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### Academic Competence in Preschool: Exploring the Role of Close Relationships and Anxiety

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# Academic Competence in Preschool: Exploring the Role of Close Relationships and Anxiety

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This study tested a conceptual model of a psychosocial pathway to academic competence in preschool. Developmental theory and research with older children suggest that social and psychological factors could have a significant impact on young children's learning and school readiness. Children in 3 preschool classrooms ( $N = 31$ ) participated. Mothers' perceptions of their children as more or less trusting and secure at age 3 years were rated on the Attachment Behavior Q-Set (Waters, 1987). Sociometric ratings were collected from classmates 1 year later through individual picture interviews. Preschool teachers rated children's academic competence and trait anxiety. Attachment Behavior Q-Set scores at age 3 were associated with teacher ratings of academic competence the following year (ages 4–5 years). However, this effect was mediated by 2 intervening psychosocial variables: anxiety and peer acceptance. Early secure attachment to parents may (a) potentiate less anxiety, removing emotional barriers to learning; and (b) enhance positive relationships with peers, perhaps motivating children to engage more in the preschool curriculum and leading to relatively greater academic competence. Adopting preschool curricula that foster positive peer relationships, anxiety regulation skills, and supportive parent–child relationships could indirectly enhance preschool children's academic competence and school readiness.

Academic competence in early childhood has garnered increasing attention in recent years, due to the linkage between early competence and later scholastic outcomes ranging from progress report marks to high school drop out (Alexander, Entwisle, & Kabbani, 2001; La Paro & Pianta, 2000). Teacher ratings of early aca-

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demic competence or engagement and tests of pre-academic skills (e.g., phonological awareness, numeracy) predict scholastic outcomes from elementary school all the way to high school (Alexander et al., 2001; Kirby, Parrila, & Pfeiffer, 2003; Starkey & Klein, 2000). Therefore, early competence is of considerable import. But what factors contribute to emerging academic competence in early childhood? Although cognitive abilities and broad contextual factors such as access to preschool have been identified as important influences on children's pre-academic skills (e.g., Entwisle & Alexander, 1993), the role of personality traits (e.g., anxiety) and the immediate social environment (e.g., quality of close relationships) has been less thoroughly studied (Belsky & MacKinnon, 1994; Jimerson, Egeland, Sroufe, & Carlson, 2000). However, developmental theory points to a potentially significant role of both of these domains in children's early academic competence.

### Theoretical Model

A theoretical model of a social/psychological pathway to early academic problems in preschool was developed based on attachment theory (Bowlby, 1969; Sroufe & Fleeson, 1986), constructivist theory (Piaget & Inhelder, 1969), and the developmental psychopathology model (Rubin & Burgess, 2001; Vasey & Dadds, 2001). This pathway (see Figure 1) begins with an early disrupted attachment relationship with primary caregiver(s) in which the child does not learn to modulate his or her emotions in the context of responsive parent-child interactions (e.g., Sroufe & Fleeson, 1986). Instead, the child develops an internal working model of social relations in which frustration, rejection, and a lack of synchrony and reciprocity are expected. States of anxiety and negative affect remain prolonged and frequent into early childhood due to the lack of internalized emotion regulation skills that are normally learned in the context of a reciprocal attachment relationship with parents (e.g., Thompson, 2001). Therefore, trait anxiety is higher for these children

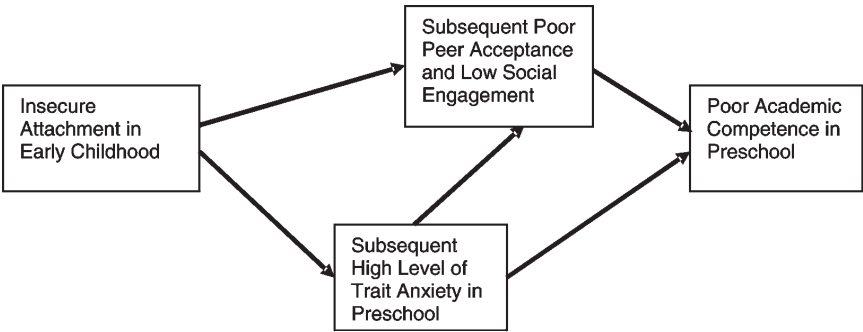


FIGURE 1 Theoretical model illustrating social and emotional influences on preschool children's academic competence.

than for those who are more trusting and securely attached, as depicted in the linkage between insecure attachment and anxiety in Figure 1. According to the model, heightened trait anxiety then leads to social reticence and disengagement in the preschool setting (e.g., Rubin & Burgess, 2001). As a result, children are not exposed to the rich peer social interactions that underlie important pre-academic competencies in the preschool age group, and they begin to fall behind their peers in early academic skills (e.g., Barriga et al., 2002). The theoretical basis for each component of this developmental path model is now articulated.

