Published in final edited form as:

J Appl Dev Psychol. 2015 ; 39: 44–52. doi:10.1016/j.appdev.2015.04.008.

Preschool Interpersonal Relationships Predict Kindergarten Achievement: Mediated by Gains in Emotion Knowledge

Marcela M. Torres^{a,1}, Celene E. Domitrovich^b, and Karen L. Bierman^a

^aThe Pennsylvania State University, Department of Psychology, 141 Moore Bldg University Park, PA, USA 16802-3106

^bThe Pennsylvania State University, Prevention Research Center for the Promotion of Human Development, 310E Biobehavioral Health Building, University Park, PA, USA 16802

Abstract

Using longitudinal data, this study tested a model in which preschool interpersonal relationships promoted kindergarten achievement in a pathway mediated by growth in emotion knowledge. The sample included 164 children attending Head Start (14% Hispanic-American, 30% African-American, 56% Caucasian; 56% girls). Preschool interpersonal relationships were indexed by student-teacher relationship closeness and positive peer interactions. Two measures of emotion knowledge (identifying emotions in photographs, recognizing emotions in stories) were assessed at the start and end of the preschool year. Structural equation models revealed that positive interpersonal relationships (with teachers and peers) predicted gains in emotion knowledge (identification, recognition) during the preschool year. Positive interpersonal relationships in preschool also predicted kindergarten achievement (controlling for initial preschool achievement); however, this association was mediated by gains in emotion knowledge during the preschool year. Implications are discussed for school readiness programs serving economically-disadvantaged children.

Keywords

emotion knowledge; school readiness; Head Start; student-teacher closeness; peer relations; academic achievement

An increasing body of research suggests that interpersonal experiences during preschool play key roles in facilitating (or impeding) early learning, and may make unique contributions to academic skill acquisition at kindergarten entry (Denham, Zinsser, &

Corresponding Author: Marcela M. Torres, Institute of Behavioral Science, University of Colorado at Boulder, 1440 15th Street, UCB 483, Boulder, Colorado, 80309, phone: 303-492-4532, fax: 303-492-2151, marcela.torres@colorado.edu.
Karen L. Bierman kb2@psu.edu
Celene E. Domitrovich cxd130@psu.edu

¹Present Address: Marcela M. Torres, Institute of Behavioral Science, University of Colorado at Boulder, 1440 15th Street, UCB 483, Boulder, Colorado, 80309

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Borwn, 2013; Ursache, Blair, & Raver, 2012). In particular, supportive relationships with teachers and peers during preschool may enhance academic readiness, at least in part by promoting specific social-emotional competencies such as emotion knowledge (Denham, et al., 2013; Garner & Waajid, 2008). Emotion knowledge refers to the ability to recognize, understand, and verbally label emotion states (Izard, Stark, Trentacosta, & Schultz, 2008; Rhoades, Warren, Domitrovich, & Greenberg, 2011). Emotion knowledge is an important marker of social-emotional competence (Izard et al., 2001; Trentacosta & Fine, 2010), and has been linked directly with academic success (Zins, Payton, Weissberg, & O'Brien, 2007).

Young children growing up in poverty are at heightened risk for delays in cognitive school readiness (math and reading scores at school entry) and social-emotional skills (Farkas & Hibel, 2008). The preschool classroom affords important opportunities for social-emotional growth, fostered by positive interpersonal relationships with teachers and peers, and may be especially critical for children entering school from low-income backgrounds (Gormley, Phillips, Newmark, Welti, & Adelstein, 2011). Despite research highlighting the importance of relationships for school readiness, no longitudinal study has yet examined the specific predictive associations between interpersonal relationships and gains in emotion knowledge during preschool, nor the degree to which gains in emotion knowledge may mediate the association between preschool relationships and academic achievement after the transition into kindergarten.

This study tested three specific hypotheses in a sample of low-income students attending Head Start: 1) positive relationships with preschool teachers and peers will promote gains in emotion knowledge, 2) positive relationships with preschool teachers and peers will promote academic achievement in kindergarten (controlling for initial achievement in preschool), and 3) preschool gains in emotion knowledge will mediate, at least partially, the association between positive preschool relationships and kindergarten academic achievement. Results consistent with these hypotheses may have important implications for preschool programming that targets the quality of interpersonal relationships.

Positive Interpersonal Relationships, Emotion Knowledge, and Academic Achievement

Much of the research examining the development of emotion knowledge in early childhood has focused on parenting contributions. More recently researchers have adapted theoretical frameworks from the parenting literature to guide research on socialization processes in the preschool classroom (Denham et al., 2013; Pianta, 1999). A driving hypothesis is that children learn about emotions in the context of close interpersonal interactions through both explicit learning processes (e.g., adults labeling and explaining feeling states) and implicit learning processes (e.g., adults modeling emotional expressiveness, responding sensitively to emotional displays, scaffolding around emotionally-evocative events) (Ashiabi, 2000). In a manner parallel to parents, teachers who form warm and supportive relationships with young children may similarly foster their emotion knowledge by providing emotional support, discussing feelings, and offering sensitive, responsive scaffolding in the context of emotionally-evocative events (Denham, Bassett, & Wyatt, 2007; Pianta, 1999). In addition,

close student-teacher relationships may benefit children by shaping their classroom behavior and providing enriched opportunities for positive socialization and social learning experiences (Davis, 2003).

Indeed, a number of empirical studies document links between close student-teacher relationships and child emotional functioning (Garner & Waajid, 2008; Izard, et al., 2008). For example, in cross-sectional studies of young children, high-quality student-teacher relationships are associated with measures of child social-emotional competence, behavioral adjustment, and cognitive skill development (Doumen, Koomen, Buyse, Wouters, & Verschueren, 2012; Palermo, Hanish, Martin, Fabes, & Reiser, 2007). When teachers report close and supportive relationships, students report that they like school more, exhibit higher levels of engagement in the classroom, and do better academically over time (Hamre & Pianta, 2001; O'Connor & McCartney, 2007; Peisner-Feinberg et al., 2001).

