is known about the ability of maternal sensitivity to predict heterogeneity in dyadic interactive competence with friends and group-level peer rejection among anxious solitary children, a number of recent studies have indicated that sensitive (but not overprotective) maternal care predicts less stability in anxious solitary or inhibited behavior over time (Early et al., 2002; Rubin et al., 2002; Rubin, Hastings, Stewart, Henderson, & Chen, 1997). It was expected that maternal sensitivity would also translate into interactive competencies in the context of close peer friendships. Early close peer friendships were of particular interest because they are the first relationships that many children develop in which it is not the primary responsibility of an adult to establish synchronous interactions. Therefore, these relationships are fertile ground for examining what interactive competencies young children bring to early relationships and what links there may be to mother–child interaction patterns.

There is evidence that anxious solitary/inhibited children are less likely than other children to initiate interaction with or make requests of their peers, regardless of whether peers are unfamiliar playmates (Stewart & Rubin, 1995) or familiar classmates (Asendorpf, 1990). Even when interacting with friends, evidence indicates that anxious solitary children, in comparison to other children, engage in less verbal communication (and are less competitive) (Schneider, 1999) and display less positive affect (Panella & Henggeler, 1986). It may be that such deficiencies in the quality of anxious solitary children's interaction with friends also translate into fewer friends, although little empirical evidence in available in this regard. Thus, although evidence concerning the nature of anxious solitary children's friendships is sparse, available data suggest that some social impairment may extend into these close relationships. However, extant data concern main effects and do not illuminate either heterogeneity among anxious solitary children's friendships or the sources of such heterogeneity.

The present investigation examines heterogeneity not only in anxious solitary children's contribution to interaction with their friends, but also their friend's interaction patterns. This is important because the reciprocal nature of interaction among friends suggests that qualities of the interaction cannot be predicted solely from the characteristics of one partner, but rather are the emergent products of dynamic interaction between both individuals. This suggests that anxious solitary children's interactions with friends may be best understood as a function of the children with whom they become friends as well as their own competencies.

Peer relationship theorists distinguish between competencies required for dyadic friendship and group-level acceptance (e.g., Bukowski & Hoza, 1989; Parker & Asher, 1993). For instance, in later childhood, the skills necessary for high-quality friendships include demonstrating loyalty, trust and engaging in appropriate self-disclosure; whereas those required for peer acceptance include adherence to peer norms for behavior, appearance, and activities. Nevertheless, because maternal sensitivity is foundational to basic social

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competencies in early childhood, we expected it to influence both competency in dyadic interaction with friends and group-level peer acceptance. This may be particularly true in the early school years when play with friends and other classmates requires shared fundamental interaction skills, such as detecting social partners' cues and communicating one's own ideas clearly and in a manner that invites the social partner's response. Because nonfriend peers are likely to interact with one another in the free-play situations common to preschool settings, preschool children's distinctions between friends and nonfriends may be relatively flexible (a friend is someone you play with), and their peer evaluations are likely to be based on basic interactive skills. Indeed, evidence indicates that differences between interactions with friends and nonfriends increase with age (Berndt, 1985; Windle, 1994).

1.2.2. Individual-level moderation: Intelligence—The likelihood that an anxious solitary affective-behavioral profile may translate into peer difficulties may be moderated not only by relational history (maternal sensitivity) but also by nonbehavioral individual characteristics. Evidence suggests that the two most robust predictors of resilience in vulnerable children are positive parenting and healthy intellectual functioning (Luthar & Zigler, 1992; Masten et al., 1999). Appearing noticeably "slower" intellectually than classmates, especially when combined with anxious behavior, might decrease a child's chance of friendship with high-functioning classmates and exacerbate a child's chance of being evaluated negatively by peers. Thus, intelligence may be a unique individual-level moderator of the relationship between anxious solitude and peer difficulties.

Evidence is somewhat contradictory in regard to whether shy/anxious solitary children, on average, differ from other children in IQ or school grade point average, although a number of studies have reported mild negative correlations (e.g., Chen, Rubin, & Sun, 1992; Ludwig & Lazarus, 1983; Morison & Masten, 1991). Perhaps more importantly, there may be substantial heterogeneity in intelligence among anxious solitary children, and intelligence may be a particularly salient buffer for these children. Although little work has been conducted on this subject, there is some suggestive evidence. Preschoolers identified as overcontrolled resilient subsequently demonstrated positive adjustment in adolescence including high intelligence and conscientiousness, as well as shyness (Weir & Gjerde, 2002). Conversely, Radke-Yarrow and colleagues identified shyness, low IQ, and peer rejection in a cluster of characteristics that differentiated poorly adjusted children from their more resilient counterparts in a sample of children from high-risk families (Radke-Yarrow & Brown, 1993).

1.2.3. Interactional model—The likelihood that early childhood anxious solitude will forecast difficulties in dyadic and group-level peer relationships in the preschool and early school years may depend on additional relational and individual factors. It was hypothesized that high early childhood maternal sensitivity and child intellectual functioning would moderate (promote) anxious solitary children's ability to interact competently with friends, have multiple friendships, and avoid peer rejection in the early school years. Taken together, these multilevel influences produce an interactional model of development in which the adaptive significance of anxious solitude is understood in the context of multiple buffers and risks that impact the child's ability to function as an adaptational system (Cairns, Elder, & Costello, 1996; Magnusson & Stattin, 2006; Sameroff, 1993).

2. Method

2.1. Participants

2.1.1. Child characteristics—The present study is a secondary analysis of the NICHD Study of Early Child Care and Youth Development (SECCYD). Participants were 1,364 children (48% female) and their parents, child care providers, and teachers. Child participants

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were selected from among 8,986 children born throughout 1991 during selected 24-hour sampling periods in 24 hospitals near 10 research sites across the United States. Children were excluded from the sample if their mothers were younger than 18 at the child's birth or did not speak English, if the family planned to move, if the child had been hospitalized for more than 7 days following birth or had obvious disabilities, or if the mother had a known substance abuse problem. Participants were selected by conditional random sampling that ensured that they reflected the ethnic, economic, and educational diversity in each site's catchment area.

Preliminary analyses were performed on the subset of children in the NICHD SECCYD sample who had complete data for the relevant predictor and criterion composites. Selected participants were 581 children (54% female) and their mothers, child care providers, and teachers. Selected participants, compared with nonselected participants from the larger sample, included a smaller proportion of children of color ($\chi^2 = 21.74$, $p < .001$; children of color constituted 17.4% of selected participants [including 8.4% African-American and 5.2% Latino children] compared with 24% for the sample as a whole] and had higher family income-to-needs ratios ($t = 6.67$, $p < .001$; selected participants' mean family income-to-needs ratio when the child was 2–4.5 years of age was 4.18 times the poverty threshold [range: 0.09–29.32], compared with 3.60 for the sample as a whole [range: 0.08–29.32]). It is important to note that, although the NICHD SECCYD did experience disproportionate attrition and incomplete data among poorer and ethnic minority participants, the sample selected for the research reported in this article is nonetheless more diverse than typical samples in extant literature on social withdrawal. Moreover, several analytic strategies diminish concerns about the representativeness of the sample. Child ethnicity and family income are statistically controlled in analyses. Additionally, two versions of regression analyses were performed: one version is based on the selected sample with complete data ($n = 581$), and a second version is based on the complete sample ($N = 1,364$), with all missing data replaced via full information maximum likelihood (FIML) estimation. FIML assumes that data are "missing at random," which allows nonrandom patterns of missing data *between* particular subsamples (e.g., ethnic groups) but requires that patterns of missing data are random *within* subsamples. FIML uses all available information to estimate parameters for the full data set, thereby reducing chances that results are influenced by selective attrition. Because there was higher attrition among children of color and poor children (NICHD ECCRN, 2003), FIML analyses maximize the generalizability of results to diverse populations. Although FIML regression analyses are based on the full sample, FIML was not available for some analyses in the Methods section (e.g., convergent validity *r*s), and these analyses are therefore reported for children with available data. The pattern of findings is similar across both versions of analyses, suggesting that the pattern of missing data did not substantially influence the findings of the current investigation. Therefore, analyses of the whole sample are presented in detail both in the text and in tabular form, whereas analyses of the sample selected for complete data are summarized in tabular form only.

Most children attended kindergarten in their first year of formal schooling (99%; the remainder entered in first grade or an ungraded school context). The majority of these children proceeded to first grade in their second year of formal schooling, but 35 children repeated kindergarten for a second year. Assessments conducted in the second year of formal schooling are referred to as "first grade" even in those cases in which the child was in his or her second kindergarten year.

2.1.2. Friends' characteristics—At 4.5 years, the study child was observed with a friend, who, whenever possible, was the closest same-sex friend (as identified by the mother or, if she did not know, the child care provider) who attended the same child care arrangement. Eighty-three percent of study children were observed with a same-sex friend. Forty-eight percent of friendship pairs were best friends, 37% were second-best friends, 12% were third-best friends, and the remainder were the closest available friends. Neither the same-sex nor the best-friend

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nature of the friendship dyad was correlated with primary predictor or criterion variables. Twenty percent of friends were children of color. The friends spent an average of 17.79 hours per week together (*SD* = 13.33) and had known each other for an average of 19.67 months (*SD* = 16.08). The majority of observations were conducted in the study child's primary child care arrangement (78%). Of those observations that occurred elsewhere, most occurred at the study child's home (82%) or another regular child care arrangement (11%). The remainder occurred in the friend's home, the laboratory, or another home.