In the proposed model, the most proximal social/psychological influence on children's early academic competence is hypothesized to be peer acceptance and social engagement with preschool peers (see Figure 1). Constructivist theory posits that peer social interaction and play are key preschool experiences that can facilitate cognitive development (cf. Van Hoorn, Nourot, Scales, & Alward, 1993) and, therefore, learning and early academic competence. For instance, decentration (the ability to understand that others may have differing points of view) is a cognitive achievement facilitated by social interaction (Piaget & Inhelder, 1969). By socializing with peers, children are exposed to new words and ideas, learn concepts from one another through modeling or direct explanation, are exposed to differing viewpoints that can enhance perspective taking, and have opportunities to engage in sociodramatic play that may enhance language skills and creativity. Furthermore, positive social relationships in the school setting are posited to promote goal-directed behaviors such as persistence and participation (Furrer & Skinner, 2003) that are fundamental to learning and academic success at all phases of schooling. Thus, there is a substantial theoretical basis for predicting a linkage between positive peer relationships and early academic competence.

A second theoretically important and proximal social/psychological influence on preschool academic competence is anxiety. Anxiety is typically studied either as a personality trait or a psychiatric disorder. This article focuses on trait anxiety, a normally distributed attribute that is characterized by frequent experiences of negative affect, worry, and physiological arousal (e.g., McWilliams & Cox, 2001). Elevated trait anxiety represents a generalized vulnerability to mood disorders but may not cause clinically significant impairment by itself (Craske, 1999). Theory and research in developmental psychopathology suggest that high anxiety is likely to interfere with learning (Wood, 2006). Anxiety produces a state of physiological arousal associated with the fight-or-flight reflex and a narrowing focus of attention on perceived threat. This state of arousal tends to impair an individual's concentration on nonthreat stimuli, such as academic tasks (e.g., Barriga et al., 2002; Crozier & Hostettler, 2003; Ma, 1999). Furthermore, trait anxiety is associated with disturbance in recall of previously mastered academic concepts (Ma, 1999). Trait anxiety is conceptually related to negative affectivity, emotional reactivity, regulation, and temperament in children (e.g., Kagan, Snidman, Zentner, & Peterson, 1999). However, these concepts are not synonymous with anxiety (Craske, 1999); for in-

stance, only about a third of infants with a highly reactive temperament go on to exhibit fearfulness and inhibition in early childhood (Kagan, 2003).

As illustrated in Figure 1, there is also hypothesized to be an indirect pathway from anxiety to early academic competence via peer acceptance. The developmental psychopathology model is the basis of the putative linkage between trait anxiety and poor peer acceptance (e.g., La Greca, 2001). Children with high anxiety may find peer interactions to be frightening (leading to avoidance) or may have poor tolerance for frustrations engendered by the negotiations and compromises inherent in peer relationships (leading to disengagement). As noted previously, a lack of peer acceptance and engagement may then directly result in lower academic competence in preschool. This possibility was evaluated in the path model tested in this study, discussed below.

Although poor peer relationships and anxiety in early childhood are hypothesized to exert a direct influence on preschool academic competence, both of these difficulties are theorized to emerge, in part, from insecure attachment representations developed in relationships with primary caregivers (e.g., Cassidy, Kirsh, Scolton, & Parke, 1996). The theoretical model depicted in Figure 1 suggests that early childhood attachment security exerts an indirect effect on eventual academic competence in preschool by directly affecting children's peer acceptance and trait anxiety. According to attachment theory, internal working models of relationships are developed during early parent-child interactions and subsequently carried forward into future relationships (Bowlby, 1969; Sroufe & Fleeson, 1986). The filtering of social interactions through the lens of the internal working model is posited to reestablish familiar patterns of relationships that recapitulate interactions with primary caregivers, contributing to a sense of coherence within the self (Sroufe, 1992). For instance, a child with a history of secure attachment to parents, reflecting a perception of relationships as mutual and supportive, may be empathic, responsive, and invested in his or her peers and caregivers (e.g., Sroufe & Fleeson, 1986). Early parent-child relationships marked by unmet needs and hostility (i.e., traits of an insecure attachment) may foster the expectation that other relationships will have these characteristics as well (Cassidy et al., 1996; McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996). Children who are less securely attached to their parents may become highly attuned to behaviors on the part of their peers that seem to demonstrate rejection. The perception that one is rejected by peers can lead to behaviors typical of rejected children (i.e., avoidance), possibly serving to initiate actual peer neglect or rejection (Dodge, Coie, & Brakke, 1982; Dodge, Coie, Pettit, & Price, 1990).