Preschool peer relations may also provide unique opportunities for social-emotional learning, thereby fostering emotion knowledge during the preschool years (Arsenio, Cooperman, & Lover, 2000). Positive peer interactions appear to motivate and support children as they engage in complex, cooperative, and imaginative play sequences that scaffold more sophisticated emotional exchanges and social-cognitive reasoning (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009; Coolahan, Fantuzzo, Mendez, & McDermott, 2000). Participation in collaborative pretend play is hypothesized to exercise and strengthen emotional understanding and perspective-taking skills, as it requires the enactment and coordination of diverse roles (Ursache et al., 2012). In addition, feeling secure and confident with peers may allow children to process emotion-laden information accurately in the context of peer conflict, listening to and learning about multiple perspectives (Izard et al., 2008). Conversely, when children have difficulties getting along with peers, particularly if they show aggressive and disruptive behaviors or are isolated socially, they may miss out on these opportunities for social-emotional learning (Buhs & Ladd, 2001). Thus, in a manner parallel to and likely inter-dependent with close student-teacher relationships, positive peer relations may directly promote gains in emotion knowledge and thereby foster improved learning at school.

In the current study, children's relations with their teacher and their peers were considered two indices of the quality of their preschool interpersonal relationships (Degotardi, Sweller, & Pearson, 2013). In addition to replicating links between positive preschool relationships and enhanced academic learning found in prior studies, the current longitudinal study also examined the degree to which positive preschool relationships promoted gains in emotion knowledge, and tested preschool gains in emotion knowledge as a potential mediator of enhanced achievement in kindergarten.

Emotion Knowledge and Academic Achievement

Accumulating research suggests that emotion knowledge is correlated with academic success (Zins et al., 2007). For example, in a cross-sectional study, Leerkes, Paradise, O'Brien, Calkins, and Lange (2008) found that emotion understanding emerged as a unique correlate of academic competence among preschool children, distinct from inhibitory control

and perspective-taking skills. Similar studies of preschool age children found positive concurrent associations between emotion situation knowledge and academic competence, controlling for age, sex and income level (Garner & Waajid, 2008; Shields et al., 2001).

Few empirical studies have examined the link between emotion knowledge and academic competence over time. An important exception is a longitudinal study with low income children conducted by Izard and colleagues (2001). In that study, children's ability to accurately recognize and label emotion expressions at the end of preschool was positively predictive of teacher-rated academic competence in third grade after controlling for demographic factors and verbal ability (Izard et al., 2001). Similarly, Rhoades and colleagues (2011) found a significant predictive relationship between preschool emotion knowledge and first grade academic competence, controlling for baseline academic performance, demographic factors, and receptive vocabulary. In a slightly older sample, path analyses revealed that kindergarten students' emotion knowledge measured with the Assessment of Children's Emotions Scale (ACES; Schultz, Izard, & Bear, 2004) was positively associated with direct assessments of academic achievement and teacher ratings of social competence (Trentacosta & Izard, 2007).

One intervention study has also demonstrated that preschool gains in social-emotional skills associated with the intervention, including emotion knowledge, made unique contributions to kindergarten outcomes in reading achievement and learning engagement, as well as social behavior, after accounting for the concurrent contributions of gains in vocabulary and emergent literacy skills (Nix, Bierman, Domitrovich, & Gill, 2013). Together, these studies suggest that gains in emotion knowledge during preschool may play a unique role in enhancing later learning engagement and academic achievement. The current study built on these findings by testing a model in which gains in emotion knowledge mediated the link between preschool interpersonal relationships and later academic achievement.

Preschool Relationships and Academic Achievement: Emotion Knowledge as Mediator

To date, only two studies have tested mediation models designed to characterize the developmental processes linking positive interpersonal relationships, emotion knowledge, and academic achievement in early childhood. Trentacosta and Izard (2007) examined the possibility that the link between kindergarten emotion knowledge and first-grade academic achievement was mediated by first-grade teacher-student closeness and peer acceptance. However, the mediational model was not supported, as kindergarten emotion knowledge did not predict first grade interpersonal relationships. Instead, kindergarten emotion knowledge emerged as a direct predictor of first-grade academic achievement. Subsequently, Garner and Waajid (2008) found support for an alternative mediation model using cross-sectional data, in which preschool emotion knowledge mediated the association between teacher-child closeness and direct assessments of academic competence (concept knowledge and language skills). The Garner and Waajid (2008) findings are consistent with a theoretical model in which high-quality interpersonal relationships create opportunities for young children to learn about emotions (their own and others) (Denham et al., 2013). From a conceptual

standpoint, this may occur because positive interpersonal relationships provide children with frequent opportunities to give and receive communications about emotions (Denham et al., 2013). Alternatively, young children with positive interpersonal experiences may be more able to attend to and accurately encode information about their own and others feelings in school, whereas children with more negative interpersonal experiences may be constrained and biased in their emotional perceptions (Izard et al., 2008). Emotion knowledge, in turn, may facilitate academic learning by promoting self-regulation of attention and emotion in the classroom, allowing the child to engage more fully in learning activities (Izard et al., 2001; Shields et al., 2001)

An important limitation of the Garner and Waajid (2008) study, however, was its cross-sectional design. In addition, the Garner and Waajid (2008) did not control for verbal ability which may, in part, explain the relationship between student-teacher closeness, student emotion knowledge, and academic achievement. Longitudinal studies, which control for cognitive ability and baseline levels emotion knowledge and achievement, are needed to provide a more robust test of this mediation model.

The Current Study

The current study extends this area of research with a longitudinal design, providing a more rigorous test of the hypothesis that preschool gains in emotion knowledge mediate the association between preschool interpersonal relationships and kindergarten achievement. Two measures of emotion knowledge (identifying emotions in photographs and recognizing emotions in stories) were administered at the start and end of the prekindergarten year for 164 Head Start children. Structural equation models were used to test the hypothesis that the quality of preschool interpersonal relationships (teacher-student closeness; positive peer interactions) in the fall of the preschool year would predict gains in emotion knowledge over the course of that year, and those gains in emotion knowledge, in turn, would mediate the association between preschool relationships and kindergarten academic achievement. The current study included controls for baseline cognitive ability (verbal intelligence), emotion knowledge, and academic achievement, thus providing a rigorous test of the hypotheses.

Method

Participants

Participants included two cohorts of 4-year-old children (Total N=164, 14% Hispanic-American, 30% African-American, 56% Caucasian; 56% girls) recruited from 22 Head Start classrooms in three counties in Pennsylvania, who served as the “usual practice” comparison group for an intervention trial. None of these children received the intervention. At the time of baseline assessment, children were, on average 4.59 years old ($SD = .32$, range = 3.87 – 5.82). Their families all met the requirements for participation in Head Start; 68% had incomes below the national poverty level, with an average income-to-needs ratio of .88, indicating that many families were financially stressed. In terms of education levels, 33% of the parents had not completed high school and most of the others (65%) had graduated from high school or attained a GED, often with some additional technical training; only 2% had a college degree. Based on their reported employment, according to the Hollingshead (1975)

classification system, 79% of the families fell into the unskilled or semi-skilled labor categories.