2.1.3. Assessment occasions—The data relevant to the present report are derived from five major longitudinal assessment points: 24 months, 36 months, 54 months, kindergarten, and first grade (or 2, 3, 4.5, 5, and 6 years of age). Prior to school entry, when children were 2, 3, and 4.5 years of age, data relevant to the present investigation were collected in the child's home, child care arrangement, and laboratory. In kindergarten, relevant data were collected via questionnaires sent to the child's parents, child care arrangement, and teacher. In first grade, relevant data were collected in the child's school classroom, home, and after-school child care arrangement.

2.2. Overview of primary measures

Anxious solitude was assessed by child care providers prior to entry to formal schooling at 2, 3, and 4.5 years on a scale adapted from Gazelle and Ladd (2003). At the same time points, children's interactions with their mothers were rated by observers for maternal sensitivity. At 3 years, school readiness was tested in the laboratory with the Bracken Basic Concepts Scale (Bracken, 1984). At 4.5 years, children were observed in a structured interaction with a friend. In first grade, number of friendships with peers and peer rejection were assessed by teacher report (see Cillessen, Terry, Coie, & Lochman, 1992). For means, standard deviations, and intercorrelations among measures, see Table 1.

2.3. Primary Predictor Variables

2.3.1. Anxious solitude—Child care provider reports of anxious solitude were obtained at 2, 3, and 4.5 years of age. The anxious solitude composite consisted of items from the widely used Child Behavior Checklist—Teacher Report Form (for 1.5- to 5-year-olds; CBCL/TRF; Achenbach, 1991a, 1991b). The entire standard CBCL/TRF forms were administered, although only selected items were included in the composites calculated for this study. The anxious solitude composite has demonstrated good psychometric properties in previous investigations (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004) and was slightly adapted for present purposes. The following eight items constituted the anxious solitude composite: "withdrawn, doesn't get involved with others," "too shy or timid," "self-conscious or easily embarrassed," "avoids looking others in the eye," "too fearful or anxious," "worries," "nervous, high-strung, or tense," and "afraid to try new things." All items were rated on a 3-point scale (0 = "not true," 1 = "sometimes true," 2 = "often true"). Scores are calculated as the mean, with higher scores reflecting higher levels of anxious solitude.

Child care provider reports were gathered only for children in child care at least 10 hours a week. The child care provider anxious solitude composites demonstrated acceptable reliability and stability from 2 to 4.5 years (α = .69 – .77; consecutive *r*s = .10–.29, $p < .05$–.001). Early childhood anxious solitude composites were created by calculating the mean of the three available standardized assessments that predated school entry (2, 3, and 4.5 years). Collapsing over these three time points for this and other early predictor composites reflects the focus of this investigation on how relatively enduring phenomena in early childhood influence subsequent childhood outcomes. This child care provider composite demonstrated modest convergence with a maternal composite that had been calculated in the same manner (r = .19, $p < .001$, n = 808). Convergence was expected to be modest because mothers and child care

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providers observe children in different contexts (Achenbach, McConaughy, & Howell, 1987). Child care provider rather than maternal reports are employed as predictors because previous work has demonstrated that child care provider reports of anxious solitude have superior predictive validity in relation to children's social functioning at school (Gazelle, 2006).

2.3.2. Maternal sensitivity—Maternal sensitivity was rated from videotaped, semistructured 15-minute mother–child interactions in the laboratory at 2, 3, and 4.5 years of age. The sessions involved developmentally appropriate play and problem-solving tasks. The "three boxes" procedure was used in which mothers introduced their child to three sets of toys in a set order (NICHD ECCRN, 1999; Vandell, 1979). At 2 years, the first box contained a story book, the second a toy stove with related props, and the third a toy house with related props. At 3 years, the first box contained markers, stencils, and paper; the second box dress-up clothes and a cash register; and the third Duplo blocks with a picture of a model. At 4.5 years, the first task was to complete a maze with an Etch-A-Sketch, the second task was to build several same-sized towers with various-sized wooden blocks, and the third was to play with several animal puppets. The first two 4.5-year tasks were designed to be too difficult for the child to execute without maternal aid, and the third task was an opportunity for play.

At 2 years, three 4-point scale ratings were made of the videotaped interactions: maternal sensitivity to child nondistress, intrusiveness (reversed), and positive regard. At 3 and 4.5 years, three 7-point scale ratings were made of the videotaped interactions: supportive presence (analogous to sensitivity to child nondistress), respect for autonomy (analogous to lack of intrusiveness), and hostility (when reversed related to the previous dimension of positive regard). Internal consistency was acceptable ($\alpha > .70$ at each age). Videotaped mother–child interactions were coded at a central non-data collection site. Intercoder reliability was calculated from two coders' ratings of 19–20% of tapes at each age and exceeded .83 at every age. Sensitivity items were summed at each age, and a cross-age composite was computed as the mean of standardized 2-, 3-, and 4.-year composites, to provide an index of mean level of maternal sensitivity in early childhood. Higher scores are indicative of greater maternal sensitivity.

2.3.3. School readiness—School readiness was chosen as an index of intellectual functioning salient for children in the early school years. School readiness is a subscale of the Bracken Basic Concepts Scale (Bracken, 1984) and was administered in the laboratory at 3 years. The School Readiness Scale as administered consisted of 51 items that tapped the child's knowledge of the basic concepts of color, letter identification, number/counting, comparisons, and shape. The child received 1 point for each item passed. Items were ordered according to increasing difficulty, and administration of each subtest ceased after the child missed three consecutive questions. The score was the sum of the number of correct subscale items and had a potential range of 0 to 51. The composite demonstrated high internal consistency ($\alpha = .93$).

2.4. Criterion Variables

2.4.1. Friendship observations—When children were 4.5 years old, they were observed during a semistructured interaction with a friend. A friend was defined as someone with whom the child enjoyed playing on a regular basis (not just a familiar child). Children were observed with their closest same-sex friend who attended the same child care arrangement and was within a year and a half of their own age (3–6 years old) whenever possible. When it was not possible to observe a friend who fit this description at day care, friendship observations were conducted in the child's or friend's home or with an opposite-sex friend (see Section 2.1.2 for further details). To ensure that friendship interactions occurred in similar environments, children

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interacted in a portable 3 × 5-foot play area consisting of cardboard walls and a curtain to hide the camera and microphone.

The 15-minute observation consisted of three 5-minute sessions. In the first joint problem-solving session, children played with a Mickey Mouse pop-up toy. In the second limited-resource session, children played with a Viewmaster with one slide. In the third fantasy role-play session, children played with a doctor kit and doll. Children were given little instruction other than that the toys were for them to play with. After briefly introducing the toys, the experimenter left the children alone together in the play area and then monitored their play from outside the play area via the camera.

Multiple observational ratings were made for each videotaped play session. All ratings were made on a 5-point scale ranging from 1 = low to 5 = very high. Negative ratings (the child's contribution to negative interaction) were recoded on a 3-point scale (3, 4, and 5 were all recoded to 3) by the NICHD SECCYD statistical staff to improve psychometric properties. Each score is the mean of ratings across the three sessions. The following ratings were made for each play session.

2.4.2. Child's contribution to coordinated positive interaction with friend— Observers rated the degree to which the study child was responsible for coordinated positive interaction with the friend. The study child was rated as contributing actively when he or she initiated new topics of play or conversation, elaborated on an ongoing theme, attended to the friend's activity, and responded enthusiastically to the friend. The study child received credit for his or her efforts even if the friend did not respond. Higher scores indicate that the study child actively contributed to most or all coordinated interaction. A very low score indicates that the child never or rarely contributed actively to the interaction (even though the child may have responded appropriately to the friend's initiations and there may have been a lot of positive interaction overall). Internal reliability ($\alpha = .75$) and interrater agreement ($r = .72$, calculated from 148 pairs of observations) were adequate.

2.4.3. Friend's contribution to positive interaction with study child—Observers rated the extent to which the friend was responsible for coordinated positive interaction with the study child. This rating was based on the same absolute criteria as the same-named rating above, except that it was also adjusted relative to the study child's contributions. In other words, if the friend contributed more actively to the interaction than did the study child, then the friend received a higher score. Even though the friend's score was relative to the study child, there was also an absolute component such that the friend could score high or low regardless of the study child's score. Higher scores indicate a friend who actively contributed to almost all the coordinated interaction. Internal reliability ($\alpha = .77$) and interrater agreement ($r = .69$, calculated from 147 pairs of observations) were adequate.

2.4.4. Child's contribution to negative interaction with friend—Observers rated the degree to which the study child initiated negative interaction with his or her friend. Any attempt by the study child to control the interaction through whining, making demands, insisting that she or he get her or his own way, or showing annoyance with the friend raised this rating. Hogging a toy when the friend wanted a turn, grabbing a toy without the friend's permission, and bossing the friend around against the friend's wishes all contribute to this rating. Violent or hostile behaviors were coded separately and do not contribute to this rating. The study child got credit for negative behaviors even when the friend did not respond. Higher scores indicate that the study child expressed more negativity in interactions. Internal reliability ($\alpha = .66$) and interrater agreement ($r = .69$, calculated from 148 pairs of observations) were adequate.

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2.4.5. Friend's contribution to negative interaction with study child—Observers rated the extent to which the friend was responsible for negative interaction with the study child. This rating was based on the same absolute criteria as the same-named rating above, except that it was also adjusted relative to the study child's contributions. In other words, if the friend instigated more negative interaction than did the study child, then the friend received a higher score. Even though the friend's score was relative to the study child, the friend could score high or low regardless of the study child's score. Higher scores indicate that the friend expressed a high degree of negativity during the interaction. Internal reliability ($\alpha = .64$) and interrater agreement ($r = .66$, calculated from 147 pairs of observations) were adequate.