Similarly, anxiety problems have also been theorized to emerge from an insecure attachment to primary caregivers (e.g., Shamir-Essakow, Ungerer, & Rapee, 2005; Sroufe, Carlson, Levy, & Egeland, 1999; Sroufe & Fleeson, 1986). Both insecure-ambivalent and insecure-avoidant categories of insecure attachment have been postulated as precursors of heightened anxiety. In the former case, children

have an underlying schema of parents as unpredictable and unavailable—potentially unable to meet their safety needs. This perception of caregiver unavailability then leads to an increased sense of generalized threat and, hence, anxiety. In the latter case, children's attachment schemata focus more on the perceived rejection of their negative affective states by primary caregivers, which leads to frustration, hostility, and anxiety. Thus, insecure attachment has been identified as a precipitating influence that is theorized to increase children's trait anxiety.

In summary, there is a strong theoretical basis for a developmental pathway leading from early insecure attachment to poor academic competence in preschool via peer acceptance problems and heightened trait anxiety.

### Empirical Support for the Proposed Theoretical Model

Previous research has tested bivariate relationships among several of the variables postulated in the theoretical model proposed in the preceding section; this research is discussed more thoroughly in this section. However, at least three important gaps remain in the field. First, the role of peer relationships and trait anxiety have not yet been well documented as predictors of children's academic competence in the preschool age group. Second, the linkage between children's attachment security and their academic outcomes has only been addressed in a small number of studies of older children, and further exploration with preschool children is needed. Third, although studies have tested the relationship between some aspects of emotion regulation and academic competence in preschoolers, a theoretically driven model examining the complex multiple linkages among attachment security, peer relationships, anxiety, and academic competence in preschool has yet to be tested. The present study addresses each of these gaps in the literature in the course of testing the theoretical model of a social/psychological pathway to academic competence in early childhood proposed in the preceding section.

*Peer relationships and academic competence.* A linkage between high levels of peer acceptance and elevated academic competence has been established in several studies of elementary school children (Chen, Rubin, & Li, 1997; Green, Forehand, Beck, & Vosk, 1980; Ollendick, Weist, Borden, & Greene, 1993). However, this relationship has not yet been established with preschool children. Therefore, an initial goal of the present study was to evaluate the association between peer acceptance and teacher ratings of academic competence in young children.

*Anxiety and academic competence.* High emotionality, poor emotion regulation, and certain temperament traits (e.g., negative affectivity) may undermine academic competence in young children as found in studies based on both teacher ratings of competence as well as academic test performance (e.g., Coplan, Barber,

& Lagacé-Séguin, 1999; Fantuzzo, Perry, & McDermott, 2004; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). As noted in the section "Theoretical Model," emotionality, emotion regulation, and temperament are related to trait anxiety, but they are not synonymous with it. Although many studies of elementary school children and secondary school youth have measured anxiety specifically and have found that it is linked with poor school performance (Barrett & Heubeck, 2000; Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995; Kessler, Foster, Saunders, & Stang, 1995; Normandeau & Guay, 1998; Woodward & Fergusson, 2001), studies have not examined the role of anxiety in preschool on concurrent academic competence. The present study also addresses this gap in the literature.

*Anxiety and peer relationships.* Preschool children who exhibit signs of internalizing mood problems and social withdrawal (which, like temperament traits, are related to but distinct from trait anxiety) also tend to be rejected by their peers (e.g., Rubin, LeMare, & Lollis, 1990; Wood, Cowan, & Baker, 2002). Travillion and Snyder (1993) found a modest correlation between ratings of anxiety and withdrawal and negative sociometric nominations among preschoolers. Thus, there is some support in the literature for the hypothesized linkage between anxiety and peer acceptance in the preschool age group.

*The role of security of attachment to mothers.* Studies have suggested that mothers' perceptions of their children as more or less trusting and secure predict children's peer acceptance in preschool (Wood, Emmerson, & Cowan, 2004; but see also Howes, Matheson, & Hamilton, 1994). Security of attachment to parents also predicts peer social status in the elementary school years (e.g., Cassidy et al., 1996; Cohn, 1990; Elicker, Englund, & Sroufe, 1992; Shulman, Elicker, & Sroufe, 1994) and in adolescence (e.g., Weinfield, Ogawa, & Sroufe, 1997).

There is also some evidence of a connection between attachment status and anxiety problems. In one study, children who had an anxious/resistant attachment to their mothers in infancy were twice as likely as other children to develop an anxiety disorder in adolescence (Warren, Huston, Egeland, & Sroufe, 1997). Insecure attachment in infancy also has been found to predict children's separation anxiety at age 6 years, with no difference between categories of insecure attachment (e.g., insecure-avoidant, insecure-ambivalent; Dallaire & Weinraub, 2005). Shamir-Essakow, Ungerer, and Rapee (2005) also found that insecure attachment in infancy predicted anxiety problems among preschool-age children, even when controlling for children's temperament status.

