Kindergarten Children’s Emotion Competence as a Predictor of Their Academic Competence in First Grade

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This study examined the relation between emotion competence and academic competence and three potential mediators of this relation. In kindergarten, 193 children from elementary schools serving urban, minority, and low income students participated in an emotion competence assessment, and 142 of these children completed a follow-up assessment in first grade. The relation between teacher ratings of emotion regulation and academic competence was primarily indirect through the effect of emotion regulation on teacher ratings of attention. Peer acceptance and teacher closeness did not mediate the relations between emotion competence and academic competence. Results highlight the potential benefits of early emotion-centered prevention programs and the need to identify children with attention problems as early as possible to prevent academic difficulties.

Keywords: emotion knowledge, emotion regulation, attention, academic competence, elementary school

Children’s emotion competence begins to emerge at birth and develops rapidly throughout early childhood. Childhood experts note that by the end of early childhood most children are beginning to master the ability to understand emotions in others and to effectively regulate their own emotions to motivate adaptive behavior (Denham, 1998). In support of this view, recent research has shown links between children’s emotion competence in early childhood and their ability to engage in appropriate social relationships in middle childhood (e.g., Denham et al., 2003). However, we still know very little about the impact of children’s emotion competence on their academic adjustment in middle childhood. The present study focused on two aspects of emotion competence, emotion knowledge and emotion regulation, in relation to children’s academic competence as they entered elementary school.

Emotion Knowledge and Emotion Regulation
Theories such as differential emotions theory (DET; Izard, 1991) suggest that our emotions have inherently adaptive functions. In order for young children to utilize their emotions adaptively, they must first understand them and also effectively regulate and manage them. In line with DET’s emphasis on utilizing emotions through understanding and effectively managing them, investigators of child development consider emotion knowledge and emotion regulation key aspects of children’s emotion competence (Denham, 1998).

Emotion knowledge can include sophisticated abilities such as the understanding of display rules and knowledge of the causes and consequences of emotion expressions (Denham, 1998). However, the majority of research on emotion knowledge in early childhood has focused on its most basic component: the ability to accurately perceive and label facial expressions and situational and behavioral emotion cues (Izard, 2001). Numerous studies have shown that emotion knowledge in young children relates to their adaptive social behavior as well as problem behavior (e.g., Izard et al., 2001).

A significant aspect of children’s emotion regulation is the ability to handle frustrating, stressful, or harmful emotional arousal (Cole, Martin, & Dennis, 2004; Denham, 1998). Young children with a well-developed ability to regulate emotions are socially competent and less likely to develop problematic internalizing and externalizing behaviors (Denham et al., 2003; Eisenberg et al., 1997, 2001). In sum, emotion competence, as reflected in well-developed emotion knowledge and emotion regulation, predicts social adaptation and lower risk for problem behaviors in young school-age children.

Even though correlational links between aspects of emotion competence and cognitive functioning are also well-established (Halberstadt & Hall, 1980), the nature of the relations between emotion competence and academic outcomes has received little attention until recently. Izard and colleagues (2001) found a somewhat surprising relation between children’s emotion knowledge and their academic competence. Children with more emotion knowledge in Head Start were rated as more academically successful in third grade by their teachers, even after controlling for the children’s verbal ability. Other studies have examined emotion regulation and academic achievement (e.g., Gumora & Arsenio,
2002). In a recent longitudinal study, parent ratings of children’s emotion regulation during preschool predicted their performance on an achievement test in kindergarten (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003).

Research is needed to identify factors that account for the relations between emotion competence and academic competence. Specifically, examining mediators and moderators of the relations between emotion competence and academic outcomes could elucidate how emotion knowledge and the ability to regulate emotions translate into academic success. Studies testing models of emotion competence in relation to academic success can also determine whether prevention programs targeting emotion competence in early childhood may also benefit children’s academic achievement. Finally, examining predictors of early academic performance is important because early academic achievement fosters a child’s ability to succeed in school and relates to numerous outcomes including positive peer relations, higher self-esteem, and lower levels of high school dropout (Cairns, Cairns, & Neckerman, 1989).

In the current study, we targeted these goals by assessing kindergarten children’s emotion knowledge and regulation in relation to academic competence in first grade. We explored whether the relations between emotion competence and academic competence were primarily direct or indirect. Based on previous research and theory, we hypothesized that the prediction of children’s academic competence from their emotion competence would be mediated by their attentional capabilities as well as their social functioning in the school context (e.g., Mostow, Izard, Fine, & Trentacosta, 2002; Trentacosta, Izard, Mostow, & Fine, 2006). Three potential mediators of the relation between emotion competence and academic competence were examined to study this hypothesis.

Hypothesized Mediators of the Emotion Competence-Academic Competence Relation

Based on theory and recent empirical research, emotion competence was expected to lead to academic success by influencing the closeness of children’s relationships with their teachers, their level of peer acceptance, and their ability to pay attention in class.

The Teacher-Student Relationship

Throughout development, close relationships with trusted adults, particularly primary caregivers and teachers, lead to positive adaptation (Pianta, 1999). In previous research, the most robust correlates of teacher’s perceptions of their students were observed positive and negative emotion in interactions between students and their teachers in the classroom (Stuhlmans & Pianta, 2002). In describing the development of effective teacher-child relationships, Pianta (1999) emphasizes a child’s emerging self-reliance in early childhood as an important foundation of positive teacher-child relationships. Because emotional exchange and self-reliance are important factors in forming positive relationships with teachers, the child’s ability to regulate and manage emotions was expected to predict the closeness of the teacher-student relationship. In addition, children with higher emotion knowledge were predicted to have closer relationships with their teachers because they would be better able to understand and respond to their teacher’s feelings and expectations.