2.4.6. Child's positive mood during interaction with friend—Observers rated the degree of positive affect displayed by the study child during interaction with the friend. Higher scores indicate that the study child expressed more happiness and enthusiasm. Internal reliability ($\alpha = .76$) and interrater agreement ($r = .70$; calculated from 148 pairs of observations) were adequate.

2.4.7. Friendship quality—Observers rated the degree to which the pair enjoyed interacting with each other and their interaction was harmonious, they were "in tune" with each other, and their interaction was reciprocal. Higher scores indicate a warmer, more harmonious relationship. Internal reliability ($\alpha = .77$) and interrater agreement ($r = .74$; calculated from 148 pairs of observations) were adequate.

2.4.8. Number of friends at school in first grade—Teachers rated the child's number of friends and playmates on a Likert scale (ranging from 1 = "no regular playmates or close friends" to 5 = "several playmates and a close friend"). First grade teachers' ratings were significantly correlated with concurrent ratings of after-school child care provider ratings ($r = .23$, $p < .05$, $n = 103$) and kindergarten teachers' ratings ($r = .18$, $p < .001$, $n = 581$).

2.4.9. Peer rejection—Peer rejection was assessed via two teacher report items in first grade. The first item was developed by Cillessen et al. (1992). Teachers were asked to report the number of "disliked" votes the child would receive from classmates on a 7-point scale ranging from 1 = "almost no votes" to 7 = "unusually large amount." The second item, taken from the Friends or Foes questionnaire created for the SECCYD, asked teachers whether there were classmates who did not like to play or work with the study child. Responses were scored on a 5-point scale (1 = "none" to 5 = "nearly all"). The composite of these two standardized items demonstrated acceptable reliability ($\alpha = .73$). Although peers are preferred informants of sociometric information, previous research indicates that teachers' assessments of peer rejection on Cillessen and colleagues' scale demonstrate adequate convergent validity with peer reports (rejection $r = .38$, $p < .001$) (Cillessen et al., 1992). In the present data, first grade teachers' ratings of peer rejection at school demonstrated moderate convergence with child care providers' concurrent ratings of peer rejection ($r = .37$, $p < .001$, $n = 151$) in the after-school-care context. First grade and kindergarten teachers' ratings of peer rejection ($r = .32$, $p < .001$, $n = 951$) also demonstrated moderate convergence.

2.5. Control Variables

2.5.1. Sex—For the purpose of the present analyses, child sex was effect coded (1 = boy, −1 = girl) such that positive sex coefficients indicate higher levels of the criterion for boys and negative coefficients represent higher levels of the criterion for girls.

2.5.2. Child race/ethnicity—For the purpose of the present analyses, ethnicity was effect coded (1 = Anglo-American non-Hispanic, −1 = other) such that positive ethnicity coefficients

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indicate higher levels of the criterion for Anglo-American children and negative coefficients represent higher levels of the criterion for children of color.

2.5.3. Family income-to-needs ratio—Mothers reported on their family income and household size throughout the study. Families' income-to-needs ratios were computed according to standard procedures: the ratio of the family's income to the concurrent government-established poverty threshold for the family's size. The present investigation employs the average income-to-needs ratios from the time the study child was 2 to 4.5 years of age.

2.5.4. Global child care quality—Global child care quality was assessed with the Observational Rating of the Caregiving Environment (ORCE) at 2, 3, and 4.5 years (NICHD ECCRN, 1996). Observations were conducted during two half-day visits scheduled within a 2-week interval. Raters observed the study child's naturally occurring interactions with child care providers for four 30-minute cycles at 2 and 3 years (97% of observations were conducted in four or more cycles although they ranged from 1 to 5 at 2 years and from 1 to 4 at 3 years) and two 30-minute cycles at 4.5 years. Positive caregiving composites were calculated at each age level. Caregiving quality ratings were made on 4-point scales at the end of each observational cycle. At 2 years, five ratings were averaged to form the positive caregiving composite: child care provider's sensitivity to the child's distress signals, stimulation of cognitive development, positive regard for child, emotional detachment (reversed), and flatness of affect (reversed). At 3 and 4.5 years, these five scales plus two additional subscales, "fosters child's exploration" and "intrusive" (reversed), were included in the composite. Cronbach αs exceeded .82 and interobserver agreement exceeded .79 at each time point. For the purposes of this study, the mean of standardized positive caregiving composites was computed from 2 to 4.5 years.

2.5.5. Aggression—Child care providers also reported on children's aggressive behaviors on the CBCL/TRF at 2, 3, and 4.5 years of age. Aggression composites created by the SECCYD consisted of 15 items at 2 and 3 years and 23 items at 4.5 years. Items included "hits others" and "gets into many fights." Items were scored on a 3-point scale (0 = "not true," 1 = "sometimes true," 2 = "often true"), and higher scores indicate more aggression. Internal reliability was high in each year (α = .88–.95), and the composites demonstrated moderate stability (r = .31–.41, $p < .01$). This study employs the mean of standardized scores from 2 to 4.5 years of age.

2.5.6. Attention problems—Child care providers rated children on the CBCL/TRF attention problems syndrome scale. The subscale includes "can't concentrate," "can't sit still," and "quickly shifts from one activity to another." Ratings were made on the same 3-point scale described earlier. The 5-item scale demonstrated acceptable reliability and stability across early childhood (αs = .60–.72; rs = .25–.38, ps < .001). The early childhood attention problems composite was calculated as the mean of the three standardized assessments that predated school entry (2, 3, and 4.5 years). Higher scores represent more attention problems.

3. Results

3.1. Preliminary Analyses

Before proceeding to the primary analyses, site differences in primary variables of interest were examined. Most variables did not demonstrate site differences, but a few significant site differences were found for income-to-needs ratios and maternal sensitivity. Although explicit modeling of site differences in hierarchical linear modeling is considered to be the gold

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standard, because site differences in the variables of interest were small site was statistically controlled as a covariate in all regression analyses.

It was not necessary to control for classroom-level nesting because the majority of children (89.7%) included in analyses were the only target child in their first grade classroom (P. Burchinal, personal communication, May 19, 2004). The majority of children were also the only target child in their school and child care arrangement.

3.2. Analytic Plan

To test the ability of early childhood anxious solitude, maternal sensitivity, school readiness, and the joint effects of these factors to predict the nature of children's interactions with friends at 4.5 years and friendship quantity and peer rejection in first grade, we conducted a series of regression analyses. Each regression analysis tested the main effects of early childhood anxious solitude, maternal sensitivity, and school readiness; all possible joint effects among these primary predictors; and all possible interactions between the child's sex and these primary predictors, while controlling for the effects of site, child's sex, child's ethnicity, family's income-to-needs ratio in early childhood, quality of child care arrangement in early childhood, and child's aggression and attention problems in early childhood. Externalizing behaviors were controlled to eliminate these as competing explanations for interactional and relational outcomes. Regression analyses were conducted via simultaneous entry, and results indicated the unique contribution of each factor after accounting for shared variance with other factors in the analyses. Factors were centered (standardized) prior to computing interaction terms. When interactions involving sex were nonsignificant, they were dropped from the final version of analyses. When interactions involving sex were significant, both combined and separate regression models are presented for boys and girls. Other interactions are decomposed by performing simple slope analyses as recommended by Aiken and West (1991). Slopes for children both high (+1 *SD*) and low (−1 *SD*) in anxious solitude are displayed in figures, but interpretation focuses primarily on slopes for children with high anxious solitude.

3.3. Main Effects of Anxious Solitude

Regression analyses revealed that children with an early childhood history of anxious solitude, in comparison to other children, when interacting with their friend at 4.5 years of age contributed significantly less actively to positive and negative interaction, exhibited significantly less positive affect, appeared to have lower quality friendships (particularly for boys), and later had fewer friends in first grade (see Table 3[1]; see also Tables 2 and 4). However, anxious solitary children, in comparison to other children, were no more rejected on average in first grade. Although differences in observed prosocial and aggressive behavior and negative affect were also examined, no main or interactive effects of anxious solitude were found, and these analyses are therefore not reported. Thus, children with an early childhood history of anxious solitude, in comparison to other children, were more behaviorally passive and affectively flat, even during interactions with their closest friends, and their friendships appeared to be lacking with respect to both quantity and quality. Yet, there was also evidence that (1) there were patterns of significant heterogeneity among anxious solitary children in these criteria and (2) these patterns of heterogeneity could be reliably predicted from both relational- and individual-level characteristics, specifically, history of maternal sensitivity in early childhood and child's school readiness at 3 years of age.

[1]Some tests of statistical significance reported in the text, tables, and figures are *t* tests and others are *z* scores. These differences result from the use of two statistical software packages (necessitated by FIML estimation).

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3.4. Maternal Sensitivity

Results revealed that early childhood maternal sensitivity significantly moderated the relation between early childhood anxious solitude and subsequent competence in interaction with a friend (see anxious solitude × maternal sensitivity and anxious solitude × maternal sensitivity × school readiness interaction terms in Table 3). Consistent with hypotheses, regression analysis revealed that anxious solitary children with high compared with low maternal sensitivity contributed significantly more actively to positive interactions with their friends at 4.5 years (simple slope = .33, $t = 6.46$, $p < .001$) (see Figure 1), but this difference was significant only for anxious solitary children high in school readiness. Also, anxious solitary children with high compared with low maternal sensitivity contributed significantly less actively to negative interactions with their friends at 4.5 years (simple slope = −.14, $t = -3.88$, $p < .001$) (see Figure 2), but this difference was significant only for children low in school readiness.