Additionally, several studies have found that the security of attachment to mothers measured in infancy or elementary school is predictive of academic competence in elementary school and middle school, based on both objective performance and teacher ratings of competence (e.g., Aviezer, Sagi, Resnick, & Gini,



2002; Jacobsen & Hofmann, 1997). However, a link between security of attachment to parents and preschool children's academic competence has not yet been tested.

### The Present Study

This study sought to establish the plausibility of the proposed theoretical model in Figure 1 by testing bivariate relations among each variable in the model. The study also endeavored to move beyond bivariate analysis by using a path analytic approach to model-testing in which all variables theorized to exert a direct or indirect influence on the outcome variables were controlled for statistically. Using this modeling approach, the mediating influence of mothers' perceptions of their children as more or less trusting and secure on academic competence via peer relationships and anxiety was tested. A longitudinal data set was employed to reflect the temporal relations implicit in this conceptual model.

## METHOD

### Participants

Participants were 31 children (16 boys and 15 girls) attending three preschool classrooms (53% participation rate) in a university-based, research-oriented early childhood center in a major metropolitan area in the western United States. The center offered substantially reduced-fee tuition for some families in order to obtain a sample of children who closely resembled the ethnic/racial diversity in the larger community. Based on a review of school records, families ranged widely in socioeconomic backgrounds, with parental occupations ranging from unskilled labor to professional (reflecting the success of the reduced-fee tuition program in attracting a diverse group of families). Families attending the center also represented a broad range of ethnic and racial groups, including African American, Latino/Latina, Asian/Pacific Islander, and White. Participating children ranged in age from 3 years 0 months to 3 years 11 months at Time 1, and from 4 years 0 months to 5 years 5 months at Time 2. Teachers and parents confirmed that children were between the ages of 3 years 0 months and 3 years 11 months for the first assessment. The Time 2 assessment occurred during the children's second year in preschool. Efforts were made to ensure that at least 12 months had passed since the assessment of attachment at Time 1, but due to limited scheduling availability, Time 2 assessments occurred 12 to 16 months after Time 1 assessments. Teachers confirmed that children ranged in age from 4 years 0 months to 5 years 5 months at Time 2. Attachment data (described below) were collected from 37 participating families at the 3-year-old assessment. Sociometric and teacher-rating data were collected at

the 4- to 5-year-old assessment from 31 of these original 37 families, plus an additional 45 families (for whom we had not collected attachment data). This larger group of 4- to 5-year-old children ( $N = 76$ ) participated in a cross-sectional study of psychosocial adjustment and peer rejection (Wood et al., 2002). However, analyses for the present study were limited to the 31 families for whom there was a combination of attachment, sociometric, and teacher-rating data. None of the analyses presented herein provide results that have been published elsewhere.

### Measurement Strategy

Teacher reports were used to measure children's academic competence and trait anxiety. Previous research has suggested that teacher reports of preschool children's academic competence converge with children's performance on standardized tests of academic skills (Fantuzzo et al., 2004; Mattanah, Pratt, Cowan, & Cowan, 2005; McWayne, Fantuzzo, & McDermott, 2004). Teacher reports of preschool children's academic competence have also been found to be predictors of children's social and academic outcomes in elementary school (e.g., Kontos, 1988; Martin, Drew, Gaddis, & Mosley, 1988). Academic competence in preschool includes learning new concepts (e.g., new words, new games) and skills (e.g., counting, letters), fine and gross motor skills (such as arts and crafts or physical play), and socioemotional competencies (e.g., persistence, flexibility; e.g., McWayne et al., 2004). The teacher report measure used in the present study, the Child Adaptive Behavior Inventory (CABI; Cowan, Cowan, Heming, & Miller, 1991; Schaefer & Hunter, 1983), has proven valid and reliable in numerous studies with preschool children. Studies of the CABI have shown that its Academic Competence scale is correlated with standardized achievement test scores and child self-reports of academic competence (validity coefficients ranging from .26 to .43; Mattanah et al., 2005) and that the measure on the whole has good convergent validity, concurrent validity, and internal consistency (McHale & Neugebauer, 1998; Wood et al., 2002, 2004). The Anxiety scale is a subscale of the broadband CABI Internalizing scale, which reflects negative mood and has good psychometric properties (validity coefficients ranging from .30 to .34; McHale & Neugebauer, 1998). The Anxiety subscale was almost perfectly normally distributed in the present sample, with no outliers. Teachers completed the CABI for each participating child at Time 2 (when the children were aged 4–5 years). The scale is composed of 106 items rated on a 4-point Likert-type response scale ranging from 1 (*not at all like*) to 4 (*very much like*). Sample items for the Academic Competence scale include “shows creativity in art or craft work,” “understands difficult words,” “often works quietly at an activity for a long time,” “learns new skills to cope with new situations or problems,” and “catches on quickly; e.g., is quick at learning new games.” For the Anxiety subscale, sample items include “is afraid of a lot of things,” “self-conscious; easily embarrassed,” and “worries a lot.” CABI scores were standardized within

classroom. Cronbach's alphas were .92 and .79, respectively, for the Academic Competence scale and the Anxiety subscale. These coefficients suggest that the Academic Competence scale and the Anxiety subscale are internally consistent, reflecting coherent constructs.