Children with close teacher relationships were also expected to have better academic outcomes, as demonstrated in previous studies of elementary school children (e.g., Birch & Ladd, 1997). Because school learning takes place in the context of social relationships, children’s ability to succeed academically is determined in part by their ability to develop positive relationships with their teachers. Children with close teacher relationships are more likely to receive positive, helpful feedback on academic assignments as well as sustained assistance with problem solving exercises (Pianta, 1999).

Peer Acceptance

Also of importance to children’s school adjustment and general adaptation are their relationships with peers. Emotion competence consistently relates to children’s positive peer relationships, and it influences peer acceptance by enhancing children’s social skills (Mostow et al., 2002). For example, children who understand emotions in facial expressions and social situations have higher levels of peer acceptance (Denham et al., 1990). In addition, children who can better regulate their emotions are more socially accepted by their peers (Shields, Ryan, & Ciechetti, 2001). Based on these findings, emotion knowledge and emotion regulation were expected to predict peer acceptance in the present study.

As supported by previous research (e.g., Wentzel & Caldwell, 1997), peer acceptance was also expected to predict academic competence. There are a number of explanations for the positive link between peer acceptance and academic success. For instance, peer acceptance could provide access to achievement-enhancing resources such as help from classmates (Wentzel & Caldwell, 1997). Peer acceptance could also foster positive opinions of school that lead to interest in academic pursuits and a motivation to succeed (Deci, 1992; Ladd, Birch, & Buhs, 1999; Wentzel, 1994).

Attention to Academic Tasks

Although children’s relationships with teachers and peers can enhance school adjustment and academic achievement, few constructs have more of a direct impact on children’s academic achievement than their ability to pay attention in the classroom.

Little research has examined emotional correlates or predictors of attention problems, but emotion theories such as DET and conceptions of children’s temperament suggest that discrete emotions, particularly interest, are vitally important for regulated attention (Izard, 1991; Ruff & Rothbart, 1996). Also, conceptions of children’s ability to modulate emotions to facilitate adaptive behavior and minimize problematic behavior highlight the importance of attention shifting and focusing for effective self-regulation (Eisenberg et al., 2001).

In terms of empirical evidence, a recent study found that children with higher emotion knowledge scores had fewer attention problems as rated by teachers, and children with more attention problems received more anger and sadness nominations from their peers (Trentacosta et al., 2006). The preliminary theoretical assertions and initial empirical support suggest that children who understand their emotions and can effectively regulate them are in a better position to pay attention in class. Emotionally competent children can pay attention because their emotion understanding...
and regulation abilities allow them to effectively harness the emotion motivation in positive emotions such as interest to attend to academic tasks (Izard, 1991). At the same time, they are able to accurately respond and minimize distress in situations involving negative emotions, thereby reducing their propensity to distraction in the classroom. Therefore, emotion knowledge and emotion regulation were expected to relate to fewer attention problems, and the ability to pay attention in school was expected to predict academic competence.

The Roles of Verbal Ability, Age, and Test Session Attention

The present study included verbal ability as a predictor of the emotion competence constructs because children’s verbal ability, a core component of cognitive ability, relates to both their emotion knowledge and their emotion regulation (Cutting & Dunn, 1999; Denham, Cook, & Zoller, 1992). Furthermore, children’s cognitive ability is consistently related to their academic achievement (Lassiter & Bards, 1995). Thus, verbal ability was also included as a direct predictor of emotion knowledge, emotion regulation, and academic competence. The study also included age as a predictor of the emotion competence constructs because research has shown age-related increases in emotion understanding and emotion regulation (Fabes & Eisenberg, 1992; Smith & Walden, 1998). Therefore, age was expected to have an indirect impact on student-teacher relationships, peer acceptance, attentional ability, and academic competence through its effect on emotion knowledge and emotion regulation.

Finally, it is possible that the effects of verbal ability and emotion competence on academic competence may simply reflect the child’s ability to attend to the tasks at hand. Children who have difficulty paying attention during the assessment session may perform relatively poorly on verbal ability and emotion knowledge tests, even though they possess superior cognitive and emotional abilities when faced with real social situations or stimulating academic challenges. Thus, children’s attention during the assessment session was included in models of the relation between emotion competence and academic competence.

The Context of the Present Study

Several concerns led us to examine the relation between emotion competence and academic competence in a sample of kindergarten children with a follow-up assessment in first grade. By the time they enter kindergarten, many children are mastering their understanding of basic emotions and are beginning to use complex behavioral and, at times, cognitive strategies to regulate emotions (Denham, 1998). Therefore, significant individual differences still exist in kindergarten, but many children have nearly mastered the ability to understand and regulate their basic emotions. Thus, kindergarten was an opportune time to assess emotion competence in the present study.

As children move to first grade, the demands to handle one’s own attention regulation in order to succeed in school increase dramatically (Entwisle & Alexander, 1998). Also, children in first grade generally continue to have consistent contact with one classroom teacher and a single group of classroom peers who can also influence their academic growth. Therefore, measurement of children’s relationships with their teachers and peers as well as their ability to allocate attention to academic tasks occurred during first grade. Academic achievement was also measured in first grade because early elementary school is considered a “critical period” for children (Alexander, Entwisle, & Kabani, 2001). Early academic success determines much of the variance in children’s later achievement and likelihood of school drop out (Entwisle & Alexander, 1998).