At the beginning of the preschool year, brochures describing the research project were distributed to parents of all 4-year-old children in the participating classrooms, and 86% elected to participate in the study and completed initial assessments. All but 7 children participated in the follow-up assessment at the end of kindergarten (96% retention). T-tests comparing the 7 children who were missing in kindergarten with the 157 children who remained in the study revealed no significant differences on any of the preschool study measures. Participants transitioned into 112 kindergarten classrooms.

Measures

Teacher ratings were used to assess students' social behavior and the quality of their relationships with teachers. Direct assessments were used to assess child cognitive ability, emotion knowledge, and academic achievement.

Baseline controls for cognitive ability—The Expressive One-Word Picture Vocabulary Test (EOWPVT; Brownell, 2000) was included as a baseline control for cognitive ability and administered in the fall of the preschool year. On the EOWPVT, children gave the word that best described pictures they were shown ($\alpha = .94$). For children 4-7 years old, the EOWPVT is highly correlated with full-scale IQ ($r = .78$; Kutsick, Vance, Schwarting, & West, 1988).

Baseline assessments of interpersonal relationships—Teacher ratings collected in the fall of the prekindergarten year assessed two aspects of positive interpersonal relationships at Head Start: 1) the quality of closeness in the student-teacher relationship, and 2) the degree of positive social interaction with peers. Lead teachers completed an abbreviated form of the Student-Teacher Relationship Scale (Pianta, 2001), which used 8 items to assess student-teacher closeness (e.g., “I share an affectionate, warm relationship with this child”, “This child openly shares his/her feelings and experiences with me.”). Each item was rated on a 5-point Likert scale ranging from *Definitely does not apply* to *Definitely does apply*, and a total score was used in analyses ($\alpha = .90$). To assess positive peer relations, teachers completed the Social Competence Scale (Conduct Problems Prevention Research Group [CPPRG], 1995), which included 6 items describing prosocial behaviors (e.g., “Invites others to play”, “Shares with others”, “Cooperates”) and two items describing social withdrawal, which were reverse-scored (e.g., “Avoids playing with other children”). Items were rated on a 6-point Likert scale (*never* to *almost always*), and a total score was used in analyses ($\alpha = .88$).

Gains in emotion knowledge—At the start and end of the preschool year, two measures were used to assess children's emotion knowledge. The Assessment of Children's Emotion Skills (ACES; Schultz, et al., 2004), is a visual recognition task that assesses the accuracy with which children identify facial expressions. Children were shown 12 photographs of children displaying happy, mad, sad, or scared expressions, or no feeling, and asked to label the feeling shown. For each photograph, children received a score of 1 if they identified the correct valence (e.g. happy vs. sad, mad, scared) and a score of 2 if they identified the

correct emotion. A total score was used in analyses ($\alpha = .57$). On this measure, the low alpha reflects the fact that some facial displays are more easily discriminated (e.g., sad vs. happy) than others (e.g., sad vs. scared); the total score reflects overall capacity to discriminate these facial displays and has shown concurrent and predictive validity, despite the low alpha (Schultz et al., 2004). The second measure was the Emotion Recognition Questionnaire (ERQ; Ribordy, Camras, Stefani, & Spaccarelli, 1988) which assessed knowledge about situations that elicit different emotions. Children were read 16 stories describing characters in emotionally evocative situations and asked to identify the feeling of the main character in the story by pointing to pictures of happy, mad, sad, or scared facial expressions. Children received a score of 2 for correctly identifying the feeling and a score of 1 for identifying the correct valence, and a total score was used in analyses ($\alpha = .63$). The relatively low alpha on this measure reflects the fact that some situations are quite distinct (e.g., situations associated with feeling happy) whereas other situations are more nuanced (e.g., situations associated with feeling sad or scared). The total score on this measure has shown concurrent, discriminant, and predictive validity in prior research (Dodge, Laird, Lochman, Zelli, and CPPRG, 2002) and is widely used to assess young children's emotion knowledge. Analyses focused on children's spring emotion knowledge scores, co-varying their fall emotional knowledge scores, thus representing gains in emotion knowledge across the year.

Academic achievement—Tests of academic achievement were collected in the fall of the prekindergarten year and again in the spring of the kindergarten year. In the fall of the Head Start year, three subscales assessing emergent literacy skills were drawn from the Test of Preschool Early Literacy (TOPEL; previously labeled the Pre-CTOPP; Lonigan, Wagner, Torgesen, & Rashotte, 2007). Blending and Elision assessed phonological processing. Children were asked to combine different parts of a word, such as “hot” and “dog” or “b” and “air” and point to the correct picture or say the full word ($\alpha = .86$); and children were asked to deconstruct compound words, pointing to the correct picture or saying the correct word (e.g., Point to “snowshoe” without “snow”; Say “airport” without “air”; $\alpha = .83$). On the Print Awareness subtest, children identified pictures of letters or words and named letters ($\alpha = .97$). Prior research has reported correlations in the range of .43 to .88 between these three subscales and the acquisition of initial reading skills (Lonigan, 2006). In addition, the Applied Problems subscale of the Woodcock-Johnson-III: Tests of Achievement (Woodcock, McGrew & Mather, 2001) assessed early numeracy skills. This measure includes a series of math-related questions that become increasingly difficult, such as showing two fingers, counting objects, and adding or subtracting small numbers. These four sub-scales were combined to create an achievement composite score in the Head Start year. The latter two tests (Print Knowledge and Applied Problems) were re-administered in kindergarten, and combined to create a composite achievement score.

Data Collection Procedures

A research assistant met with each Head Start teacher six weeks after the start of each school year to explain the teacher-rating measures and attain informed consent. All teachers agreed to participate. Teachers completed the ratings on student behavior on their own time, and returned them to the project within two weeks. Teachers were compensated \$7 per student at

each time point to complete ratings of their students. End-of-year teacher ratings were collected in April. In both preschool and kindergarten, direct child assessments of academic achievement were conducted at school by trained interviewers, during two individual 30-45 minute “pull-out” sessions in preschool and a single 45-minute session in kindergarten. To give children time to acclimate to the classroom setting, preschool assessments began three weeks after school began and continued through the end of October. In the kindergarten year, research assistants visited kindergarten classrooms from March to April to complete direct assessments of the children.

