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The transition from preschool to first grade: A transactional model of development☆

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ABSTRACT

Transactional relations between children's positive social interaction skills, school engagement, and academic achievement were examined using a longitudinal panel model across the transition from preschool to first grade. Participants were Head Start children ($N = 241$; 49% girls, M age = 53 months, range 45–60); 78% were Mexican/Mexican-American; 82% of families were of low socioeconomic status. Head Start children's positive social interaction skills and academic achievement in preschool were positively related to kindergarten school engagement, positive social interaction skills and school engagement influenced one another over time, and academic achievement was positively related to positive social interaction skills from preschool to kindergarten. A small, but significant, transactional effect of preschool academic achievement on first-grade school engagement through kindergarten positive social interaction skills was found. Findings from the current study provide support for previously undocumented longitudinal relations between positive social interaction skills, school engagement, and academic achievement for Head Start children.

1. Introduction

Too many children, especially low-income and racial/ethnic minority children, are inadequately prepared for the transition to formal school. This lack of readiness is evidenced by the significant and persistent gap in academic achievement between low-income, racial/ethnic minority children and their more affluent, racial/ethnic majority peers (Rathbun, West, & Hausken, 2004). In addition to academic skills, practitioners and scholars agree that children's positive social interaction skills and school engagement are important factors for a successful transition from preschool to elementary school (Rimm-Kaufman & Pianta, 2000; Stipek, 2006). Transactional models of development suggest that positive social interaction skills, school engagement, and academic achievement likely build on and influence one another over time (Sameroff & MacKenzie, 2003). Despite the consensus regarding the importance of academic and social behaviors and skills for a successful transition to elementary school, few studies have longitudinally examined the potential transactional development of positive social interaction skills, school engagement, and academic achievement for low-income, ethnic minority children across this critical transition. Doing so is important because this type of research can help identify the specific skills and time period in which practitioners should intervene to set these children on a positive trajectory for school success.

The purpose of the present research was to address this gap using a sample of low-income Head Start children. Nearly two-thirds of the children in the current study were of Mexican or Mexican/American descent and about half were dual-language learners. We followed these children from preschool through first grade and examined how positive social interaction skills, school engagement, and academic achievement assessed at the end of each year related to one another across three time points (preschool, kindergarten, first grade). In line with a transactional model that posits bidirectional and transactional influences, we examined direct and indirect relations between children's positive social interaction skills, school engagement, and academic achievement across the transition from preschool to formal school using a cross-lagged longitudinal panel model.

2. The transition to formal schooling

The transition from the informal learning context of preschool to the formal learning context of elementary school is a time during which

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there are dramatic changes in the expectations for children (Fabian & Dunlop, 2002; Rimm-Kaufman & Pianta, 2000). For example, in most preschool settings, children spend 30% to 60% of their time in play-based activities (Chien et al., 2010; Goble, Hanish, Martin, Eggum-Wilkens, Foster, & Fabes, 2016). These play-based activities typically emphasize the development of positive social interaction skills, such as sharing and cooperation, and they are characterized by warm teacher-child relationships, unstructured child-directed activities, and children spending time in small peer groups (Early et al., 2010; Martin, Fabes, Hanish, & Hollenstein, 2005; Palermo, Hanish, Martin, Fabes, & Reiser, 2007). In contrast, kindergarten and first-grade contexts typically emphasize academic achievement and consist of larger class sizes and structured teacher-directed academic activities (Bassok, Latham, & Rorem, 2016). Children's interactions with peers tend to occur in larger peer groups with fewer adults present. Moreover, teacher and parental expectations for self-control and attention are greater, teacher-child relationships tend to be less warm, and children typically must interact with a more diverse population of children (Wilson, Pianta, & Stuhlman, 2007).