An additional regression analysis revealed that the friend's contribution to positive dyadic interaction strongly predicted the child's own contribution to positive dyadic interaction with the friend (see second regression model in Table 3). Furthermore, when the friend's contribution to positive interaction was added to the model predicting the child's own contribution to positive interaction with this friend, the anxious solitude × maternal sensitivity and anxious solitude × school readiness interaction terms and the main effects of anxious solitude, maternal sensitivity, and school readiness were slightly reduced in magnitude, but still significant (with the exception of school readiness, which became nonsignificant [see Table 3]; note that the pattern is stronger in Table 2). A separate regression analysis revealed that children's own individual characteristics predicted whether they chose friends who made positive contributions to positive dyadic interaction. Anxious solitary children, in general, tended to have friends who made less active contributions to positive dyadic interaction ($\beta = -.07$, $z = 1.73$, $p < .10$), whereas children with high maternal sensitivity and school readiness had friends who more actively contributed to positive interaction (maternal sensitivity $\beta = .06$, $z = 1.69$, $p < .10$; school readiness $\beta = .15$, $z = 4.01$, $p < .001$). This pattern of findings suggests that friends' interactive characteristics partially mediate the anxious solitude × maternal sensitivity and anxious solitude × school readiness interactions (they are mediated moderators) and the main effects of anxious solitude, maternal sensitivity, and school readiness (Baron & Kenny, 1986). Thus, anxious solitary children, on average, made little active contribution to the dyadic interaction with their friend, in part, because their friends similarly made little active contribution to the dyadic interaction. Furthermore, anxious solitary children who experienced low early childhood maternal sensitivity contributed particularly little to positive dyadic interaction with their friends, in part, because they had friends who made particularly little active contribution to dyadic interaction themselves. Friends' active contribution to negative interaction also positively predicted the child's own active contribution to negative interaction (see Table 3 column 3); however, results did not support a similar mediational pattern.

Further, anxious solitary children with high compared with low maternal sensitivity had significantly more friends in first grade (simple slope = .13, $z = 4.25$, $p < .001$) (see Figure 3) and were significantly less rejected by first grade peers (simple slope = −.21, $z = -7.16$, $p < .001$) (see Figure 4) (For interaction terms corresponding to each figure, see anxious solitude × maternal sensitivity interaction terms in columns 6 and 7 of Table 3). Finally, for anxious solitary boys who experienced high compared with low maternal sensitivity, there was a nonsignificant trend toward higher quality friendship (simple slope = .06, $z = 1.30$, *ns* [see Table 4]; this interaction was nonsignificant for girls, but there was a significant main effect indicating that high maternal sensitivity predicted higher friendship quality for girls in general).

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3.5. School Readiness

Consistent with expectations, regression analyses revealed that, for children in general, school readiness at 3 years predicted more active contribution to positive dyadic interaction with a friend and higher friendship quality at 4.5 years. School readiness also interacted with early childhood anxious solitude and maternal sensitivity in the prediction of the child's active contribution to positive and negative interaction with a friend (see Figures 1 and 2 and first paragraph in Section 3.4). Additionally, school readiness interacted with anxious solitude in the prediction of positive affect with a friend, friendship quality, and peer rejection. However, these interactions were in the *opposite* direction than had been predicted. For anxious solitary children, the benefits normally accompanying high school readiness were *suppressed*. Thus, for anxious solitary children with high compared with low school readiness, there was no significant difference in positive affect in the friend interaction (simple slope = −.05, $z = -1.40$, ns) (see Figure 5) and, for boys only, no significant difference in friendship quality (simple slope = −.02, $z = -.42$, ns; the interaction was nonsignificant in girls) (see Figure 6 and Table 4). In contrast, children low in anxious solitude with high compared with low school readiness displayed significantly more positive affect in the friend interaction (simple slope = .08, $z = 2.27$, $p < .05$) (see Figure 5) and, for boys only, significantly better friendship quality (simple slope = .22, $z = 4.79$, $p < .001$) (see Figure 6).

Results also revealed that anxious solitary children with high compared with low school readiness were significantly more rejected by their first grade peers (simple slope = .10, $z = 3.21$, $p < .01$) (see Figure 7), contrary to expectations. In contrast, children low in anxious solitude with high compared with low school readiness did not differ in rejection by first grade peers (simple slope = −.04, $z = -1.14$, *ns*) (see Figure 7).

3.6 Effect Sizes

Results revealed that most regression models comprising early childhood predictors accounted for 12–16% of the variance in children's subsequent interactive behavior and relational outcomes (see R^2 for full model in Table 3). The largest effect was obtained for the regression model predicting the positive interaction, which accounted for 37% of the variance in children's active contribution to positive interaction with a friend at 4.5 years. Theoretically central predictors (primary predictors and mediators when relevant) accounted for a significant increment in effect size in each analysis (see R^2 change in Table 3), and this incremental effect was most sizable in accounting for variance in children's contribution to positive and negative interaction, but more modest in regard to other criteria. Nonetheless, simple slope analysis indicated that anxious solitary children high in comparison to low in early childhood maternal sensitivity differed from each other by .26–.65 *SD* across interactive and relational outcomes. Thus, the effects of central theoretical relevance appeared to have a relatively sizable impact on highly anxious solitary children, although these effects were often modest in regard to explaining variance for all children in the sample as a whole. This pattern suggests that future examination of these patterns may benefit from a person-oriented rather than variable-oriented approach, which is particularly well suited to examining effects that may have a substantial impact for a minority group within a larger sample. Finally, the predominant pattern for anxious solitary children high in comparison to low in school readiness at 3 years was the suppression (lack of) of benefits normally conferred by high school readiness in children low in anxious solitude.

4. Discussion

Results contribute to extant literature not only by providing evidence of heterogeneity among anxious solitary children in interactive competence with friends, quantity and quality of peer friendships, and experience of peer rejection in the early school years, but by providing

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evidence that this heterogeneity is "lawful" in nature. Variation in interactive competence and peer relationships among anxious solitary children in the early school years can be predicted from early childhood maternal sensitivity.

4.1. Maternal Sensitivity

Anxious solitary children who had experienced high compared with low maternal sensitivity in early childhood contributed significantly more actively to positive interactions and less actively to negative interactions with a close friend at 4.5 years (these effects were dependent on the child's school readiness), and had more friends and were less likely to be rejected by peers in first grade. These results are consistent with the notion that maternal sensitivity is especially instrumental in building anxious solitary children's capacity to become active contributors to social interaction. Particularly for children who are anxious about interaction with social partners, a history of sensitive maternal responses may encourage more skill at reading others' cues and, thus, permit these children to become more responsive social partners themselves.

That maternal sensitivity is instrumental in fostering anxious solitary children's interactive competencies is further suggested by the result that anxious solitary children with a history of highly sensitive mothering, in comparison to other anxious solitary children, had more friends by first grade. This success in friendship formation was likely supported by these children's capacity to be active contributors to positive interaction with friends, as illustrated in their interactions at 4.5 years. In future research it will be important to examine these patterns in relation to the stability of anxious solitary children's friendships. We would expect that the competencies displayed at 4.5 years by anxious solitary children with a history of high maternal sensitivity would also support the maintenance of friendships over time.

Maternal sensitivity predicted differential success for anxious solitary children in group-level as well as dyadic-level peer relationships in first grade. Anxious solitary children who had experienced low maternal sensitivity, in comparison to other anxious solitary children, were at increased risk for peer rejection in first grade. It may be that the failure to develop interactive competencies that occurred in the absence of sensitive mothering translated into foundational difficulties in interaction (e.g., behavioral passivity) that influenced both dyadic- and group-level peer relationships.

Evidence from other investigations further suggests that features of anxious solitary children's dyadic friendships could have implications for broader group-level peer treatment. Hodges and colleagues have found that anxious solitary behavior interacts with friendship status in the prediction of group-level peer victimization (Hodges, Malone, & Perry, 1997). They suggest that when behaviorally vulnerable children lack friends, they may spend more time alone (e.g., at recess) and, therefore, are more likely to be seen as an easy target for victimization. Interestingly, these investigators also provide evidence that friends can serve a protective function against peer victimization, but that this depends on the social behavioral characteristics of friends, with aggressive but not anxious solitary friends conferring protection (Hodges et al., 1997; Hodges & Perry, 1999).

4.2. Friends' Characteristics

Although information about the social behavioral characteristics of study children's friends was not available, evidence indicated not only that the friend's contribution to positive interaction strongly predicted the child's own contribution, but also that the friend's contribution partially mediated the relationship between anxious solitude and the child's active contribution to positive interaction. Specifically, analyses indicated that the joint effect of anxious solitude and maternal sensitivity and the main effect of anxious solitude on the child's

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contribution to positive interaction were reduced after the friend's contribution to positive interaction was entered into the model. This suggests that anxious solitary children may make little active contribution to interaction with their friends, in part, because they may choose friends who similarly make little active contribution to interaction. Anxious solitary children may have friends with similar behavioral tendencies. Indeed, evidence indicates that children tend to become friends with peers with whom they share behavioral characteristics (homophily) (Farver, 1996; Haselager, Hartup, van Lieshout, & Riksen-Walraven, 1998; Hogue & Steinberg, 1995; Rubin, Lynch, Coplan, Rose-Krasnor, & Booth, 1994). Although this effect has most often been demonstrated for conconcordance in aggressive behavior (Farver, 1996; Hanish, Martin, Fabes, Leonard, & Herzog, 2005), Rubin and colleagues have demonstrated that children develop preferences for interacting with playmates who resemble themselves with respect to rate of solitary behavior (Rubin et al., 1994; see also French, Jansen, Riansari, & Setiono, 2003; Haselager et al., 1998).