The current study recruited participants from urban schools serving a substantial minority and low income population. McLoyd’s (1998) analysis of the relations between poverty and child development shows that economically disadvantaged children have a greater risk of low academic achievement as well as associated outcomes including school dropout (Cairns et al., 1989). Therefore, it is particularly important to identify constructs that can boost the academic achievement of children from low income communities.

Method

Participants

Participants were recruited from kindergarten classrooms at seven elementary schools in two small cities. Four of the schools were public charter schools, and three were private Catholic schools. All participating elementary schools were in urban areas, and approximately 75% or more of the students at each school were ethnic minorities. At least 40% of each school’s population consisted of low income children as indicated by the percent receiving free or reduced lunch during the initial recruitment year. The 40% low income guideline has been used by the United States government to determine school risk status (Lippman, Burns, & McArthur, 1996).

All kindergarten teachers at each school were asked to distribute parental permission forms to all of their children. The letters provided details of the study and explained that participation involved individual interviews with their children in kindergarten and first grade as well as rating forms for teachers to complete. During the initial kindergarten recruitment, 314 children from 15 classrooms were invited to participate in the study, and 193 children received parental permission to participate. The mean age for these 193 children was 6 years, 1 month at the kindergarten assessment. Eighty-eight percent of these children were African-American, 7% were Hispanic, 3% were White, and the remaining 3% were Biracial. Forty-nine percent of these children were boys, and 51% were girls.

For the first grade follow-up portion of the study, 123 children attended first grade at the same schools, 3 children shifted between schools in the study, and 13 children from a charter school that closed were followed up at 2 charter schools that joined the study. In addition, three participating children attended the same school but were retained in kindergarten. In order to include the largest number of children for the follow-up, these three retained children were included in the first grade follow-up sample and assessed with the same procedures as the other children. Thus, 74% of children in the original sample (142 children) were assessed at follow-up. Ninety-one percent of the follow-up sample was African-American, 4% was Hispanic, 1% was White, and 3% was Biracial. Fifty-one percent were boys, and 49% were girls.
Using independent samples t tests, there were no differences in age, verbal ability, emotion knowledge, emotion regulation, or test session attention between children who were available for longitudinal follow-up and children who were unavailable for follow-up (all p-values > .05). The mean age of the 142 children at the follow-up assessment was 6 years, 11 months. Also for the follow-up portion of the study, the classmates of the 142 children in the longitudinal sample were invited to participate in sociometric nomination procedures. The resulting “classmates sample” consisted of 155 children.

Procedure

Data were collected in the spring of the child’s kindergarten year and approximately 10 months later during the late winter or early spring of the child’s first grade year. At the kindergarten assessment, children completed measures of verbal ability and emotion knowledge. Trained undergraduate research assistants obtained child assent and individually administered these measures in a quiet area of the school. Each individual interview lasted approximately 30 minutes, and children received a small reward for their participation. After the interview, the research assistant completed a short rating of the child’s behavior during the assessment session. Also at the kindergarten assessment, teachers completed measures of children’s emotion regulation.

At the first grade follow-up, children completed a measure of their academic achievement as well as a sociometric measure of peer acceptance following the same procedure as in kindergarten. Children in the classmates sample completed only the sociometric status measure. Teachers completed a measure of their relationship with the child as well as measures of the child’s attention in the classroom and academic competence for the 142 children originally recruited into the sample.

Kindergarten Measures

Verbal ability. Children’s verbal ability was assessed with the Peabody Picture Vocabulary Test-Third Edition (PPVT-III; Dunn & Dunn, 1997). The PPVT-III assesses children’s receptive vocabulary and has excellent internal reliability for 5- and 6-year-old children (α = .94; Dunn & Dunn, 1997). Based on the child’s age, raw scores were converted to standard scores with a mean of 100 and a standard deviation of 15.

Emotion knowledge. Children’s emotion knowledge was measured with the Assessment of Children’s Emotion Skills (ACES; Schultz & Izard, 1998). ACES contains three subscales: facial expressions, social situations, and social behaviors. The facial expressions subscale assesses the ability to understand emotions conveyed through other children’s facial expressions. This 26-item subscale consists of color photographs of ethnically diverse elementary school children depicting happy, sad, anger, and fear expressions as well as ambiguous expressions and expressions that do not convey emotions. The examiner showed the child the pictures one at a time, and each time asked the child if the child in the picture felt happy, sad, mad, scared or no feeling. The examiner circled the child’s response.

The social situations and social behaviors subscales each include 15 two to three sentence vignettes. The vignettes describe prototypic situations or behaviors related to happiness, sadness, anger, or fear. An additional three vignettes in each subscale are ambiguous because the vignettes describe behaviors or situations that do not depict prototypic emotion behaviors or situations. The examiners read the vignettes to the children and after each vignette asked the child if the main character felt happy, sad, mad, scared, or no feeling. The examiner circled the child’s response.

The emotion knowledge accuracy score was calculated by determining the number of correct responses to happy, sad, anger, and fear items within each subscale. Then, the subscale scores were standardized and added to attain the total emotion knowledge score. The 40-item emotion knowledge accuracy scale had moderate internal reliability (α = .75). In previous research, children’s scores on the ACES emotion knowledge accuracy scale related to their attention regulation and social functioning (Mostow et al., 2002; Trentacosta et al., 2006).