Thus, the transition from preschool to the start of formal schooling involves changing circumstances, expectations, and settings, such that by the time children start formal schooling, they are expected to be able to interact successfully with larger groups of peers during structured tasks and expected to devote extended periods of time to learning academic concepts and skills. This transition may be particularly challenging for Head Start children from low-income, racial/ethnic minority backgrounds. Although there are many benefits derived from Head Start, Head Start children often move out of Head Start to attend low-quality and low-performing elementary schools compared to their counterparts (Pigott & Israel, 2005). Although speculative, low-quality classroom experiences in kindergarten classrooms may reduce positive social interactions with peers and school engagement as well as negatively impact academic achievement (Burchinal et al., 2008). Accordingly, it is especially important to examine, in Head Start children, the relations between children's positive social interaction skills, school engagement, and academic achievement across this critical transition.

3. Positive social interaction skills, school engagement, and academic achievement

Children's positive social interaction skills fall into two categories: (1) socially competent behaviors, such as sharing and helping and (2) a lack of negative behaviors, such as conflict and aggression (Fantuzzo et al., 1995). Prior research suggests that children's positive social interaction skills are related to academic achievement across the transition from preschool to formal school for low-income, racial/ethnic minority children. For example, Fantuzzo, Sekino, and Cohen (2004) found that predominantly African-American Head Start children who were skilled at interacting with peers early in the preschool year were rated higher on measures of literacy and mathematic skills by their teachers at the end of the year. Similar correlational research in largely African-American Head Start classrooms has found that positive social interaction skills during preschool were associated with literacy and math outcomes in kindergarten and third grade (Bulotsky-Shearer, Bell, Romero, & Carter, 2012; Hampton & Fantuzzo, 2003). Additionally, recent research has shown positive significant associations between positive social interaction skills and language and literacy outcomes for a predominantly Hispanic Head Start sample (Bulotsky-Shearer, Lopez, & Mendez, 2016).

Examining school engagement might help us understand how or why positive social interaction skills are related to academic achievement for low-income, ethnic minority Head Start children. In general, cross-sectional studies with predominately affluent, racial/ethnic majority samples in elementary school show that children who have positive social interaction skills (i.e., both socially competent behaviors and a lack of negative behaviors) are more likely to enjoy being at school (i.e., emotional engagement) and engage in classroom activities (i.e., behavioral engagement; Birch & Ladd, 1996; Buhs & Ladd, 2001; Ladd & Burgess, 2001). Furthermore, Head Start research with low-income, ethnic minority children supports these associations showing that positive social interaction skills are related to skills that support school engagement such as children's attitudes toward learning, motivation, and attention/persistence (Bulotsky-Shearer et al., 2016; Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Eggum-Wilkens, Fabes, Castle, Zhang, Hanish, & Martin, 2014; Mendez, Fantuzzo, & Cicchetti, 2002). In turn, children's school engagement has been linked to their academic achievement (i.e., language, literacy, math) concurrently as well as longitudinally (e.g., Iyer, Kochenderfer-Ladd, Eisenberg, & Thompson, 2010; Ladd, Birch, & Buhs, 1999; Ladd, Buhs, & Seid, 2000; Ladd & Dinella, 2009; Ladd, Kochenderfer, & Coleman, 1997).

Relations between positive social interaction skills, school engagement, and academic achievement are not likely unidirectional. Sameroff's transactional model of development suggests a continuous, dynamic interplay between the child and his or her social context over the course of development that allows for both continuity in children's development and creates potential for change (Sameroff, 2009; Sameroff & MacKenzie, 2003). As such, the development of a child's positive social interaction skills, school engagement, and academic achievement may form part of a dynamic system of influences across the transition to formal school, such that intervention at any period and on any facet may alter children's school trajectories. Most of the prior empirical evidence examining positive social interaction skills, school engagement, and academic achievement has utilized designs that are limited in their ability to test bidirectional (i.e., A → B and A ← B) and transactional hypotheses (i.e., A → B → C; Buhs & Ladd, 2001; Bulotsky-Shearer et al., 2012; Bulotsky-Shearer et al., 2016; Coolahan et al., 2000; Fredricks, Blumenfeld, & Paris, 2004; Iyer et al., 2010; Ladd et al., 1999; Ladd & Dinella, 2009; Ladd et al., 2000).