It must also be acknowledged that in addition to the effect of the friend's influence on the interaction, both the study child's and friend's characteristics are likely to be transactional, such that active contributions from either partner are less likely to be evoked by a relatively passive friend. Indeed, Schneider (1999) provides some evidence to suggest that interactions among anxious solitary children and their friends were of poorest quality when both partners shared an anxious solitary affective-behavioral profile.

4.3. School Readiness

The main effect of school readiness at 3 years predicted more active contributions to positive interactions with friends and, for boys, higher friendship quality at 4.5 years. These main effects are consistent with the general expectation that better early intellectual development supports children's capacity to engage in active and competent social interaction.

There was also support for the more specific prediction that school readiness interacts with early anxious solitude in predicting competent social interaction with peers and success with peer relationships; however, this interaction was in the direction *opposite* of that hypothesized. Results revealed that for children *low* in anxious solitude, school readiness at 3 years positively predicted subsequent positive affect during interaction with a friend and, for boys only, friendship quality. In contrast, these relationships were not significant for highly anxious solitary children (there was no indication that anxious solitary children differed significantly from each other in positive affect with friends or friendship quality in a way that was linked to school readiness). This pattern of results suggests that school readiness generally serves to promote children's positive engagement in peer interaction, but that these benefits are *suppressed* by high levels of social anxiety and accompanying emotional dysregulation. It may be that high school readiness augments most children's ability to contribute ideas to playful interaction, but that this normative contribution of school readiness is impeded when children with high social anxiety either fail to share their ideas with play partners or are unable to produce playful ideas due to their preoccupation with feelings or thoughts linked with social anxiety.

Given that high anxious solitude generally suppressed the interactive competencies usually accompanying high school readiness, it was not surprising that high school readiness also failed to buffer anxious solitary children from peer rejection in first grade. However, results actually indicated that anxious solitary children were more likely to be rejected in first grade if they were high versus low in school readiness. This result was unexpected. It prompts the question whether high school readiness may not only fail to support interactive competencies in anxious solitary children, but may also support undesirable interaction patterns in these children. However, there was no evidence of this in other aspects of the results. For instance, it was anxious solitary children who were low rather than high in school readiness who displayed

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more negative behavior (e.g., toy grabbing, whining) toward their friend in the context of low versus high maternal sensitivity. Moreover, anxious solitary children high in school readiness were active contributors to positive interaction with their friend when they had experienced high maternal sensitivity in early childhood. Thus, the possibility that anxious solitary children high in school readiness may be at increased risk for peer rejection should be viewed with caution unless replicated in other investigations.

Although the present study did not find evidence to support school readiness as a buffer for risk among anxious solitary children, other studies have provided some evidence suggesting such an effect, and there are several possible explanations for this discrepancy in findings. First, other studies have examined this pattern in older children (e.g., Radke-Yarrow & Brown, 1993). Because cognitive competencies are less stable in early than middle childhood (Kopp, 1994), the early nature of our assessment may have attenuated its predictive power. Another possibility is that the Bracken School Readiness Subscale (Bracken, 1984) used in the present investigation captures a different set of intellectual capabilities than do the measures employed in other relevant investigations (often the Wechsler) (Masten et al., 1999; Morison & Masten, 1991; Radke-Yarrow & Brown, 1993; Weir & Gjerde, 2002). Despite these considerations, it will be important in the future to further examine the propensity of anxious solitude to suppress interpersonal benefits normally conferred by healthy cognitive development.

It is important to note that maternal sensitivity is believed to promote children's school readiness (Belsky & Fearon, 2002). However, because both maternal sensitivity and school readiness were entered simultaneously into analyses, results demonstrate that school readiness is uniquely related to children's interaction capacities above and beyond the extent to which it may derive from maternal care.

4.4. Strengths and Limitations

Confidence in the findings of this investigation is supported by methodological, design, and sampling strengths. With respect to methodology, a number of high-quality observational and testing methodologies were employed (observation: maternal sensitivity, interaction with friend; testing: school readiness). Although peer reports of rejection and friendship would have been preferable to teacher reports, there is evidence to support teachers as the next-best source of information on peer relationships (Achenbach et al., 1987; Cillessen et al., 1992). Also, the pattern of findings supporting maternal sensitivity as a moderator of anxious solitary children's subsequent peer relationships was consistent across peer relationship outcomes regardless of whether they were observed or teacher-reported.

With respect to design, repeated frequent multimethod child assessments are strengths. In regard to sampling, the relatively diverse sample drawn from 10 research sites across the United States ought to be more representative of American children than a sample drawn from a single-site study. Although missing data and attrition were most common among poor and ethnic minority participants, participants in the current study were more diverse than in most comparable work on anxious solitude, and analyses conducted on the subsample with complete data versus the full data set with FIML estimation indicated a similar pattern of findings. These analyses revealed that in most instances the significance and explanatory power of analytical models were augmented when applied to the whole data set rather than only the subsample with complete data.

4.5. Predicting Lawful Heterogeneity

Examining the origins and evolution of heterogeneity among vulnerable children reveals multilevel processes involved in the accumulation versus remediation of interpersonal risk. This investigation demonstrates not only substantial heterogeneity in interactive competence

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and peer relationships among anxious solitary children, but that the origins of this heterogeneity stem in part from variation in the sensitivity of early maternal care. Thus, the quality of early maternal contributions to the mother–child relationship is especially predictive of the quality of later peer relationships for anxious solitary children. These patterns provide a window into how early familial relationships can either facilitate or diminish vulnerable children's capacity to build healthy relationships as they encounter an expanding world of social partners. The applied implications of these findings for parents and parent–child educators is that engaging in sensitive, contingent interactions with shy children early on is especially crucial to building their interactive competency and future peer relationships.

Acknowledgements

This research was supported by National Institute of Child Health and Human Development Grant R03 HD47327. The authors extend thanks to Sarah Friedman for comments on an earlier version of the article, Doug Levine for statistical advice, and the APA and NICHD Early Child Care Research Network (ECCRN) investigators and staff who conducted the 2004 APA Advanced Training Institute on Large Scale Databases for the NICHD Study of Early Child Care (SECC). This study was conducted by the NICHD ECCRN supported by NICHD through a cooperative agreement that calls for scientific collaboration between the grantees and the NICHD staff.

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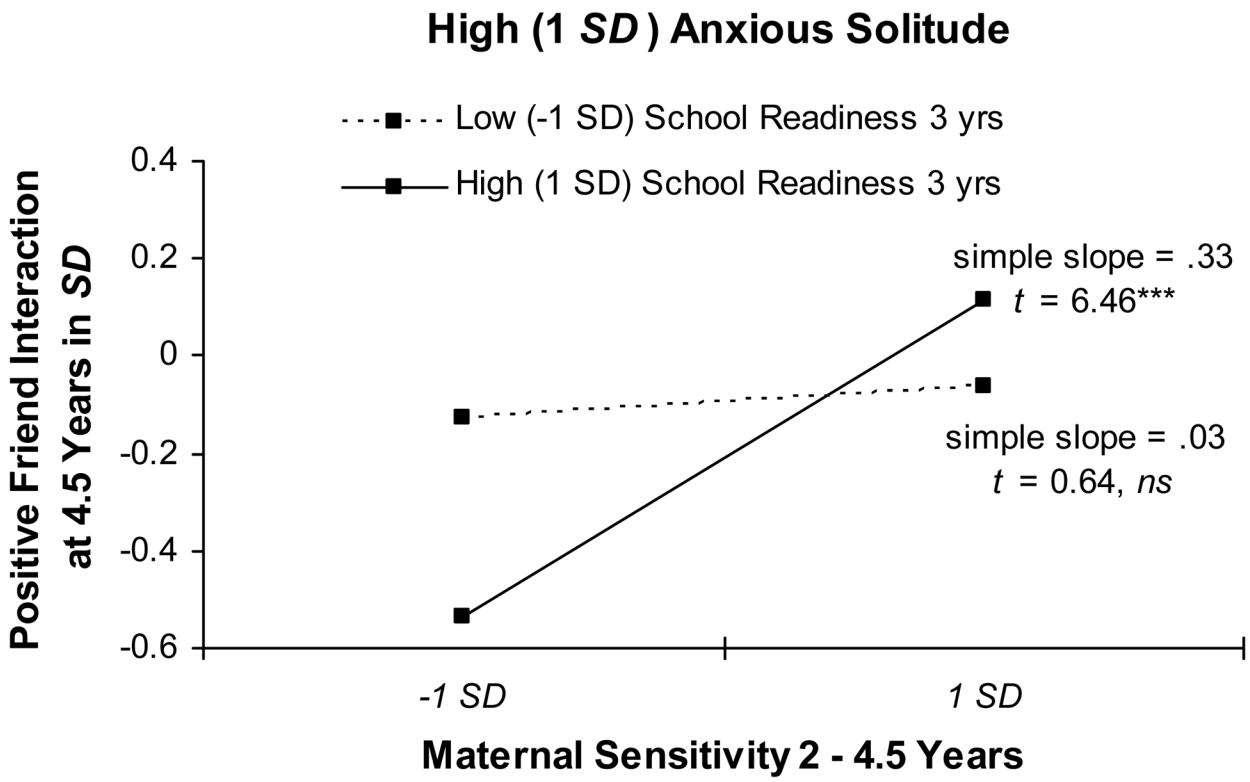

Figure 1.
Simple slopes of observed maternal sensitivity at 2–4.5 years on child's observed active contribution to positive interaction with a friend at 4.5 years for children who were high in anxious solitude at 2–4.5 years and low or high in school readiness at 3 years.