Results

Overview of Analyses

The current study examined the predictors of children's academic achievement in kindergarten using measures collected at three time points (beginning and end of the preschool year prior to elementary school entry, and end of the kindergarten year). We hypothesized a model in which: 1) positive interpersonal relationships at the start of preschool would predict academic achievement in kindergarten (controlling for preschool achievement); 2) positive interpersonal relationships at the start of preschool would predict gains in emotion knowledge (from the beginning to end of the preschool year), and 3) the effects of positive preschool relationships on kindergarten achievement would be mediated by gains in emotion knowledge during the preschool year. Cognitive ability was included as a covariate. Structural equation modeling (SEM) was used to test the hypothesized relationships. Descriptive statistics and correlations among study variables were computed using SPSS 22.0, and modeling was conducted using AMOS 22.0.

Descriptive Statistics and Interrelations among Study Variables

Means and standard deviations for all variables, at each time point, are presented in Table 1. Correlations for all variables are presented in Table 2. As shown in the first two columns of this table, the two measures reflecting interpersonal relationships (student-teacher closeness and positive peer interactions) were moderately correlated, $r = .68, p < .01$. Similarly, the two measures of emotion knowledge (emotion identification and emotion recognition) were significantly correlated at each time point, $r = .34, p < .01$ in the fall and $r = .39, p < .01$ in the spring of the preschool year. Almost all of the measures were significantly associated with cognitive ability, including small associations between cognitive ability and interpersonal relationships ($r = .20, p < .05$) and moderate correlations between cognitive ability and kindergarten achievement ($r = .43, p < .01$). Cross-sectional correlations in the fall of the preschool year revealed associations of small magnitude between the measures of interpersonal relationships and emotion knowledge ($r = .11 - .23$), interpersonal relationships and achievement ($r = .24 - .35$), and measures of emotion knowledge and achievement ($r = .23 - .53$).

Measurement Model

Before testing the full hypothesized model, we first examined whether measures of positive interpersonal relationships (student-teacher closeness and positive peer relations) and measures of emotion knowledge (visual emotion recognition and emotion situation

knowledge) would load together onto two latent factors to be used as independent predictors. Model fit was assessed using the following indices and standards: root mean square error of approximation, RMSEA < 0.06 (good fit) to .08 (adequate fit) (Schreiber, Stage, King, Nora, & Barlow, 2006); p of close fit, PCLOSE > 0.05 (Kenny, 2013); comparative fit index, CFI > .95 (Schreiber et al, 2006); and chi-square to degrees of freedom ratio, CMIN/DF < 3.00 (Schreiber et al., 2006).

Results of a confirmatory factor analysis (CFA), using maximum likelihood estimation, provided empirical support for the two latent variables of prekindergarten peer interpersonal relationships and emotion knowledge (see Figure 1 and Table 3). This hypothesized measurement model had a good fit, RMSEA = .00, PCLOSE = .67, CFI = 1.00, CMIN/DF = .42.

Structural Equation Models

The first structural equation model (SEM) tested the hypothesis that positive interpersonal relationships measured in the fall of preschool would predict emotion knowledge measured in the spring of preschool and academic achievement at the end of kindergarten. This model used maximum likelihood estimation to account for missing data, and included baseline (preschool fall) levels of cognitive ability, emotion knowledge, and academic achievement as covariates (see Table 4). Model fit was acceptable (RSMEA = .07; PCLOSE = .12; CFI = .95; CMIN/DF = 2.62). The direct effect of positive interpersonal relationships on gains in emotion knowledge during preschool was significant ($\beta = .27, p < .01$), as was the direct effect of positive interpersonal relationships on kindergarten achievement ($\beta = .19, p < .05$) (see Figure 2).

The second SEM tested the full hypothesized model, by adding a pathway to the first model that linked preschool emotion knowledge with kindergarten achievement. In this model, baseline levels of cognitive ability, emotion knowledge, and academic achievement were again included as covariates (see Table 4), such that the emotion knowledge represented gains over the course of the preschool year and achievement represented gains from fall of preschool through spring of kindergarten. This final model demonstrated good model fit (RSMEA = .05; PCLOSE = .41; CFI = .98; CMIN/DF = 1.97), consistent with hypotheses. The association between preschool emotion knowledge and kindergarten achievement was significant ($\beta = .37, p < .01$). With emotion knowledge included in the model as a potential mediator, the direct association between positive interpersonal relationships in the fall of preschool and kindergarten achievement, dropped to non-significance ($\beta = -.06, p = .49$). The RMediation program (Tofighi & MacKinnon, 2011) was used to test for the significance of this indirect effect by computing confidence limits for the product of values for the two relevant pathways. In this case, RMediation yielded lower and upper 95% confidence limits of 0.009 and 0.265, respectively, indicating a statistically significant indirect effect between preschool positive interpersonal relationships and kindergarten academic achievement, mediated by gains in emotion knowledge made during the preschool year (see Figure 3).

Discussion

Improving children's cognitive and academic readiness prior to kindergarten appears critical to closing the achievement gap associated with poverty (Duncan et al., 2007). Effectively doing so may require a focus on social-emotional development during the preschool years, as well as a focus on enriching learning opportunities. In particular, high-quality interpersonal relationships with teachers and peers during early childhood may play a central role in promoting readiness to learn, by providing a positive context for the development of specific social-emotional competencies, such as emotion knowledge, that support academic learning (Denham et al., 2013; Ursache et al., 2012). Certainly, continued research is needed to better understand these relationships. This study addressed this need by examining associations between children's preschool interpersonal relationships with teachers and peers, gains in emotion knowledge over the course of the prekindergarten year, and the prediction to kindergarten achievement (controlling for preschool achievement and cognitive ability). At the beginning of the preschool year, the quality of interpersonal relationships with teachers and peers was assessed in a sample of 4-year-old children attending Head Start. The quality of those relationships predicted gains in emotion knowledge skills over the course of the prekindergarten year, and also predicted academic learning (a composite reflecting emergent literacy and numeracy skills). Further analyses demonstrated that emotion knowledge mediated the relationship between interpersonal relationships and academic achievement. These models controlled for general cognitive ability (verbal intelligence) as well as baseline levels of emotion knowledge and academic achievement. Thus, these findings suggest that the impact of interpersonal relationships on gains in academic achievement from preschool to kindergarten is attributable to the influence of interpersonal relationships on gains in emotion knowledge.