Thus, to better understand children's development across the transition to formal school and to identify potential points of intervention, the objective of the present study was to longitudinally explore the transactional effects of Head Start children's positive social interaction skills, school engagement, and academic achievement. We used a cross-lagged panel model (see Fig. 1) that includes bidirectional and indirect relations between these skills over time (Selig & Little, 2012). In addition to accounting for relations among positive social interaction skills, school engagement, and academic achievement concurrently (i.e., within wave) and controlling for stability across time, our cross-lagged model with bidirectional paths examines relations between positive social interaction skills, school engagement, and academic achievement from one wave to the next (i.e., preschool to kindergarten and kindergarten to first grade). This type of analysis allows for the prediction of change in children's skill development at kindergarten and first grade by controlling for prior levels of these skills. Furthermore, testing indirect effects sheds light on potential transactional relations between children's positive social interaction skills, school engagement, and academic achievement from preschool to first grade. When examining complex longitudinal models using a sample of Head Start children, of which a large proportion are dual-language learners, it is important control for verbal ability and language preference, which may, in part, explain the relations between study variables. Thus, preliminary analyses were conducted to examine how verbal ability and language preference, as well as other potentially important demographic characteristics, were related to the study variables and all models included controls to provide a more robust test of the cross-lagged panel model.

4. Method

4.1. Participants

Data were drawn from a 3-year longitudinal study of Head Start children designed to explore the impact of children's school-based