Sociometric ratings were collected at Time 2 through individual child interviews. Individual interviews were conducted using Ramsey's (1995) ratings procedure, which is a modified version of the ratings method described by Asher, Singleton, Tinsley, and Hymel (1979). Sociometric ratings have been found to be superior to sociometric nominations in terms of validity coefficients in preschool children (Asher et al., 1979). Each child observed pictures of other children in his or her class and was asked to rate how much he or she played with each classmate. First, children were asked to rate whether they "play a little" or "play a lot" with each of their peers, creating two piles of pictures. Second, if the children said they "play a little" with a peer, then they were asked to rate whether they "never play with" that peer or if they "play with him/her a little." Third, the peers whom children said they "played with a lot" were coded as "friends" or "best friends" (see Ramsey, 1995, for additional background on this sociometric ratings approach). Following Hymel, Rubin, Rowden, and LeMare (1990) and others, sociometric ratings were standardized within gender and classroom to permit comparability across classrooms with different sizes and gender compositions. Standardized scores of the highest possible ratings (HPRs; e.g., number of best friend ratings) on sociometric ratings scales are commonly used as a measure of peer acceptance, and standardized scores of the lowest possible ratings (LPRs; e.g., number of never play with ratings) are commonly used as a measure of peer rejection (cf. Howes, 1988; Rubin & Clark, 1983; Travillion & Snyder, 1993). The middle ratings (e.g., friend and play with a little) are not used in forming HPR and LPR scores because they are not clear indicators of either acceptance or rejection.

An aggregate of the HPR and LPR scores ( $zHPR - zLPR$ ) is often used as an overall measure of peer acceptance and is referred to as the *social preference score* (e.g., Howes, 1988). This social preference score was used in the present study in the interest of data reduction. In this article I refer to this aggregate score either as *sociometric ratings* or as *peer acceptance*, depending on the context, for ease of interpretation. It should be noted that results were not substantively different regardless of whether the HPR and LPR scores were each used separately or aggregated into the single social preference score; the same pattern of significant results was obtained with each of these sociometric measurement approaches.

Mothers' perceptions of their children as more or less trusting and secure were assessed at Time 1 (when the children were 3 years old) using Waters's (1987) Attachment Behavior Q-Set (AQS), which consists of 90 descriptive items of a child's behavior during interactions with a caregiver. These items are intended to comprehensively describe a child's secure base behavior with his or her caregiver. Sample items include "actively solicits comforting from adult when distressed"

and “cries to prevent separation.” The AQS has proven to be a psychometrically sound procedure to measure attachment behavior in children beyond infancy (Teti & McGourty, 1996; Vaughn & Waters, 1990; however, see also Stevenson-Hinde & Shouldice, 1990). Mothers in the present study were instructed to carefully examine each of the 90 Q-Set cards in relation to their child’s behavior, then to sort the cards into nine piles: Items most characteristic of the child were placed at one end of the distribution (Piles 9, 8, and 7), and items least characteristic were sorted at the opposite end (Piles 3, 2, and 1). Following Waters and Deane (1985), security scores were computed by correlating the individual item ratings for each child to the ratings for a hypothetical “most secure child.” Thirty-five percent of the sample had scores below .30, suggesting that at least a third of the children in this study did not exhibit many attachment behaviors consistent with the hypothetical secure child.

## RESULTS

Table 1 presents intercorrelations, means, standard deviations, and ranges for all study variables. As noted in Method section, the CABI and sociometric scores were standardized within classroom (standardization was performed using the larger sample of 76 children studied at Time 2 in order to maximize representativeness of the standardized scores); hence, the means of the sociometric ratings, CABI Anxiety scores, and CABI Academic Competence scores were close to 0. As hypothesized, there were statistically significant Pearson correlations among AQS scores, sociometric ratings, CABI Anxiety scores, and CABI Academic Competence scores (all in the direction predicted in Figure 1), with one exception:

TABLE 1  
Intercorrelation Matrix and Descriptive Statistics for All Study Variables

<i>Measure</i>	<i>AQS Score</i>	<i>Sociometric Ratings</i>	<i>Anxiety</i>	<i>Academic Competence</i>
AQS score	—			
Sociometric ratings <sup>a</sup>	.43*	—		
CABI Anxiety <sup>b</sup>	-.38*	-.21	—	
CABI Academic Competence <sup>b</sup>	.39*	.54**	-.62**	—
<i>M</i>	0.35	0.07	0.01	-0.17
<i>SD</i>	0.25	1.84	0.85	0.98
Range	-0.22-0.72	-3.62-2.60	-1.79-2.15	-2.09-1.61

*Note.* AQS = Attachment Q-Set; CABI = Child Adaptive Behavior Inventory.