Developmental Processes

Although these analyses do not test causal mechanisms, they provide a foundation for speculation regarding the possible developmental processes that might account for the observed associations. Only a handful of studies have examined how relationships with teachers and peers during preschool influence future academic performance. The current study found support for the conceptualization of emotion knowledge as a mediator in this association, with positive interpersonal relationships in preschool fostering gains in emotion knowledge, and gains in emotion knowledge predicting gains in academic achievement. In the following section, we speculate about the developmental processes that might underlie two facets of this model, including the link between positive interpersonal relationships and gains in emotion knowledge during preschool, and the link between gains in emotion knowledge during preschool and improved academic achievement in kindergarten.

Preschool interpersonal relationships and gains in emotion knowledge—

Findings from the current study demonstrated a direct association between interpersonal relationships with teachers and peers and gains in emotion knowledge. These findings lend support to the idea that student-teacher relationships in preschool are an important non-familial context that affects the development of child social and emotional competence. Consistent with the hypothesis that children learn about emotions in the context of their

interactions with parents, both through explicit teaching and implicit modeling (Ashiabi, 2000), interactions with teachers may offer similar opportunities for learning about emotion. In particular, when interactions with teachers are characterized by warmth and responsiveness, children may be better able to benefit from both the explicit and implicit messages provided to them about emotion and, at the same time, may be less likely to experience the negative impact of exposure to negative emotional reactions on emotional competence (Raikes & Thompson, 2006). In addition, to the extent that close relationships with teachers provide preschoolers with a secure base from which to navigate and explore the classroom environment, students who experience close relationships with their teachers may be better able to engage positively in peer interactions and learning activities in the classroom (Buhs & Ladd, 2001; Davis, 2003; Pianta, 1999). Engagement in classroom activities, particularly peer interactions, may in turn enhance opportunity for learning about emotions. Future studies that include observations of student-teacher interactions should be conducted to replicate associations found in the current study between positive student-teacher relationships and gains in child emotion knowledge, and to elucidate underlying developmental processes.

Findings from the present study demonstrate that positive peer interactions also contribute to fostering emotion knowledge. Results are consistent with previous research findings which indicate that prosocial children have higher levels of emotion knowledge than children who experience peer difficulties (Arsenio et al., 2000). Positive peer relationships may foster the development of emotion knowledge as they become more complex and collaborative with age (see Bierman & Erath, 2006; Coplan & Arbeau, 2009). In order to play in more complex ways, children must be sensitive to others' feelings, so that they can coordinate actions and negotiate conflicts. For pretend play, they must also mentally represent and enact complementary social roles and social routines. Thus, theorists have speculated that, during the preschool years, interactions with peers both motivate and support the development of the emotion knowledge and associated perspective-taking skills and empathy, therefore providing an important opportunity for social and emotional learning (Arsenio et al., 2000; Bierman et al., 2009; Coolahan et al., 2000; Izard et al., 2008).

Although the findings from the present study cannot test causal models, they are consistent with these theoretical models, and suggest that positive relationships with teachers and peers in preschool may both motivate and support the acquisition of emotion knowledge skills over the course of the preschool year. The current findings replicate and extend upon a cross-sectional study testing this mediation model in preschool (Garner & Waajid, 2008). It is important to note that at least one study has also found effects in the other direction, with emotion knowledge predicting later success in social functioning (Miller et al., 2005). Longer-term longitudinal studies are needed to fully explore the possibility of bi-directional effects over time.

Emotion knowledge and academic achievement—The current study revealed a direct association between emotion knowledge and academic achievement, with emotion knowledge measured at the end of the preschool year predicting academic achievement measured one year later, at the end of kindergarten. This finding is consistent with previous cross-sectional and longitudinal research demonstrating a direct and positive relationship

between emotion knowledge and academic success (Garner & Waajid, 2008; Izard et al., 2001; Leerkes, et al., 2008; Rhoades et al., 2011; Trentacosta & Izard, 2007). Several hypotheses have been put forward which may explain this relationship. For example, children with higher levels of emotion knowledge and associated social competence may communicate more effectively with their teachers, elicit certain kinds of behavior from adults, and establish a rapport that facilitates instruction. Related to this, children who have more advanced social and emotional skills may be better able to engage in the collaborative learning activities that characterize preschool and kindergarten classrooms given the positive effect of emotion knowledge on their understanding of socially complex interactions. As a result, the classroom may become more predictable and controllable (and less threatening or anxiety-provoking).

Recently, Izard and colleagues (2008) have described a process of emotion utilization, in which increasing emotion knowledge enables children to more efficiently channel emotional arousal into constructive thought and action. According to these theorists, emotion utilization is more likely when emotion knowledge is present and operating in a supportive social context; effective emotion utilization allows children to use arousal to motivate adaptive social behavior and thereby supports classroom engagement and academic competence (Trentacosta & Izard, 2007). Thus, improved emotion knowledge may essentially “free up” cognitive resources for learning that would otherwise be engaged in monitoring and processing social information.

Strengths and Limitations

Several strengths of the study warrant mention. The use of multiple informants enhances confidence in the validity of the findings, as interpersonal relationships were assessed via teacher ratings, emotion knowledge via direct assessments, and academic achievement via direct assessments. The sample size was fairly large, and included children who entered a diverse array of kindergarten contexts. The longitudinal design, with three time points of measurement, also provided a stronger basis for understanding developmental processes than the cross-sectional studies on this topic. Finally, the inclusion of two different indices of interpersonal relationships and two different indices of emotion knowledge provided the capacity to create latent constructs representing these key domains of interest.

The study also had limitations that qualify the findings. For example, this study relied on relatively brief assessments of discrete skills that are assumed to reflect broader domains of cognitive ability, emotion knowledge, and academic achievement. In addition, the sample consisted only of economically-disadvantaged children in Head Start, such that findings may not generalize to other populations. Although the data analyses take advantage of longitudinal data, they are still correlational in nature, and hence causal interpretations are unwarranted. It is possible that a set of unstudied variables explains some of the co-variation observed over time in this study. For example, language or executive function skills may have developed in parallel with emotion knowledge, also fostered by positive interpersonal relationships during preschool (Dickinson & Sprague, 2001), and these unmeasured variables may explain the observed associations.

In addition, the study did not include an independent measure of emotion regulation. Children who are more aware of the causes of their own and others' feelings may also have better emotion regulation (Halberstadt, Denham, & Dunsmore, 2001). The combination of emotion knowledge and emotion regulation may allow children to remain on task and achieve greater academic success in the face of frustration or other emotional situations in the classroom (Trentacosta & Izard, 2007). Without a direct assessment, this study cannot determine the role of emotion regulation skills in the developmental processes studied here.