Test session attention. Children’s level of attention during the assessment session was measured with the Guide to the Assessment of Test Session Behavior (GATSB; Glutting & Oakland, 1991). The GATSB was originally designed to be completed by examiners after using the Wechsler intelligence and achievement tests, but it contains a range of items that are applicable to a wide variety of individual testing situations. The measure contains 29 items divided among three scales: Avoidance, Inattentiveness, and Uncooperative Mood. For each item, examiners select whether the item description “usually applies,” “sometimes applies,” or “doesn’t apply” based on the child’s behavior during the assessment session.

Undergraduate examiners received training on GATSB items by viewing videotapes of assessment sessions from a previous study. In these assessment sessions, young children completed measures that were similar to the measures used in the present study. Examiners viewed the videotapes with the first author and discussed GATSB item content as it related to the children’s behavior during the assessment session. Then, examiners individually viewed specific portions of two assessment sessions and privately completed the GATSB based on the child’s behavior during the segment. Their ratings on the GATSB were compared to the first author’s ratings of the same video segments. Across examiners, the mean exact agreement with the first author was 70%, and examiners chose either the first author’s exact response or an adjacent response (e.g., selecting “sometimes applies” instead of “usually applies”) for more than 96% of items.

Agreement with the first author was also calculated on two occasions for each examiner during data collection for the present study, once at the beginning of data collection and once near the end of data collection. The first author sat a few feet away from the child participant, observed the assessment session, and privately completed the GATSB items. Mean exact agreement between examiners and the first author on GATSB items was 80.5%.

The GATSB’s 10-item Inattentiveness scale measured test session attention. This scale contains items such as “listens attentively to directions and test items” and “is sensitive to minor disturbances or competing stimuli.” In the present study, this scale exhibited adequate reliability (α = .78). Scores on the scale were reversed so that higher scores indicated more attention during the testing session.

Emotion regulation. Children’s emotion regulation was assessed with the Emotion Regulation Checklist (ERC), a measure designed to be completed by either parents or teachers (Shields &
Cicchetti, 1997). This measure contains 24 items divided into two subscales: emotion regulation and lability/negativity. Each item is rated on a Likert scale ranging from 1 (Rarely/Never) to 4 (Almost always). The emotion regulation subscale contains items such as “Is a cheerful child.” The lability/negativity subscale includes items such as “Exhibits wide mood swings.” Items on the ERC generally include specific emotion content, distinguishing them from the measures of attention used in the present study. The ERC item “Is impulsive” was not included in the present study because it relies on a behavioral descriptor that closely overlaps with common conceptions of attention problems and hyperactivity.

In the present study, both ERC scales had moderate to high internal reliability (α = .92 on the lability/negativity subscale and α = .84 on the emotion regulation subscale), and both subscales were used to assess emotion regulation. Both subscales contain items assessing the ability to handle situations involving positive and negative emotions, and previous research has used items from both scales to assess emotion regulation (e.g., Ramsden & Hubbard, 2002). Also, in the present study there was a large correlation between the two subscales (r = .51). Thus, the lability-negativity subscale was reverse-scored so that higher scores indicated less negative expression, and the two subscales were standardized and aggregated to form a single index of emotion regulation.

Follow-up Measures

**Student-teacher closeness.** The relationship between students and their primary teacher was assessed with the Student-Teacher Relationship Scale (STRS; Pianta, 1996). The STRS is completed by teachers and contains 28 items rated on a Likert scale ranging from 1 (definitely does not apply) to 5 (definitely applies). The STRS includes three subscales: conflict, closeness, and dependency. For the present study, the closeness scale was used in analyses to index the teacher-child relationship for two reasons. First, in previous studies the closeness and the dependency subscales were consistent predictors of a child’s academic achievement, whereas the conflict scale did not predict academic achievement (Birch & Ladd, 1997). Secondly, even though the dependency subscale predicted academic achievement in previous studies, it contains multiple items that overlap with our measure of emotion regulation and has poorer internal reliability than the closeness subscale (Pianta, 1996). In the current sample, the 11-item closeness subscale had good internal reliability (α = .84).

**Peer acceptance.** Children’s peer acceptance was assessed with a sociometric method developed by Coie and his colleagues (Coie, Dodge, & Coppotelli, 1982), and later modified by Terry (Terry & Coie, 1991). In this method, children are first asked to name the children in their class that they “like.” Then, they are asked to name the children in their class that they “don’t like very much.” Unlike the original method of Coie et al., where children could only nominate three classmates as liked and three as disliked, children in this study were allowed to nominate as many classmates as they wanted. If a child indicated the same classmate as both liked and disliked, examiners asked the child to clarify her response.

Based on Terry’s (1999) recommendations for this sociometric procedure, the participant recruitment goal was a minimum of 40% of children in each classroom in order to achieve a reliable and valid social preference score. Although 40% or more of the children in each classroom received parental permission, the actual participation rate fell to 37% in one classroom because a child refused to participate in the sociometric procedure. This classroom included three children from the longitudinal sample. From the nomination procedure, a social preference score was calculated for each child. The child’s disliked nominations were subtracted from her liked nominations. The difference score was standardized based on the other scores in the child’s classroom. The resulting standardized social preference score was our index of peer acceptance.

**Attention to academic tasks.** Children’s ability to attend to academic tasks was assessed with an adapted version of the Teacher Observation of Classroom Adaptation-Revised (TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991). The TOCA-R consists of 31 items that measure children’s aggression, shyness, and academic problems. On the original TOCA-R, teachers rated their students in a semi-structured interview on a 6-point scale with anchor points of almost never and almost always.