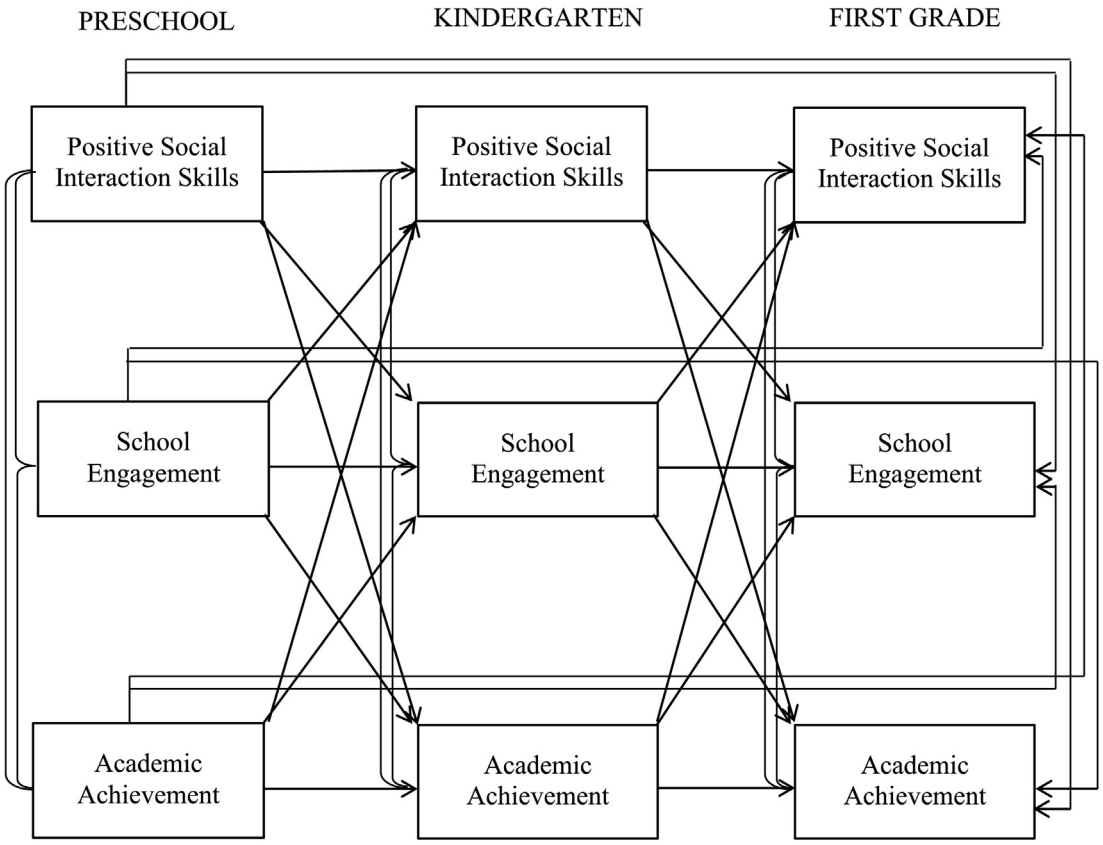

Fig. 1. Conceptual model between positive social interactions skills, school engagement, and academic achievement. *Note*. All indirect effects were tested.

relationships in Head Start on school transition and adjustment in kindergarten and first-grade. The participants were recruited from Head Start preschool (Wave 1) classrooms in a large, metropolitan Southwestern city. The participants were subsequently followed through kindergarten (Wave 2) and first grade (Wave 3). Consent rates were 99% at recruitment ($N = 308$ out of a possible 311). Children who were chronically absent or who left in the fall semester of preschool were dropped from the analyses due to an insufficient amount of data. Those who were too young to enter kindergarten the following year and/or did not continue in the study after preschool were also dropped, resulting in 68 children being excluded from the sample. Attrition analyses revealed no significant difference by gender, ethnicity, language, or family income between children excluded from the study and those retained. For children who repeated preschool during our study and had 2 years of preschool data ($n = 16$), only data from the second year of preschool (the year before they entered kindergarten) were used in analyses.

The final sample consisted of 241 children (52% male, $n = 134$) enrolled in 18 Head Start classes, ranging in age from 45 to 60 months at the beginning of preschool ($M = 53.32$ months, $SD = 3.75$ months). Based on demographic data collected from parents, the majority of participants (78%) were Mexican or Mexican-American; nearly double the percentage of children from Hispanic/Latino descent served nationally by Head Start (38%; Administration for Children & Families, 2015). Relatively few of the participants were Anglo-American (8%), African-American (6%), or Native-American (1%). Race/ethnicity was other or unknown for the remaining 7% of the sample. Prior to direct assessments in preschool, children were approached in the language indicated as their preference by their teacher and given the choice to complete interviews in English or Spanish; 50% of children completed preschool assessments in English. Within classrooms, the number of children who preferred Spanish ranged from 0 to 85% ($M = 50\%$). In kindergarten and first grade, direct assessments of academic achievement were only offered in English to be consistent with the standard testing procedures used in their schools (see Measures for details). However, children were approached in the language they indicated as their preference the year prior and asked to report their preferred language prior to conducting the direct assessment. In kindergarten and first grade, 61% and 75% of the children preferred English, respectively. According to parent reports, 82% of the families were of low socio-economic status (SES; less than $30,000 per year). Almost half (45%) of the participants' parents were married, 22% were together but never married, 13% were divorced/separated, and the remaining 20% of parents were single.

Several efforts were made to contact families throughout the 3 years of the study to minimize attrition (e.g., sending birthday cards, newsletters). The Head Start children were dispersed to 150 kindergarten classrooms and 147 first grade classrooms across 36 elementary schools. Of the 241 children, 159 children had complete data in both kindergarten and first grade. A total of 82 children had some missing data (i.e., 9 children were missing data at kindergarten only, 19 children were missing data at first grade only, and 54 children were missing data for both kindergarten and first grade). *t*-Tests showed that children for whom complete data were not available at all three time points did not differ from the rest of the sample (children with complete data for all 3 years) on Peabody Picture Vocabulary Test (PPVT-III), family income, gender, age, preschool positive peer interactions, preschool school engagement, or preschool academic achievement. We used a full information maximum likelihood estimator (ML) to handle missing data for the final sample ($N = 241$).