<sup>a</sup>Mean sociometric rating scores from classmates, standardized within class and gender (higher scores reflect more acceptance and less rejection).

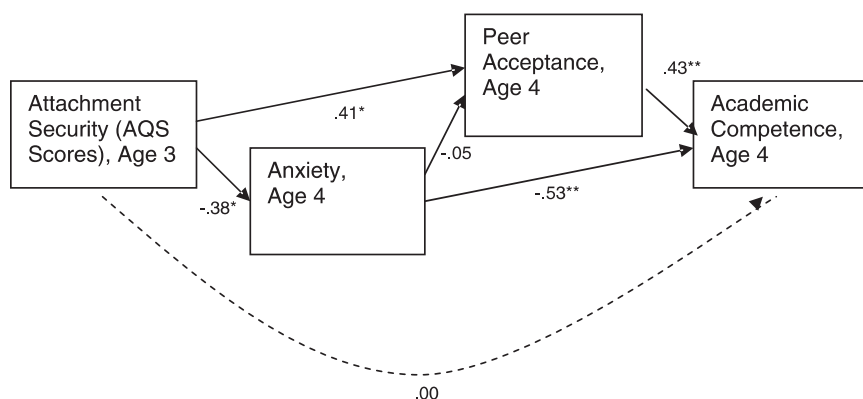
<sup>b</sup>Completed by teachers. Values are standardized scores.

\* $p < .05$ ; \*\* $p < .01$ .

The correlation between sociometric ratings and CABI Anxiety scores was not statistically significant, although it was in the expected direction. Thus, mothers' perceptions of their children as more trusting and secure were related to higher sociometric ratings, less anxiety, and better academic outcomes. Complementarily, higher sociometric ratings and lower anxiety were both related to superior academic outcomes.

### Evaluating the Conceptual Model With Path Analysis

Traditional path analysis using ordinary least squares regression (e.g., Land, 1969; Wright, 1960) was employed to test the conceptual model of relations among mothers' perceptions of their children as more or less trusting and secure, anxiety, peer relationships, and academic competence proposed in this article. (Model-fitting procedures for path analysis [e.g., Bentler & Wu, 1995] were unfortunately not appropriate for this data set due to sample size constraints; hence, traditional path analysis was the preferred data analysis technique.) Briefly, in path analysis, each variable that is hypothesized to cause or precede other variables in the model is statistically controlled for when estimating beta weights linking pairs of variables. For example, in the present study, the path from peer acceptance to academic competence controlled for the influence of both anxiety and mothers' perceptions of their children as more or less trusting and secure (i.e., attachment security/AQS scores), both of which "precede" (are to the left of) peer acceptance in the model (see Figure 2).



**FIGURE 2** Estimated path model of social and emotional influences on children's academic competence. All variables to the left of each DV were controlled for in ordinary least squares regression models to estimate each path. Coefficients are standardized beta weights. "Peer Acceptance" refers to sociometric rating scores. "Attachment Security (AQS scores)" refers to mothers' perceptions of their children as more or less trusting and secure. \* $p < .05$ ; \*\* $p < .01$ .

Results of the path analysis suggested that higher AQS scores at age 3 predicted both lower child anxiety (as rated by teachers) and higher sociometric ratings (as rated by peers) at ages 4 to 5 (see Figure 2). Variation in child anxiety did not predict variability in sociometric ratings. However, lower anxiety and higher sociometric ratings each predicted higher academic competence (as rated by teachers), even after controlling for the other variables in the model. The direct path from AQS scores to academic competence was completely eliminated (.00) after controlling for the intervening variables. For the full model with all three independent variables predicting academic competence,  $R^2 = .56$  ( $p < .0001$ ). Because the same respondent (teacher) rated both child anxiety and academic competence, a second regression model was tested in which only sociometric ratings and AQS scores were used to predict academic competence scores (i.e., excluding anxiety as a predictor); in this model,  $R^2 = .32$  ( $p < .01$ ).

The results from the path analysis suggested that anxiety and peer acceptance may have mediated the relationship between mothers' perceptions of their children as more or less trusting and secure (at age 3) and later academic competence (at ages 4–5). Using Baron and Kenny's (1986) criteria for mediation, I found that (a) there was a significant bivariate relationship between the predictor variable (AQS scores) and outcome variable (academic competence; see Table 1); (b) there was a significant bivariate relationship between the predictor variable and both of the mediators (anxiety and sociometric ratings; see Table 1); (c) controlling for the predictor variable, the mediators had a significant relationship with the outcome variable (see Figure 2); and (d) the path between the predictor variable and outcome variable was no longer statistically significant when controlling for the mediators (see Figure 2). Hence, all of the criteria for mediation were met. Regarding the final criterion, the path weight from AQS scores to academic competence was reduced from .39 to .00 by controlling for the two mediating variables, suggesting complete mediation of the effect. Even when only controlling for one of the mediating variables at a time, the direct effect of AQS scores on academic competence was reduced to a nonsignificant effect (controlling only for anxiety,  $\beta = .18$ , *ns*; controlling only for sociometric ratings,  $\beta = .19$ , *ns*).