For this study, teachers completed a 26-item version of the TOCA-R that includes a cognitive concentration subscale (Conduct Problems Prevention Research Group, 1992). Some items from the cognitive concentration subscale were not included in the present analyses because the items overlapped with our conceptualization of academic competence (e.g., “Leans up to ability”). Items that are most indicative of attention in the classroom and have the most similarity to criteria used to diagnose the inattentive subtype of Attention-Deficit/Hyperactivity Disorder were added to create an attention subscale for the present study (American Psychiatric Association, 1994). As a result, the attention subscale consisted of the following five items: “concentrates,” “pays attention,” “easily distracted,” “mind wanders,” and “stays on task.” Unlike the GATS Inattentiveness scale, teachers were instructed to rate TOCA-R items based on the child’s overall behavior rather than their performance during specific tasks. Nonetheless, the TOCA-R attention subscale items measured behaviors that were similar to those included on the GATS Inattentiveness scale. The attention subscale from the TOCA-R exhibited excellent internal reliability (α = .93).

**Academic competence.** Children’s academic competence was assessed in two ways. The Wechsler Individual Achievement Test-2nd Edition-Abbreviated (WIAT-II-A; Wechsler, 2001) includes three subtests, Word Reading, Numerical Operations, and Spelling. These subtests assess the child’s reading, mathematics, and spelling achievement, respectively. Each subtest raw score was converted to a standard score with a mean of 100 and a standard deviation of 15. The standard scores were summed to compute a composite sum. The composite sum was converted to a composite standard score with a mean of 100 and standard deviation of 15. The WIAT-II-A includes both age- and grade-based standard scores. Grade-based standard scores were used in the present study because age was already included in the analyses as an exogenous variable.

Teachers also rated academic competence using the Social Skills Rating System (SSRS; Gresham & Elliott, 1990). The SSRS includes an academic competence subscale consisting of nine items. The teacher was asked to rate the child in comparison to either other children in the classroom or overall grade-level expectations using a 5-point scale ranging from 1 (lowest 10%) to 5 (highest 40%).
onto separate factors. Thus, even though there was a high bivariate correlation between the teacher ratings of attention and academic competence, the factor analysis presented evidence that attention in the classroom and academic competence were distinct constructs in this study.

Initial Model Estimation

The path analytic models were examined with maximum likelihood estimation using AMOS 5.0 (Arbuckle, 2003). The fit statistics for each model are presented in Table 4. Model 1 (see Figure 1) included age, test session attention, and verbal ability as exogenous variables, and emotion knowledge, teacher ratings of emotion regulation, student-teacher closeness, peer acceptance, teacher ratings of attention, and the academic competence aggregate as endogenous variables. Direct paths were included from age, test session attention, and verbal ability to emotion knowledge and emotion regulation. A direct path was also included from verbal ability to academic competence.

In terms of the first grade mediators in Model 1, direct paths were included from emotion knowledge and emotion regulation to student-teacher closeness, peer acceptance, and teacher attention ratings. Direct paths were also included from each of the first grade mediators to the academic competence aggregate. Finally, the residual error terms for each of the first grade mediators were correlated. Correlated residual error terms between the mediators were included for two reasons. First, the bivariate correlation matrix showed significant positive relations among the first grade mediators. Secondly, because relations between the mediators were not central to the investigation of the mediational models, specifying directional paths between the mediators was not essential to the models.

Model 1 provided unsatisfactory fit to the data based on multiple fit indices. The chi-square goodness of fit index tests exact model fit, and a nonsignificant chi-square value supports model fit. The chi-square index for Model 1 was significant, suggesting poor model fit. There are also a number of relative fit indices. The Root Mean Square Error of Approximation (RMSEA) is one such measure of relative fit, and RMSEA values below .06 support good model fit (Hu & Bentler, 1999). Based on the RMSEA criteria, Model 1 showed inadequate model fit. Two other statistics, the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) measure the absolute fit of the model in comparison to the absolute fit of an independence model, and values above .95 for the CFI and TLI indicate good model fit (Hu & Bentler, 1999). Model 1 showed inadequate model fit based on the CFI and the TLI.

A number of the path coefficients in Model 1 were nonsignificant. Most importantly, the paths from student-teacher closeness and peer acceptance to the academic competence aggregate were nonsignificant. Because these paths were nonsignificant, these constructs did not meet criteria as mediators of the relations between emotion competence and academic competence.

Additional Investigations of the Initial Model

The initial model received further investigation and refinement in two ways. First, a model was explored where the academic achievement test replaced the academic competence aggregate as the dependent variable in the model. Because the same teachers completed the attention ratings and the academic competence

Table 1
Means and Standard Deviations for Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>Age in years</td>
<td>6.09</td>
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<tr>
<td>Test session attention (GATSJB)</td>
<td>17.85</td>
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<td>Verbal Ability (PPVT)</td>
<td>91.63</td>
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<td>Emotion knowledge aggregate (ACES)</td>
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<td>Facial expressions</td>
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<td>Social situations</td>
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<td>Social behaviors</td>
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<td>Emotion regulation aggregate (ERC)</td>
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<td>Lability/negativity</td>
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<td>Regulation</td>
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<td>Student-teacher closeness (STRS)</td>
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<tr>
<td>Peer acceptance</td>
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<td>Attention to academic tasks (TOCA-R)</td>
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<tr>
<td>Grade-based achievement score (WIAT-II)</td>
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<td>11.29</td>
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<tr>
<td>Teacher ratings of academic competence (SSRS)</td>
<td>16.78</td>
<td>6.01</td>
</tr>
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</table>