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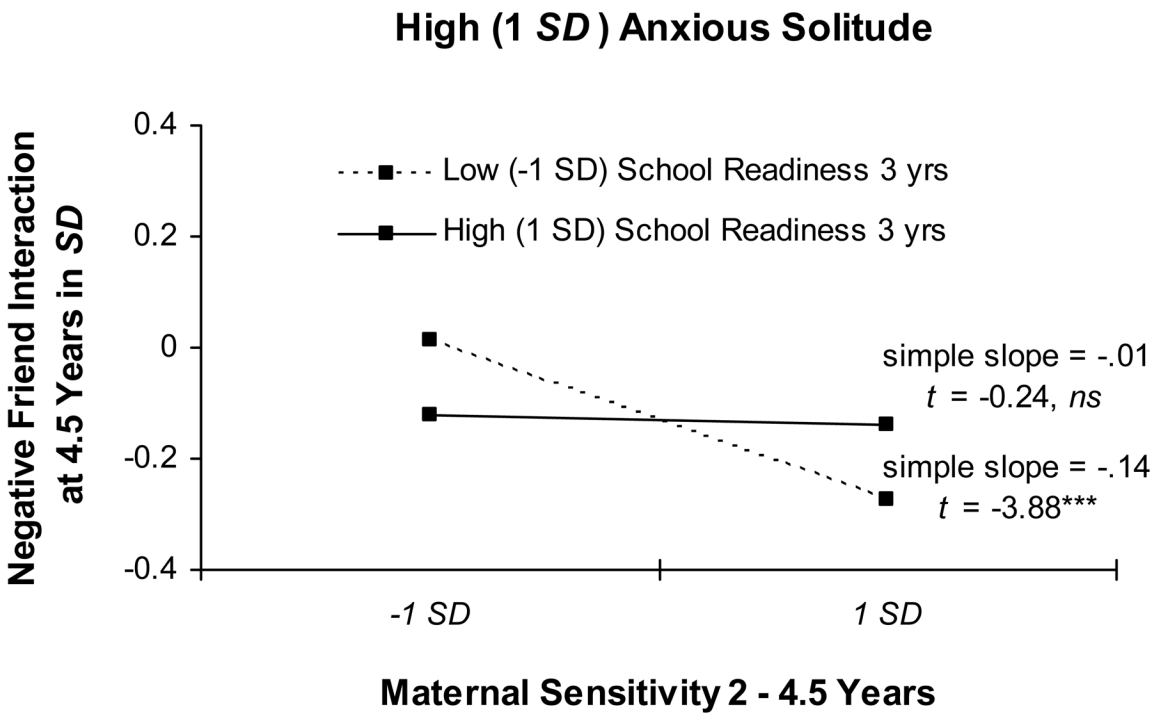

Figure 2.
Simple slopes of observed maternal sensitivity at 2–4.5 years on child's observed active contribution to negative interaction with a friend at 4.5 years for children who were high in anxious solitude at 2–4.5 years and low or high in school readiness at 3 years.

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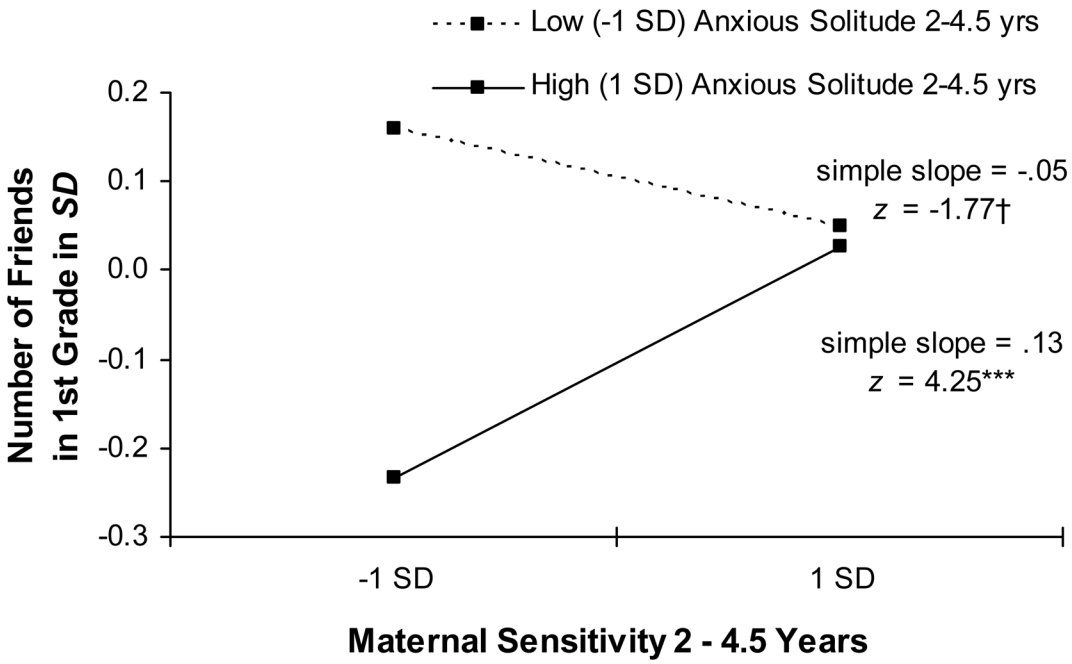

Figure 3.
Simple slopes of observed maternal sensitivity at 2–4.5 years on child's number of friends in first grade for children who were high and low in anxious solitude at 2–4.5 years.

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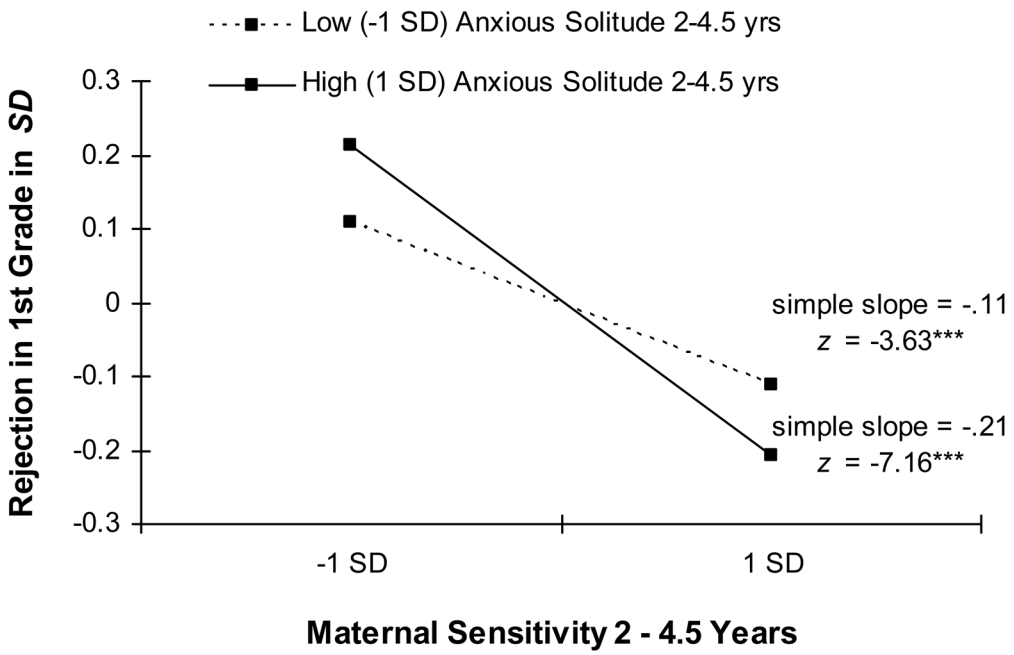

Figure 4.
Simple slopes of observed maternal sensitivity at 2–4.5 years on child's peer rejection in first grade for children who were high and low in anxious solitude at 2–4.5 years.