Implications for Practice and Policy

Strategic efforts to promote school success among children growing up in poverty are a current and growing priority in the United States. As a function of shifting demographics, the proportion of young children experiencing poverty in the U.S. is rising, with nearly one in two preschoolers currently living in low-income families (Addy, Engelhardt, & Skinner, 2013). Interventions that promote school readiness hold promise as a strategy to reduce the significant achievement gap associated with growing up in poverty.

Findings from this study suggest that interventions targeting children's emotion knowledge should be more widely diffused. Several preschool interventions that include components designed to enhance children's emotion knowledge have demonstrated evidence of efficacy in small randomized trials (Bierman & Motamedi, in press), and a recent large-scale national study suggests that these programs can be implemented at scale with similar positive impacts on emotion knowledge (Morris et al., 2014). The wider dissemination of early social-emotional learning programs appears warranted, given the benefits on early academic achievement demonstrated by the current findings.

Another implication of the study is that interventions which target the promotion of supportive student-teacher relationships and peer relationships in preschool may also have benefits for both emotion knowledge acquisition and in turn academic learning. While existing preschool interventions are effective in promoting emotion knowledge and other social-emotional competencies and have positive outcomes on student-teacher and peer relationships, in general (e.g. Preschool PATHS; Domitrovich, Cortes, & Greenberg, 2007), they do not explicitly target teacher-student relationships characterized by low levels of closeness. The present findings suggest that enhancements to existing interventions that directly promote supportive teacher-student relationships may improve outcomes on academic learning for a larger number of students over time.

Overall, the present study findings suggest that additional research is needed to better understand how to promote early social-emotional competencies among economically-disadvantaged children, and to further elucidate that role that these preschool competencies play in later school adjustment and attainment. Early disadvantage often contributes to delays in social-emotional as well as cognitive competencies, and both may require remediation in order to promote academic achievement and school success (Ryan, Fauth, & Brooks-Gunn, 2006). The manner in which interpersonal interactions with teachers and peers support the development of child emotional competence, and should be further examined as a key target of efforts to enhance both cognitive and social-emotional school readiness for young children.

Acknowledgements

This project was supported by National Institute of Child Health and Human Development grants HD046064 and HD43763. Appreciation is expressed to the teachers, students, parents, and program personnel who served as partners in this project. Reprint requests can be sent to Marcela M. Torres, Institute of Behavioral Science, University of Colorado at Boulder, 1440 15th Street, UCB 483, Boulder, Colorado, 80309.

References

- Addy, S.; Engelhardt, W.; Skinner, C. Basic facts about low-income children: Children under 6 years, 2011. 2013. Retrieved from National Center for Children in Poverty website: http://www.nccp.org/publications/pdf/text_1076.pdf
- Arsenio WF, Cooperman S, Lover A. Affective predictors of preschoolers' aggression and peer acceptance: Direct and indirect effects. *Developmental Psychology*. 2000; 36:438–448. [PubMed: 10902696]
- Ashiabi G. Promoting the emotional development of preschoolers. *Early Childhood Education Journal*. 2000; 28:79–84.
- Bierman, KL.; Erath, SA. Promoting social competence in early childhood: Classroom curricula and social skills coaching programs.. In: McCartney, K.; Phillips, D., editors. *Blackwell handbook on early childhood development*. Blackwell; Malden, MA: 2006. p. 595-615.
- Bierman, KL.; Motamedi, M. Social-emotional programs for preschool children.. In: Durlak, J.; Domitrovich, C.; Weissberg, RP.; Gullotta, T.; Goren, P., editors. *The Handbook of Social and Emotional Learning: Research and Practice*. Guilford; New York: in press
- Bierman KL, Torres MM, Domitrovich CE, Welsh JA, Gest SD. Behavioral and cognitive readiness for school: Cross-domain associations for children attending Head Start. *Social Development*. 2009; 18:305–323.
- Brownell, R. *Expressive One-Word Picture Vocabulary Test Manual*. Academic Therapy Publications; Novato, CA: 2000.
- Buhs ES, Ladd GW. Peer rejection as an antecedent of young children's school adjustment: An examination of mediating processes. *Developmental Psychology*. 2001; 37:550–560. [PubMed: 11444490]
- Coolahan K, Fantuzzo J, Mendez J, McDermott P. Preschool peer interactions and readiness to learn: Relationships between classroom peer play and learning behaviors and conduct. *Journal of Educational Psychology*. 2000; 92:458–465.
- Conduct Problems Prevention Research Group. *Teacher Social Competence Scale Technical Report*. 1995. Available from <http://www.fasttrackproject.org>
- Coplan, RJ.; Arbeau, KA. Peer interactions and play in early childhood.. In: Rubin, KH.; Bukowski, SWM.; Laursen, B., editors. *Handbook of peer interactions, relationships, and groups*. Guilford; New York: 2009. p. 143-161.
- Davis HA. Conceptualizing the role and influence of student-teacher relationships on children's social and cognitive development. *Educational Psychologist*. 2003; 38:207–234.
- Degotardi S, Sweller N, Pearson E. Why relationships matter: parent and early childhood teacher perspectives about the provisions afforded by young children's relationships. *International Journal of Early Years Education*. 2013; 21:4–21.
- Denham, SA.; Bassett, HH.; Wyatt, T. The socialization of emotional competence.. In: Grusec, JE.; Hastings, PD., editors. *Handbook of socialization: Theory and research*. Guilford Press; New York: 2007. p. 614-637.
- Denham, SA.; Zinsner, KM.; Brown, CA. The emotional basis of learning and development in early childhood.. In: Spodek, B.; Saracho, O., editors. *Handbook of research on the education of young children*. 3rd Ed.. Lawrence Erlbaum; New York: 2013.
- Dickinson, DK.; Sprague, KE. The nature and impact of early childhood care environments on the language and early literacy development of children from low-income families.. In: Neuman, SB.; Dickinson, DK., editors. *Handbook of Early Literacy Research*. Guilford Press; New York: 2001. p. 263-280.