Note. GATSJB = Guide to the Assessment of Test Session Behavior; PPVT = Peabody Picture Vocabulary Test; ACES = Assessment of Children’s Emotion Skills; ERC = Emotion Regulation Checklist; STRS = Student-Teacher Relationship Scale; TOCA-R = Teacher Observation of Classroom Adaptation-Revised; WIAT-II = The Wechsler Individual Achievement Test-2nd Edition-Abbreviated; SSRS = Social Skills Rating System.
ratings that were part of the academic competence aggregate, it was possible that common method variance contributed to the robustness of teacher ratings of attention as a predictor of the academic competence aggregate. To address the issue of common method variance, all paths from Model 1 were retained, but the grade-based standardized achievement test score replaced the academic competence aggregate as the outcome. An examination of this model, Model 2, showed continued poor model fit, and the paths from student-teacher closeness and peer acceptance to the achievement test score were not significant.

Secondly, refinements were made to the initial model by deleting nonsignificant paths and adding paths based on modification indices. The initial refined model, Model 3, did not include student-teacher closeness and peer acceptance in the model but included all other significant paths from Model 1. Fit statistics for Model 3 also indicated unsatisfactory fit, and modification indices suggested adding paths from test session attention to teacher ratings of attention and from emotion knowledge to academic competence. Also, a nonsignificant path coefficient supported removal of the path from emotion knowledge to teacher ratings of attention. The path changes were made, and the resulting model, Model 4, showed adequate fit. Based on modification indices for Model 4, a path from verbal ability to teacher ratings of attention was added. This addition created the final model exploring mediators of the relations between emotion competence and the academic competence aggregate.

The final model, Model 5 (see Figure 2), demonstrated good fit based on the chi-square, RMSEA, CFI, and TLI statistics. All predicted paths in Model 5 were significant. Therefore, the model supported direct effects of verbal ability and emotion knowledge on children’s academic competence. There were also significant direct paths from emotion regulation to teacher ratings of attention and from teacher ratings of attention to academic competence. The Sobel (1982) test was conducted on a slightly revised version of Model 5 that included a direct (and nonsignificant) path from emotion regulation to academic competence as required by traditional tests of indirect effects (Shrout & Bolger, 2002). The indirect effect of emotion regulation on academic competence through teacher ratings of attention was significant, $t = 3.39, p < .01$.

Overall, measured variables in Model 5 accounted for 29.6% of the variance in emotion knowledge, 5.8% of the variance in emotion regulation, 21.5% of the variance in teacher ratings of attention, and 47.9% of the variance in academic competence.

**Additional Investigations of the Final Model**

Similar to our exploration of the initial model, the final model was tested with the achievement test as the dependent variable. All paths from Model 5 were retained, but the grade-based standardized achievement test score replaced the academic competence aggregate.

### Table 2
**Intercorrelations Among Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kindergarten age</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Test session attention</td>
<td>.04</td>
<td>.22**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Verbal ability</td>
<td>.15*</td>
<td>.22**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Emotion knowledge</td>
<td>.12</td>
<td>.23**</td>
<td>.47**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Emotion regulation</td>
<td>.11</td>
<td>.18</td>
<td>.26**</td>
<td>.22**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Student-teacher closeness</td>
<td>.00</td>
<td>.16</td>
<td>.12</td>
<td>.13</td>
<td>.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Peer acceptance</td>
<td>.07</td>
<td>.26**</td>
<td>.05</td>
<td>.09</td>
<td>.24**</td>
<td>.23**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Attention (teacher)</td>
<td>.09</td>
<td>.31**</td>
<td>.30**</td>
<td>.20</td>
<td>.36**</td>
<td>.40**</td>
<td>.38**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Academic aggregate</td>
<td>.06</td>
<td>.27**</td>
<td>.44**</td>
<td>.37**</td>
<td>.26**</td>
<td>.22**</td>
<td>.19**</td>
<td>.63**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Achievement test</td>
<td>.07</td>
<td>.23**</td>
<td>.41**</td>
<td>.35**</td>
<td>.16</td>
<td>.19**</td>
<td>.14</td>
<td>.52**</td>
<td>.93**</td>
<td>.73**</td>
</tr>
<tr>
<td>11. Teacher academic rating</td>
<td>.04</td>
<td>.27**</td>
<td>.41**</td>
<td>.34**</td>
<td>.32**</td>
<td>.21**</td>
<td>.22**</td>
<td>.64**</td>
<td>.93**</td>
<td>.73**</td>
</tr>
</tbody>
</table>

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

### Table 3
**Factor Analysis: Pattern Matrix Factor Loadings**

<table>
<thead>
<tr>
<th>Item description</th>
<th>Factor 1 loading</th>
<th>Factor 2 loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRS: Overall academic performance</td>
<td>.92</td>
<td>.07</td>
</tr>
<tr>
<td>SSRS: Reading, compared to other students</td>
<td>.91</td>
<td>.00</td>
</tr>
<tr>
<td>SSRS: Math, compared to other students</td>
<td>.94</td>
<td>-.03</td>
</tr>
<tr>
<td>SSRS: Reading, compared to grade expectations</td>
<td>.90</td>
<td>.02</td>
</tr>
<tr>
<td>SSRS: Math, compared to grade expectations</td>
<td>.97</td>
<td>-.02</td>
</tr>
<tr>
<td>TOCA-R: Concentrates</td>
<td>.19</td>
<td>.78</td>
</tr>
<tr>
<td>TOCA-R: Pays attention</td>
<td>.04</td>
<td>.88</td>
</tr>
<tr>
<td>TOCA-R: Easily distracted</td>
<td>.04</td>
<td>-.84</td>
</tr>
<tr>
<td>TOCA-R: Mind wanders</td>
<td>.11</td>
<td>-.83</td>
</tr>
<tr>
<td>TOCA-R: Stays on task</td>
<td>.07</td>
<td>.88</td>
</tr>
</tbody>
</table>