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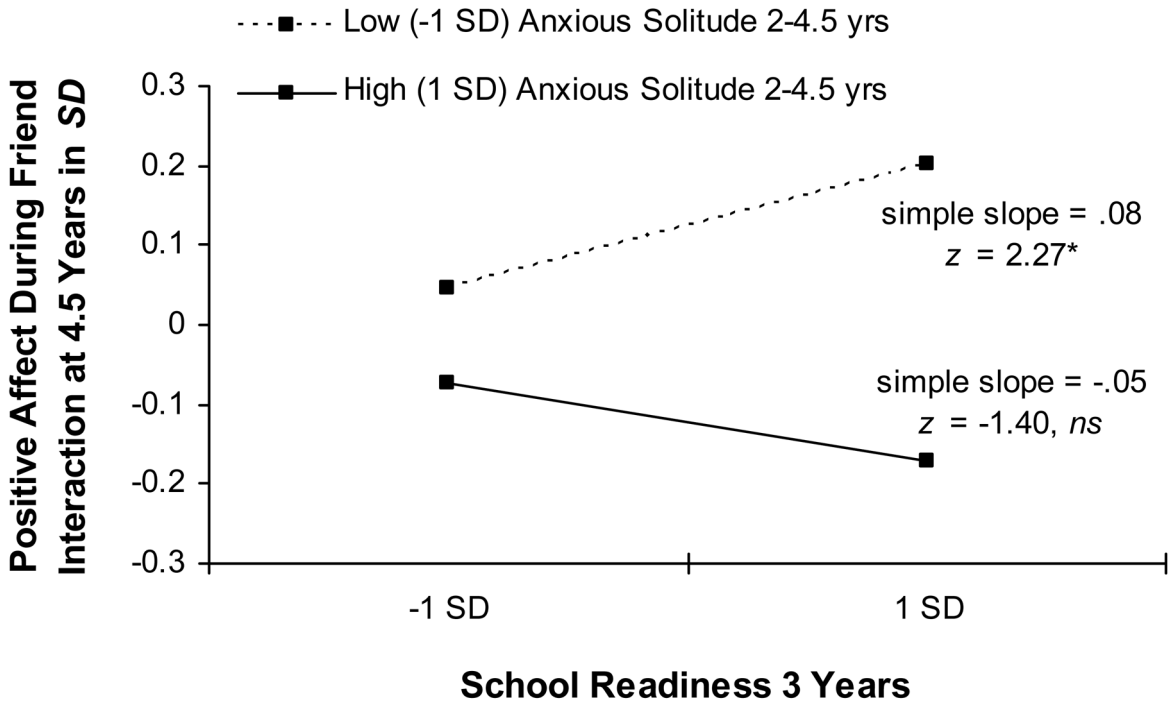

Figure 5.
Simple slopes of school readiness at 3 years on child's observed positive affect during interaction with a friend at 4.5 years for children who were high and low in anxious solitude at 2–4.5 years.

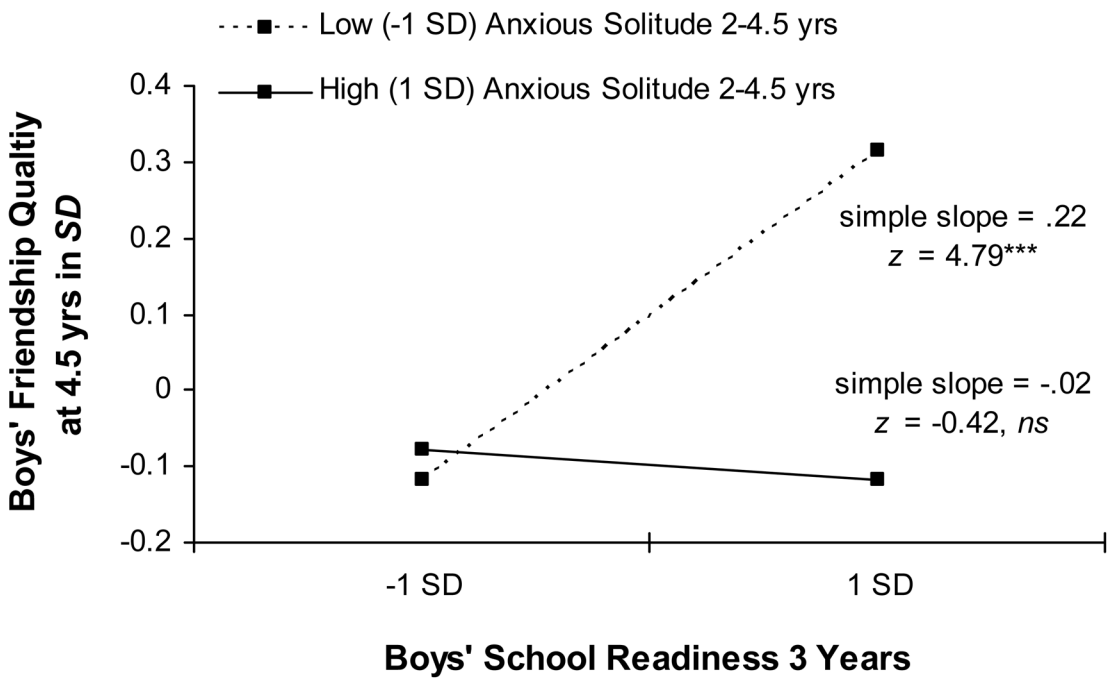

Figure 6.
Simple slopes of school readiness at 3 years on boy's observed friendship quality during interaction with a friend at 4.5 years for boys who were high and low in anxious solitude at 2–4.5 years.

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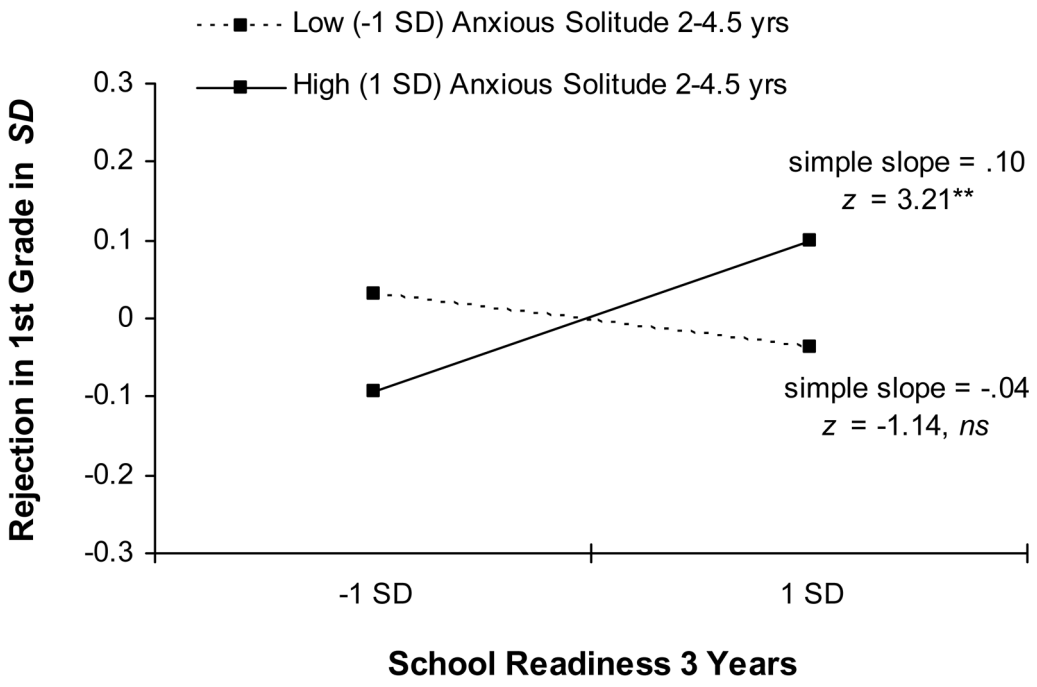

Figure 7.
Simple slopes of school readiness at 3 years on child's peer rejection in first grade for children who were high and low in anxious solitude at 2–4.5 years.

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Table 1

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tion	Negative interaction	Positive affect	Frienship quality	Number of friends	Rejection	Sex	Ethnicity	Income	Child care	Agg	Att	Friend Pos	Friend Neg
	1.45	3.17	3.24	4.44	0.00	53.87%	82.62%	4.18	2.95	0.32	−0.05	2.75	1.37
	0.50	0.68	0.66	0.83	0.90	Girl (−1)	White (1)	3.11	0.41	0.29	0.79	0.71	0.48
	1.00												
	−0.09***	1.00											
	−0.25***	0.68***	1.00										
	−0.04*	0.03	0.04	1.00									
	0.18***	−0.02	−0.03	−0.35***	1.00								
	0.01	0.04	0.03	0.01	0.08*	1.00							
	−0.14***	0.14***	0.16***	−0.02	−0.04	−0.01	1.00						
	−0.10*	0.03	0.12**	0.03	−0.08*	−0.02	0.20***	1.00					
	−0.16***	0.06	0.09*	0.06	−0.11**	0.03	0.13**	0.20***	1.00				
	0.15***	0.07	0.00	−0.12**	0.32***	0.08*	−0.10*	−0.05	−0.15***	1.00			
	0.14***	0.02	−0.03	−0.18***	0.31***	0.12**	−0.08*	−0.10*	−0.12**	0.55***	1.00		

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tion	Negative interaction	Positive affect	Frienship quality	Number of friends	Rejection	Sex	Ethnicity	Income	Child care	Agg	Att	Friend Pos	Friend Neg
	−0.14***	0.42***	0.69***	0.07	−0.11**	0.02	0.14***	0.10*	0.08	−0.04	−0.09*	1.00	
	0.25***	0.01	−0.18***	−0.04	0.02	0.00	−0.04	−0.04	−0.14***	0.03	0.03	−0.02	1.00

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Table 2

Testing Maternal Sensitivity and Child School Readiness in Early Childhood as Moderators of the Relationship between Early Childhood Peer Outcomes