## DISCUSSION

Numerous social and psychological factors may affect children's emerging academic competence during preschool. Mothers' perceptions of their children as more or less trusting and secure at age 3 were moderately related to teacher ratings of children's academic competence 1 year later (ages 4–5 years), suggesting that internal working models of close relationships can predict children's ability to engage successfully in the preschool curriculum. However, this effect was mediated by two intervening social/psychological variables: anxiety and peer ac-

ceptance. Consistent with the theoretical model proposed in this article, these findings suggest that children's security of attachment to their mothers may have a direct effect on their ability to regulate negative affective states such as anxiety, as well as their success in relationships with preschool peers. In turn, the lower anxiety and higher peer acceptance associated with stronger attachment security to mothers may (a) reduce affective barriers to learning and (b) provide social motivation to engage in academic aspects of the curriculum, leading to relatively greater academic competence. About 56% of the variance in academic competence was explained by AQS scores (mothers' perceptions of their children as more or less trusting and secure), anxiety, and peer acceptance. These findings suggest that there may be a social/psychological pathway to academic competence in preschool.

Children whose mothers perceived them as less trusting and secure exhibited more anxiety at preschool than did children who were perceived as more trusting and secure, perhaps reflecting a failure to develop emotion regulation skills through a reciprocal, synchronous relationship with a primary caregiver early in life (Sroufe et al., 1999; Warren et al., 1997). Furthermore, children who lack a secure base from which to explore the environment may exhibit avoidance of novel stimuli and social situations, clinginess to adults, and other manifestations of fear and anxiety. Theory suggests that anxious arousal prevents concentration on academic tasks due to narrowed attention to threat cues; cross-sectional research has consistently demonstrated a linkage between anxiety and poor school performance (Barriga et al., 2002; Call, Beer, & Beer, 1994; Ma, 1999). The present study attempted to extend this research by testing anxiety as a mediator of the longitudinal relationship linking mothers' perceptions of their children as more or less trusting and secure and academic outcomes over 2 years in preschool. The results suggest that insecure attachment to mothers could set the stage for heightened anxiety, which may then exert a more proximal and direct influence on children's pre-academic skills in the preschool setting.

A second factor related to academic competence among the 4- and 5-year-olds in this study was peer acceptance: Children who had many "best friends" and who were rejected by few peers, according to peer sociometric ratings, tended to have higher teacher ratings of academic competence than did children who were less well accepted by peers. The path model was consistent with a mediational effect in which early attachment security to mothers predicted the quality of peer relationships, which then led to varying levels of academic competence. Attachment theory posits that children will carry forward models of close relationships from early childhood into newly formed relationships with others (Sroufe & Fleeson, 1986), perhaps as a result of the expectancies that children have for new relationships and the habitual interaction patterns that they have developed in their previous experiences with caregivers. In any case, if strong attachment security to parents is the basis of positive engagement in peer relationships in preschool, the frequency and



quality of interactions with peers may then have direct implications for cognitive development and academic outcomes.

Although specific cognitive achievements that may stem from positive peer engagement were not directly assessed in this study, constructivist theory offers several possible explanations for the findings linking peer acceptance and early academic competence. For example, early notions of “the other” may be developed in close friendships—and especially in the play and cooperative interactions resulting from such friendships—facilitating decentration and perspective-taking (e.g., Van Hoorn et al., 1993). The role of decentering in cognitive development is substantial, permitting acquisition of concrete operations such as conservation (e.g., using the concept of reversibility by inversion, which requires thought that is decentered from the action of the subject; Piaget & Inhelder, 1969). In turn, earlier acquisition of concrete operations facilitates better performance in a variety of academic tasks in preschool and kindergarten (e.g., Campbell & Ramey, 1990; Kingma & Koops, 1983; Pasknak, Madden, Malabonga, Holt, & Martin, 1996). Due to the importance of early academic success for later school achievement (Alexander et al., 2001; La Paro & Pianta, 2000), positive peer relationships may be a key component of the preschool curriculum, as frequently asserted in constructivist theory (cf. Van Hoorn et al., 1993). However, positive peer relationships do not emerge in equivalent proportions for all children in the preschool setting, and the present results suggest that they are more likely to develop when mothers perceive their children as more trusting and secure in early childhood. Again, this demonstrates that one likely pathway to academic competence in preschool begins with early caregiver–child relationships that impact emerging close peer relationships and, thus, variations in academic competence.