**Note.** SSRS = Social Skills Rating System; TOCA-R = Teacher Observation of Classroom Adaptation-Revised.

### Table 4
**Fit Statistics for Path Analytic Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>36.54*</td>
<td>.107*</td>
<td>.903</td>
<td>.750</td>
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<tr>
<td>Model 2</td>
<td>36.54*</td>
<td>.107*</td>
<td>.889</td>
<td>.715</td>
</tr>
<tr>
<td>Model 3</td>
<td>27.11*</td>
<td>.110*</td>
<td>.907</td>
<td>.804</td>
</tr>
<tr>
<td>Model 4</td>
<td>13.40</td>
<td>.059</td>
<td>.976</td>
<td>.944</td>
</tr>
<tr>
<td>Model 5</td>
<td>8.22</td>
<td>.014</td>
<td>.999</td>
<td>.997</td>
</tr>
<tr>
<td>Model 6</td>
<td>9.53</td>
<td>.037</td>
<td>.990</td>
<td>.974</td>
</tr>
</tbody>
</table>

**Note.** RMSEA = The Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.

$p < .05$. 

...
aggregate as the outcome. This model, Model 6 (see Figure 3), was also tested to examine whether there was an indirect effect of emotion regulation on academic achievement test scores through teacher ratings of attention. Based on fit statistics, Model 6 demonstrated good fit, and all predicted paths were significant. In addition, the Sobel test indicated a significant indirect effect of emotion regulation on the achievement test through teacher ratings of attention, $t = 3.19, p < .01$. The amount of variance explained in the achievement test, $35.9\%$, was somewhat less than the amount of variance explained in the academic competence aggregate in Model 5. However, Model 6 supported emotion knowledge, verbal ability, and teacher ratings of attention as direct predictors of academic competence even when measured solely with an achievement test.

To more closely examine components of the achievement test, three additional models were tested. In each case, one of the standardized achievement test subtests (mathematics, reading, or spelling) was included in the model as the final outcome measure.

\[
\begin{align*}
\text{Test Session Attention} & \rightarrow \text{Emotion Knowledge} \\
\text{Age} & \rightarrow \text{Emotion Regulation} \\
\text{Verbal Ability} & \rightarrow \text{Attention to Academic Tasks} \\
\text{Student-Teacher Closeness} & \rightarrow \text{Academic Competence}
\end{align*}
\]

\[\text{Figure 1. Model 1: Initial model of kindergarten predictors of academic competence with three proposed mediators in the model.}\]

\[\text{Figure 2. Model 5: Final model of kindergarten predictors of academic competence examining teacher ratings of attention as a mediator.}\]
Each model demonstrated adequate to good model fit, and all paths remained significant with a few notable exceptions. In the model predicting mathematics achievement, verbal ability and emotion knowledge were nonsignificant predictors. In the model predicting reading achievement, verbal ability was a nonsignificant predictor. In the model predicting spelling achievement, emotion knowledge was a nonsignificant predictor.

Finally, to test sex differences in the final model, path models with the same predicted paths as Model 5 were set up for boys and for girls. Then, an unconstrained model for the two groups was compared with a model where path coefficients were constrained to be equal. The chi-square difference test was used to compare the chi-square statistics and degrees of freedom for the two models to examine whether constraining the path coefficients worsened model fit (see Byrne, 2004). Based on the nonsignificant chi-square difference test ($\Delta \chi^2 = 10.53$, $\Delta df = 10$, $p > .05$), the constrained model did not significantly worsen model fit. Thus, there was not support for overall sex differences in the final model.

Discussion

The present study confirmed a number of predictions regarding the relations between emotion competence and academic competence. However, the results provided some support for mediation for just one of the constructs measured in first grade, teacher ratings of attention.

Regarding student-teacher closeness, criteria for mediation were not met for multiple reasons. First, bivariate correlations showed nonsignificant relations between student-teacher closeness and the emotion competence variables. The results suggest that teachers may share close relationships with students possessing a wide range of emotion competence. Teachers of young children entering elementary school may forgive or tolerate emotional reactivity more than teachers of older children. It is also possible that emotion competence would have been more closely related to other aspects of the student-teacher relationship such as dependency on the teacher.

Secondly, student-teacher closeness, although it showed small but significant bivariate correlations with the academic outcomes, did not predict academic competence in a path analytic model. Teachers may share close relationships with some of their academically struggling students because these children show consistent attempts to learn and seek support that bring them closer to their teachers.