Structured Interaction with Friend at 4.5 years (ob)																			
hild's contribution to tive interaction without mediator			Child's contribution to positive interaction with mediator			Child's contribution to negative interaction			Child's positive affect			Friendship quality			Number of friends first grade (t)			Peer rejection first grade (t)	
B	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2
3	−2.68**		−0.10	−2.47*		−0.11	−2.38*		−0.14	−2.94**		−0.09	−1.88†		−0.11	−2.26*		0.00	0.01	
7	1.42		0.05	1.24		−0.11	−2.24*		0.06	1.21		0.03	0.62		0.04	0.76		−0.09	−1.81†	
3	2.69**		0.06	1.46		−0.04	−0.93		0.03	0.68		0.14	2.82**		0.01	0.30		0.01	0.31	
0	2.09*		0.07	1.76†		0.04	0.79		0.04	0.77		0.07	1.35		0.13	2.68**		−0.13	−2.84**	
9	−1.99*		−0.06	−1.57		0.01	0.15		−0.08	−1.60		−0.12	−2.54*		−0.08	−1.74†		0.00	0.10	
4	0.90		0.04	1.07		0.00	0.05		0.04	0.96		−0.01	−0.13		−0.02	−0.52		0.00	0.03	
6	1.17		0.05	1.09		0.05	0.96		0.05	1.03		0.04	0.72		0.03	0.62		0.04	0.88	
ex and primary predictor																				
												−0.05	−1.11							
												−0.11	−2.15*							
												0.10	2.16*							
												0.11	2.16*							
												−0.10	−2.17*							
												−0.01	−0.29							
												0.03	0.61							
3	0.83		0.01	0.21		−0.01	−0.27		0.05	1.30		0.07	1.63		0.03	0.81		0.05	1.28	
9	1.98*		0.05	1.24		−0.05	−1.11		0.12	2.62**		0.10	2.15*		−0.05	−1.19		0.04	0.84	
2	0.51		0.02	0.49		−0.01	−0.20		0.02	0.38		0.06	1.38		0.00	−0.06		−0.02	−0.56	

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	Structured Interaction with Friend at 4.5 years (ob)																	
	Child's contribution to positive interaction without mediator			Child's contribution to positive interaction with mediator			Child's contribution to negative interaction			Child's positive affect			Friendship quality			Number of friends first grade (t)			Peer rejection first grade (t)		
	B	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2	*B*	*t*	R^2
	1	0.12		0.00	−0.12		−0.07	−1.76†		0.05	1.10		0.03	0.81		0.02	0.50		−0.04	−1.08	
	3	0.59		0.02	0.43		0.10	2.00*		0.12	2.44*		0.06	1.27		−0.01	−0.25		0.21	4.49***	
	2	0.48		0.05	1.20		0.06	1.22		−0.01	−0.25		−0.02	−0.41		−0.14	−2.63**		0.16	3.24***	
				0.54	15.35***		0.21	5.23***													
			0.38			0.35			0.14			0.09			0.11			0.07			0.18

rls). Informant: (cg) caregiver, (ob) observer, (t) teacher, (m) mother.

sex and the primary predictors were tested in all analyses but were dropped when nonsignificant.

ll analyses, but because this variable consisted of nine dummy codes, it is not shown to reduce clutter.

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Table 3

FIML: Regression Analyses Testing Maternal Sensitivity and Child School Readiness as Moderators of the Relation between Early Childhood Anxious Solitude and Peer Outcomes

	Structured Interaction with Friend at 4.5 years (ob)													
	Child's contribution to Positive Interaction Without Mediator		**Child's contribution to Positive Interaction With Mediator**		**Child's contribution to Negative Interaction**		**Child's Positive Affect**		**Friendship Quality**		**Number of Friends 1st grade (t)**		**Peer Rejection 1st grade (t)**	
	B	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***
Primary predictors														
Child anxious solitude 2–4.5 yrs (AS) (cg)	−0.15	−4.23***	−0.13	−4.32***	−0.13	−3.61***	−0.12	−3.43***	−0.08	−2.36*	−0.10	−3.14**	0.00	0.08
Maternal sensitivity 2–4.5 yrs (MS) (ob)	0.08	2.23*	0.07	2.33*	−0.09	−2.66**	0.03	0.85	0.03	0.93	0.06	1.81†	−0.14	−4.63***
Child school readiness 3 yrs (SR) (ob)	0.07	1.96*	0.01	0.38	−0.02	−0.43	0.02	0.52	0.08	2.41*	0.01	0.38	0.04	1.18
AS × MS	0.10	2.86**	0.09	2.92**	−0.01	−0.23	0.04	1.22	0.05	1.30	0.12	3.75***	−0.06	−1.91†
AS × SR	−0.13	−3.49***	−0.10	−3.19***	0.02	0.42	−0.09	−2.39*	−0.11	−2.92**	−0.05	−1.33	0.07	2.19*
MS × SR	0.07	1.99*	0.08	2.56**	0.00	−0.10	0.02	0.52	−0.01	−0.37	−0.05	−1.64	0.00	0.06
AS × MS × SR	0.08	2.13*	0.08	2.45*	0.08	2.06*	0.05	1.26	0.02	0.48	0.02	0.64	−0.05	−1.63
Interactions between sex and primary predictors														
SX × AS									−0.04	−1.01				
SX × MS									−0.07	−2.41*				
SX × SR									0.06	1.79†				
SX × AS × MS									0.10	2.72**				
SX × AS × SR									−0.08	−2.08*				
SX × MS × SR									−0.01	−0.19				
SX × AS × MS × SR									0.01	0.17				
Control variables														
Child sex (boy = 1, girl = −1)	0.02	0.49	0.01	0.20	−0.02	−0.51	0.05	1.42	0.04	1.30	−0.01	−0.45	0.07	2.48*
Child ethnicity (1= white, −1=other)	0.07	1.95†	0.05	1.16	−0.08	−2.26*	0.10	2.97**	0.08	2.35*	0.00	−0.07	−0.01	−0.22
Family income-to-needs ratio	0.07	1.92†	0.03	0.82	0.00	−0.02	0.03	0.77	0.08	2.30*	0.01	0.25	−0.04	−1.12

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	Structured Interaction with Friend at 4.5 years (ob)													
	Child's contribution to Positive Interaction Without Mediator		**Child's contribution to Positive Interaction With Mediator**		**Child's contribution to Negative Interaction**		**Child's Positive Affect**		**Friendship Quality**		**Number of Friends 1st grade (t)**		**Peer Rejection 1st grade (t)**	
	B	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***	***B***	***z***
2–4.5 yrs (m) Childcare provider quality 2–4.5 yrs (ob)	0.02	0.45	−0.01	−0.18	−0.03	−0.95	0.03	0.72	0.03	0.96	0.05	1.37†	−0.02	−0.77
Child aggression 2–4.5 yrs (cg)	0.03	0.89	0.03	1.11	0.10	2.69**	0.11	2.98**	0.05	1.38	0.02	0.69	0.18	5.76***
Child attention problems 2–4 yrs (cg)	0.03	0.81	0.04	1.31	0.10	2.73**	−0.01	−0.25	−0.03	−0.71	−0.14	−4.23***	0.19	6.02***
Added mediators														
Friend's contribution to interaction (ob)			0.55	18.71***	0.20	5.86***								
	R^2		R^2		R^2		R^2		R^2		R^2		R^2	
	full	change	full	change	full	change	full	change	full	change	full	change	full	change
	0.13	0.05***	0.37	0.29***	0.12	0.07***	0.13	0.02***	0.16	0.02***	0.06	0.03***	0.12	0.02***

Note . FIML = full information maximum liklihood estimation of missing data. N = 1364 (659 girls). Informant: (cg) caregiver, (ob) observer, (t) teacher, (m) mother.

† $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Interactions involving sex and the primary predictors were tested in all analyses but were dropped when non-significant.

Site was controlled in all analyses but because this variable consisted of 9 dummy-codes it is not shown to reduce clutter.

R^2 change is the incremental increase in variance explained by primary predictors (and mediator when relevant) after controls were already accounted for.

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Table 4

Separate Models for Boys and Girls: Regression Analyses Testing Maternal Sensitivity and Child School Readiness in Early Childhood as Moderators of the Relation between Early Childhood History of Anxious Solitude and Friendship Quality

	Structured Interaction with Friend at 4.5 years (ob)		
	Friendship Quality		
	B	***z***	R^2
		Boys	
			0.23
Primary predictors			
Child anxious solitude 2–4.5 yrs (AS) (cg)	−0.10	−2.02*	
Maternal sensitivity 2–4.5 yrs (MS) (ob)	−0.05	−1.02	
Child school readiness 3 yrs (SR) (ob)	0.11	2.41*	
AS × MS	0.14	2.76**	
AS × SR	−0.18	−3.60***	
MS × SR	−0.02	−0.51	
AS × MS × SR	0.02	0.35	
Control variables			
Child ethnicity (1= white, −1=other)	0.06	1.27	
Family income-to-needs ratio 2–4.5 yrs (m)	0.06	1.13	
Childcare provider quality 2–4.5 yrs (ob)	0.04	0.83	
Child aggression 2–4.5 yrs (cg)	0.04	0.76	
Child attention problems 2–4 yrs (m)	−0.09	−1.77†	
		Girls	
			0.13
Primary predictors			
Child anxious solitude 2–4.5 yrs (AS) (cg)	−0.07	−1.33	
Maternal sensitivity 2–4.5 yrs (MS) (ob)	0.13	2.64**	
School readiness 3 yrs (SR) (ob)	0.03	0.70	
AS × MS	−0.04	−0.81	
AS × SR	−0.03	−0.60	
MS × SR	0.00	0.04	
AS × MS × SR	0.01	0.20	
Control variables			
Child ethnicity (1= white, −1=other)	0.09	1.91†	
Family income-to-needs ratio 2–4.5 yrs (m)	0.11	2.18*	
Childcare provider quality 2–4.5 yrs (ob)	0.03	0.68	
Child aggression 2–4.5 yrs (cg)	0.05	0.96	
Child attention problems 2–4 yrs (m)	0.06	1.23	

Note. N = 1364 (659 girls). Informant: (cg) caregiver, (ob) observer, (t) teacher, (m) mother.

† $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Site was controlled in all analyses but because this variable consisted of 9 dummy-codes it is not shown to reduce clutter.