Contrary to expectation, an indirect effect of anxiety on academic competence via peer acceptance was not found. Although a modest bivariate correlation between anxiety and acceptance was obtained, it was not statistically significant, and the path weight was of trivial magnitude in the path model. Previous findings have suggested that anxiety is linked with peer acceptance in preschool (Travillion & Snyder, 1993). It had been hypothesized that anxiety might inhibit children’s friendships in preschool and thereby interfere with developing academic skills. However, anxiety may exert a more direct impact on early academic competence, perhaps by interfering with attention, memory, and persistence (e.g., Barriga et al., 2002; Crozier & Hostettler, 2003; Ma, 1999) when children are exposed to novel concepts and learning opportunities in preschool.

Although the social and psychological variables assessed in the present study had consistent moderate linkages with variability in children’s academic competence, they did not explain all of the variance in academic competence. A more complete model seeking to account for additional variance in children’s academic competence would need to address the broader social context of the family, school, and community (e.g., socioeconomic status, primary language spoken in the home,



access to educational resources and stimuli, community attitudes about the importance of early academic development; e.g., Entwisle & Alexander, 1993); the child's cognitive abilities (e.g., intelligence, cognitive-developmental level, language mastery, attention span; e.g., Campbell & Ramey, 1990); and possibly additional psychological factors (e.g., anger, regulation; e.g., Fantuzzo et al., 2004). Needless to say, attendance at preschool per se is not universal, and this is an additional contextual factor with considerable significance for early and later scholastic achievement (Entwisle & Alexander, 1993).

These findings, if replicated, could have important implications for early childhood education practice. Social and psychological factors are not immutable and can be influenced through intervention by teachers, parents, and other concerned adults. Adopting curricula and teaching practices that foster positive peer relationships, anxiety regulation skills, and supportive parent-child relationships could indirectly enhance preschool children's academic competence and school readiness. Most developmental preschool curricula emphasize friendship development and play skills, adopting a Piagetian view of cognitive development that treats peer interactions as a key mediator of learning (Van Hoorn et al., 1993). In terms of supporting children's emotion regulation skills (and thereby reducing anxiety), basic emotion education and modeling of positive coping skills by teachers and other caregivers may be useful. Recent research suggests that brief evidence-based (behaviorally focused), preschool-based parent education programs can be helpful in reducing young children's anxiety (Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005). Potentially (although this remains to be seen), such programs may also improve the parent-child relationship (cf. Wood, McLeod, Sigman, Hwang, & Chu, 2003). In sum, there is potentially much to be done in the early childhood education setting to foster early academic competence by promoting positive social and emotional development.

Strengths of the present study include the preschool-age sample, the use of multiple informants, the test of a mediating model, and the longitudinal design. Although a longitudinal design cannot establish causality and does not rule out the possibility that there was a different direction of effects (e.g., academic success preceding decreases in anxiety), it can reduce artifacts of concurrent ratings inflating the association between measures. The relatively small sample size posed a limitation, precluding, for instance, meaningful comparisons of trends for boys versus girls. The results—and particularly the path model—will require replication in larger samples. As just noted, additional variables representing broader contextual factors as well as additional intraindividual characteristics should be considered in future attempts to delineate the multiple pathways to early academic competence. Furthermore, confirmation of these results with other forms of attachment security ratings would be useful; although there is evidence of concurrent validity for mother-rated AQS Q-sorts in this age group (i.e., Vaughn & Waters, 1990), one study found little evidence of agreement between mothers' AQS ratings

(on a modified, 75-item version of the AQS) and independent observations of attachment security in a laboratory-based Strange Situation task with 2.5-year-olds (Stevenson-Hinde & Shouldice, 1990). Of course, teacher ratings of academic competence could also be complemented by direct tests of academic achievement (although, as reviewed in the "Measurement Strategy" section, there is evidence of concurrent and predictive validity of teacher ratings of academic competence that converge with young children's achievement test scores; Fantuzzo et al., 2004; Mattanah et al., 2005; McWayne et al., 2004).

The present study was designed to test a theoretical model of a social/psychological pathway to early academic competence in a preschool age group. Children bring to preschool certain characteristics that are liable to affect their adaptation to the environment and curriculum (Belsky & MacKinnon, 1994). Previous research has focused on individual differences in intellectual ability and family- and community-level variables such as socioeconomic status that influence children's early academic competence. The present findings suggest that secure attachment to parents may set the stage for early social and psychological adjustment, enhancing preschoolers' readiness to learn. Although experimental data will be needed to establish a causal effect of these variables on academic competence, there is a theoretical basis for expecting causal relations (i.e., attachment theory, constructivist theories based on Piaget's work, and the developmental psychopathology model). A potential implication of these findings—pending confirmation with other samples and research designs—is that children's psychosocial needs should be addressed explicitly in the early childhood curriculum as a means of fostering academic competence.

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