- Dodge KA, Laird R, Lochman JE, Zelli A, the Conduct Problems Prevention Research Group. Multidimensional latent-construct analysis of children's social information processing patterns: Correlations with aggressive behavior problems. *Psychological Assessment*. 2002; 14:60–73. [PubMed: 11911050]
- Domitrovich CE, Cortes R, Greenberg MT. Improving young children's social and emotional competence: A randomized trial of the preschool PATHS curriculum. *Journal of Primary Prevention*. 2007; 28:67–91. [PubMed: 17265130]
- Doumen S, Koomen HM, Buyse E, Wouters S, Verschueren K. Teacher and observer views on student-teacher relationships: Convergence across kindergarten and relations with student engagement. *Journal of School Psychology*. 2012; 50:61–76. [PubMed: 22386078]
- Duncan GJ, Dowsett CJ, Claessens A, Magnuson K, Huston AC, Klebanov P, Duckworth K. School readiness and later achievement. *Developmental Psychology*. 2007; 43:1428–1446. [PubMed: 18020822]
- Farkas, G.; Hibel, J. Being unready for school: Factors affecting risk and resilience.. In: Crouter, A.; Booth, A., editors. *Early disparities in school readiness: How do families contribute to successful and unsuccessful transitions to school*. Lawrence Erlbaum; Mahwah, N.J.: 2008. p. 3-30.
- Garner PW, Waajid B. The associations of emotion knowledge and teacher-child relationships to preschool children's school-related developmental competence. *Journal of Applied Developmental Psychology*. 2008; 29:89–100.
- Gormley WT, Phillips DA, Newmark K, Welts K, Adelstein S. Social-emotional effects of early childhood education programs in Tulsa. *Child Development*. 2011; 82:2095–2109. [PubMed: 21954844]
- Halberstadt AG, Denham SA, Dunsmore JC. Affective social competence. *Social Development*. 2001; 10:79–119.
- Hamre BK, Pianta RC. Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*. 2001; 72:625–638. [PubMed: 11333089]
- Izard CE, Fine S, Schultz D, Mostow A, Ackerman B, Youngstrom E. Emotion knowledge as a predictor of social behavior and academic competence in children at risk. *Psychological Science*. 2001; 12:18–23. [PubMed: 11294223]
- Izard C, Stark K, Trentacosta C, Schultz D. Beyond emotion regulation: Emotion utilization and adaptive functioning. *Child Development Perspectives*. 2008; 2:156–163. [PubMed: 19956781]
- Kenny, DA. [December, 18, 2013] Measuring model fit.. 2013. from <http://davidakenny.net/cm/fit.htm>
- Kutsick K, Vance B, Schwarting FG, West R. A comparison of three different measures of intelligence with preschool children identified at-risk. *Psychology in the Schools*. 1988; 25:270–276.
- Ladd GW, Herald SL, Kochel KP. School readiness: Are there social prerequisites? *Early Education and Development*. 2006; 17:115–150.
- Leerkes E, Paradise M, O'Brien M, Calkins S, Lange G. Emotion and cognition processes in preschool children. *Merrill-Palmer Quarterly*. 2008; 54:102–124.
- Lonigan CJ. Development, assessment, and promotion of preliterate skills. *Early Education and Development*. 2006; 17:91–114.
- Lonigan, CJ.; Wagner, RK.; Torgesen, JK.; Rashotte, CA. *Test of preschool early literacy*. Pro-Ed; Austin, TX: 2007.
- Miller AL, Gouley KK, Seifer R, Zakriski A, Eguia M, Vergnani M. Emotion knowledge skills in low-income elementary school children: Associations with social status and peer experiences. *Social Development*. 2005; 14:637–651.
- Morris, P.; Matterna, SK.; Castells, N.; Bangser, M.; Bierman, K.; Raver, C. OPRE Report 2014. Department of Health and Human Services; 2014. *Impact Findings from the Head Start CARES Demonstration: National Evaluation of Three Approaches to Improving Preschoolers' Social and Emotional Competence*.
- Nix RL, Bierman KL, Domitrovich CE, Gill S. Promoting preschool social emotional skills with the Head Start REDI Program enhances academic and behavioral outcomes in kindergarten. *Early Education and Development*. 2013; 24:1000–1019.
- O'Connor E, McCartney K. Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal*. 2007; 44:340–369.

- Palermo F, Hanish LD, Martin CL, Fabes RA, Reiser M. Preschoolers' academic readiness: What role does the teacher-child relationship play? *Early Childhood Research Quarterly*. 2007; 22:407–422.
- Peisner-Feinberg ES, Burchinal MR, Clifford RM, Culkin ML, Howes C, Kagan SL, Yazejian N. The relation of preschool child-care quality to children's cognitive and social development trajectories through second grade. *Child Development*. 2001; 72:1534–1553. [PubMed: 11699686]
- Pianta, RC. Student-teacher relationship scale. Psychological Assessment Resources; Odessa, FL: 2001.
- Pianta, RC. Enhancing Relationships between Children and Teachers. School Psychology Book Series. American Psychological Association; Washington, DC: 1999.
- Raikes HA, Thompson RA. Family emotional climate, attachment security, and young children's emotion understanding in a high-risk sample. *British Journal of Developmental Psychology*. 2006; 24:89–104.
- Rhoades BL, Warren HK, Domitrovich CE, Greenberg MT. Examining the link between preschool social-emotional competence and first grade academic achievement: The role of attention skills. *Early Childhood Research Quarterly*. 2011; 26:182–191.
- Ribordy SC, Camras LA, Stefani R, Spaccarelli S. Vignettes for emotion recognition research and affective therapy with children. *Journal of Clinical Child Psychology*. 1988; 17:322–325.
- Ryan, RM.; Fauth, RC.; Brooks-Gunn, J. Childhood poverty: Implications for school readiness and early childhood education.. In: Spodek, B.; Saracho, ON., editors. *Handbook of research on the education of young children*. 2nd ed.. Lawrence Erlbaum Associates Publishers; Mahwah, NJ, US: 2006. p. 323-346.
- Schreiber JB, Stage FK, King J, Nora A, Barlow EA. Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Education Research*. 2006; 99:323–337.
- Schultz D, Izard CE, Bear G. Children's emotion processing: Relations to emotionality and aggression. *Development and Psychopathology*. 2004; 16:371–387. [PubMed: 15487601]
- Shields A, Dickstein S, Seifer R, Giusti L, Magee KD, Spritz B. Emotional competence and early school adjustment: A study of preschoolers at risk. *Early Education and Development*. 2001; 12:73–96.
- Tofighi D, MacKinnon DP. RMediation: An R package for mediation analysis confidence intervals. *Behavior Research Methods*. 2011; 43:692–700. [PubMed: 21487904]
- Trentacosta CJ, Fine SE. Emotion knowledge, social competence, and behavior problems in childhood and adolescence: A meta-analytic review. *Social Development*. 2010; 19:1–29. [PubMed: 21072259]
- Trentacosta CJ, Izard CE. Kindergarten children's emotion competence as a predictor of their academic competence in first grade. *Emotion*. 2007; 7:77–88. [PubMed: 17352565]
- Ursache A, Blair C, Raver CC. The promotion of self-regulation as a means of enhancing school readiness and early achievement in children at risk for school failure. *Child Development Perspectives*. 2012; 6:122–128.
- Woodcock, RW.; McGrew, KS.; Mather, NM. Woodcock Johnson III. Riverside; Itasca, IL: 2001.
- Zins, JE.; Payton, JW.; Weissberg, RP.; O'Brien, MU. Social and emotional learning and successful school performance.. In: Mathews, G.; Zeidner, M.; Roberts, RD., editors. *The science of emotional intelligence: Knowns and unknowns*. Oxford University Press; New York, N.Y.: 2007. p. 376-395.