Peer acceptance also failed tests of mediation in the present study. Unlike student-teacher closeness, peer acceptance was significantly correlated with teacher ratings of emotion regulation. These findings support previous positive relations shown between emotion regulation and peer relations (Shields et al., 2001; Smith, 2001). Unlike numerous previous studies (e.g., Mostow et al., 2002), emotion knowledge was not significantly related to peer acceptance. Sample characteristics may partially explain some of the differences because the present sample was primarily minority, from urban areas, and from schools with high concentrations of low income children, whereas most previous studies have used primarily white and middle class samples. In urban and ethnic minority populations, aspects of the neighborhood or cultural context may be more predictive of children’s peer acceptance than emotion knowledge. However, one previous study with a sample of ethnic minority children showed some evidence of relations between emotion knowledge and peer status (Smith, 2001).

After controlling for verbal ability and other first grade predictors of academic competence in a path analytic model, peer acceptance did not significantly predict the academic competence aggregate. Therefore, peer acceptance was not a mediator of the relation between teacher ratings of emotion regulation and aca-
demic competence. Peer acceptance may emerge as a more robust predictor of academic competence later in elementary school and in preadolescence when children become more reliant on support from friends to feel confident and achieve academically (Wentzel & Caldwell, 1997).

In contrast to the findings for peer acceptance and student-teacher closeness, teacher ratings of attention were the most consistent predictor of academic competence. Furthermore, teacher ratings of emotion regulation predicted academic competence indirectly through teacher ratings of attention. Thus, it appears that children who can manage their emotions succeed academically because emotion regulation promotes attention to tasks in the classroom. The significant indirect effect of emotion regulation on academic competence through teacher ratings of attention supports teacher ratings of attention as a mediator based on recent standards for mediation (Shrout & Bolger, 2003). This finding is similar to a previous study of slightly younger children where behavioral regulation in kindergarten mediated the relation between children’s emotion regulation in preschool and their academic achievement in kindergarten (Howse et al., 2003).

Overall, predictors in the final path analytic model explained nearly half of the variance in the academic competence aggregate, and teacher ratings of attention were the largest contributor to the variance in the academic aggregate. More strikingly, even when predicting the achievement test to remove common method variance between the attention and academic competence ratings, over one third of the variance in the achievement test was explained by variables in the model. Furthermore, the teacher rating of attention was the most robust predictor of the achievement test based on the standardized path coefficients. Because the other constructs in the final model were measured in kindergarten, part of the robustness of the relation between teacher ratings of attention and academic performance is likely because of the concurrent measurement of these constructs. Nonetheless, the results provide strong support for attention in the classroom as a key predictor of academic success, whether measured by teacher perceptions or test scores.

Even though mediators were not found for the relation between emotion knowledge and academic competence, emotion knowledge directly predicted children’s academic competence. These results support previous evidence that emotion knowledge is a robust correlate of academic performance (Halberstadt & Hall, 1980; Izard et al., 2001). Although previous studies have controlled for verbal ability when examining the relation between emotion knowledge and academic outcomes, earlier research did not account for the child’s level of attention during the assessment session. Thus, the current results provide some of the strongest evidence to date that emotion understanding helps to promote academic performance. However, it is important to note that emotion knowledge did not predict spelling and mathematics achievement in models that explored components of the achievement test.

Limitations

The study has a number of limitations. First, the study examined predictors of academic competence in primarily ethnic minority children from elementary schools serving urban areas with high concentrations of low income families. Thus, the results of the study may not generalize to middle class, nonurban, or primarily Caucasian or other ethnic populations. Furthermore, these children were assessed in kindergarten and followed up in first grade. Therefore, the results may not generalize to academic performance later in childhood.

Also, the study relied heavily on teacher ratings and child performance on individually administered tasks, and many correlations were likely inflated because of common method variance. Teachers were the sole informants for emotion regulation, student-teacher closeness, and attention in the classroom, and their ratings constituted half of the academic competence aggregate. Due to the longitudinal design, ratings of emotion regulation and the first grade constructs were obtained from separate teachers. Naturalistic observations of children’s emotion regulation or coding of their performance during structured tasks would have increased the diversity of methods and possibly the stability of the results.

Furthermore, the measure of emotion regulation used in this study, the ERC, contains items that may be considered indicators of trait emotionality as well as regulatory skill. As a result, children with low levels of negative emotionality may have received ratings on this measure similar to children with well-developed regulatory skills. Thus, efforts to obtain purer measures of regulatory skill through naturalistic observation or other means could have helped to discern differences between children’s emotion regulation and their level of emotionality.

Finally, attrition was a limitation in this study. Slightly less than three quarters of the original sample completed the follow-up assessment because of the highly transient nature of this primarily urban sample. Comparisons between children with data only at the kindergarten data collection and children with complete data revealed no significant differences. However, attrition likely affected the power to detect significant relations between kindergarten predictors, hypothesized first grade mediators, and academic competence.

Conclusions, Implications, and Future Directions

This study provides support for multiple predictors of academic competence in first grade. Verbal ability was a direct predictor of academic competence, but other important child characteristics also predicted academic competence. Emotion knowledge was a consistent direct predictor of academic competence. Therefore, training in understanding the facial, behavioral, and situational cues for emotions may promote academic success. Many preventive intervention programs contain emotion knowledge components (e.g., Greenberg, Kusche, Cook, & Quamma, 1995; Izard et al., 2004), but these programs rarely investigate academic achievement variables as outcomes.

Future research should examine additional potential mediators of the relation between emotion knowledge and academic competence. For example, the mediational role of social skills could be examined because previous research supports consistent positive relations between emotion knowledge and social skills and between social skills and academic achievement (McClelland, Morrison, & Holmes, 2000; Mostow et al., 2002). However, one recent study showed that a direct path from emotion knowledge in middle childhood to academic compe-
study of social status in school: A cross-age comparison.

References


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