Highlights

- We test relations between preschool relationships, emotion knowledge and achievement.
- Preschool interpersonal relationships predict gains in emotion knowledge.
- Preschool relationships predict academic achievement at the end of kindergarten.
- Preschool relationships and achievement is mediated by gains in emotion knowledge.
- Implications for school readiness programs are discussed.

Figure 1.
Confirmatory factor analysis testing the measurement model. $*p < .05$

Figure 2.

Direct effects of preschool relationships on gains in emotion knowledge and kindergarten achievement. e = error; d = disturbance.

Note: Covariates included in the model (not depicted) include baseline cognitive ability, baseline measures of emotion knowledge, and baseline achievement (see Table 4 for covariate regression weights).

* $p < .05$

Figure 3.

Final model testing direct and indirect effects. e = error; d = disturbance.

Note: Covariates included in the model (not depicted) include baseline cognitive ability, baseline measures of emotion knowledge, and baseline achievement (see Table 4 for covariate regression weights).

* $p < .05$

Table 1

Descriptive Statistics for all Variables

Variable	Mean	SD	Min	Max	Skewness	Kurtosis
Preschool Fall						
Vocabulary ^a	82.37	(13.53)	55.00	118.00	0.19	-0.18
Student-Teacher Closeness	4.28	(.73)	1.38	5.00	-1.18	1.16
Positive Peer Interaction	4.24	(.88)	1.88	6.00	-0.03	-0.57
Emotion Knowledge –ERQ ^a	21.39	(4.62)	10.00	31.00	-0.37	-0.50
Emotion Knowledge – ACES ^a	5.68	(2.27)	1.00	11.00	0.15	-0.64
Achievement ^{ab}	0.00	(.70)	-1.86	2.00	0.29	0.01
Preschool Spring						
Emotion Knowledge - ERQ	23.49	(4.22)	11.00	32.00	-0.62	-0.18
Emotion Knowledge – ACES	21.39	(4.62)	1.00	12.00	-0.06	-0.11
Kindergarten						
Achievement ^b	0.00	(.76)	-2.82	1.45	-0.97	1.51

^aVariable was included as a baseline control.

^bAchievement represents a composite of scores standardized within the sample.

Table 2

Correlations among Variables Within and Across Time

	1	2	3	4	5	6	7	8
<u>Pre-K Fall: Baseline Covariates</u>								
1. Vocabulary								
2. Achievement	.58 ^{**}							
3. Emotion Knowledge- ERQ	.53 ^{**}	.53 ^{**}						
4. Emotion Knowledge- ACES	.30 ^{**}	.23 [*]	.34 ^{**}					
<u>Pre-K Fall: Interpersonal Relationships</u>								
5. Student-Teacher Closeness	.20 [*]	.24 ^{**}	.11	.12				
6. Positive Peer Interaction	.23 [*]	.35 ^{**}	.17 [*]	.23 [*]	.68 ^{**}			
<u>Pre-K Spring: Emotion Knowledge</u>								
7. Emotion Situation Knowledge	.44 ^{**}	.45 ^{**}	.53 ^{**}	.28 ^{**}	.30 ^{**}	.30 ^{**}		
8. Visual Emotion Recognition	.34 ^{**}	.32 ^{**}	.33 ^{**}	.47 ^{**}	.20 [*]	.23 [*]	.39 ^{**}	
<u>Kindergarten Achievement</u>								
9. Achievement	.43 ^{**}	.52 ^{**}	.31 ^{**}	.29 ^{**}	.29 ^{**}	.30 ^{**}	.43 ^{**}	.40 ^{**}

^{**}
 $p < .001$

^{*}
 $p < .05$

Table 3

Standardized and Unstandardized Coefficients for Confirmatory Factor Analysis

Observed Variable	Latent Construct	β	<i>B</i>	<i>SE</i>
Student-Teacher Closeness	Interpersonal Relationships	.81	1.00	
Peer Relations	Interpersonal Relationships	.84	1.25	.24
Emotion Knowledge - ERQ	Emotion Knowledge	.73	1.00	
Emotion Knowledge - ACES	Emotion Knowledge	.56	.41	.13

Table 4

Summary of Covariate Regression Weights for Structural Equation Models

Direct Effects Model (see Figure 2)				
Baseline^a Covariate	Dependent Variable	β	<i>B</i>	<i>SE</i>
Vocabulary	Positive Interpersonal Relationships	.05	.00	.01
	Emotion Knowledge	.17	.04	.02
	Kindergarten Achievement	.16	.01	.01
Emotion Knowledge - ERQ	Positive Interpersonal Relationships	-.01	.00	.01
	Emotion Knowledge	.39	.25	.07
Emotion Knowledge - ACES	Positive Interpersonal Relationships	.15	.04	.02
	Emotion Knowledge	.28	.36	.11
Achievement	Positive Interpersonal Relationships	.32	.26	.09
	Emotion Knowledge	.15	.63	.44
	Kindergarten Achievement	.35	.38	.10
Final Model (see Figure 3)				
Baseline^a Covariate	Dependent Variable	β	<i>B</i>	<i>SE</i>
Vocabulary	Positive Interpersonal Relationships	.04	.00	.00
	Emotion Knowledge	.18	.04	.02
	Kindergarten Achievement	.05	.00	.01
Emotion Knowledge - ERQ	Positive Interpersonal Relationships	-.01	.00	.01
	Emotion Knowledge	.32	.21	.07
Emotion Knowledge - ACES	Positive Interpersonal Relationships	.16	.04	.02
	Emotion Knowledge	.29	.38	.11
Achievement	Positive Interpersonal Relationships	.32	.26	.09
	Emotion Knowledge	.17	.73	.46
	Kindergarten Achievement	.25	.27	.10

^aBaseline measures were collected in the fall of preschool