4.2. Procedures

During Head Start, trained English-Spanish bilingual study personnel administered the Peabody Picture Vocabulary Test III (PPVT-III/TVIP) in the fall semester and Woodcock-Johnson Tests of Achievement III (WJ-III) in the spring semester to all participants in their preferred

language, English or Spanish. Preschool teachers' questionnaire packets were delivered to the teachers, and a member of the research team picked them up upon completion. Because the Head Start classrooms fed into elementary schools and districts all over the city, kindergarten and first-grade teachers were mailed questionnaire packets once the child's school and teacher were identified by parents and consent was provided by the parent, district, principal, and teacher. Teachers mailed the packets back to the researchers upon completion (97% return rate). The teacher questionnaire at all three grades included a number of measures including assessments of children's social skills, and school engagement. Completion of the questionnaire took approximately 45 min and teachers were paid $25 per child for their time.

Families of participating children came to lab-based follow-up visits during the spring of children's kindergarten and first-grade years, at which time children were administered achievement tests by study personnel. Home visits were made for families who were unable to schedule a lab visit (2%). Families were paid $40 for participating in follow-up visits and children received a small toy for their time. During these visits, parents completed a questionnaire that included, in part, items regarding child sex, age, and income.

4.3. Measures

4.3.1. Positive social interaction skills

To assess social interaction skills in preschool, kindergarten, and first grade, children's primary teacher in each grade completed the Penn Interactive Peer Play Scale (PIPPS; Fantuzzo, Mendez, & Tighe, 1998). Teachers were asked to indicate on a 4-point scale (1 = *never* to 4 = *always*) how frequently they observed various peer interactive behaviors in a particular child. Three reliable dimensions of the PIPPS have been identified: (1) Play Interaction (children's play strengths; e.g. "This child directs others' actions politely"; 10 items), (2) Play Disruption (behaviors that interfere with peer play - aggression, destroying others' property, etc.; e.g., "This child disrupts play of others"; 11 items), and (3) Play Disconnection (nonparticipation in peer play; e.g., "This child hovers outside playgroup"; 11 items). This measure has been validated for use with low-income and majority Hispanic samples (Castro, Mendez, & Fantuzzo, 2002; Fantuzzo et al., 1995) and had adequate reliability in the present sample (alphas ranged from 0.85 to 0.90, 0.82 to 0.93, and 0.82 to 0.93, for preschool, kindergarten, and first grade, respectively).

4.3.2. School engagement

Teachers at each wave reported on children's school engagement using the Teacher Rating Scale of School Adjustment (Birch & Ladd, 1997; Ladd et al., 1999), on a 3-point, Likert-type scale (1 = *Doesn't apply* to 3 = *Certainly applies*). Four reliable subscales have been identified from this measure: (1) School Liking (e.g., "This child likes to come to school"; 5 items), (2) School Avoidance (e.g., "This child makes up reasons to go home from school"; 5 items), (3) Cooperative Participation (i.e., the extent to which the child is cooperative within the classroom; e.g., "This child follows teacher's directions"; 7 items), and Self-directedness (i.e., the extent to which the child works autonomously in the classroom; 4 items). The subscales of this measure have been shown to have good internal consistency (alphas range from 0.77 to 0.91; Buhs & Ladd, 2001) and they had adequate reliability in the present sample (alphas ranged from 0.47 to 0.93, 0.76 to 0.93, and 0.62 to 0.94, for preschool, kindergarten, and first grade, respectively).

4.3.3. Academic achievement

Children were assessed each spring across the 3 years of the study using three subscales from the Woodcock-Johnson Tests of Achievement III (WJ-III; Woodcock, McGrew, & Mather, 2001; Spanish equivalent, Batería-III Woodcock-Muñoz; Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005) — Letter Word Identification (e.g., naming letters and reading words aloud from a list), Passage Comprehension (e.g., orally supplying the missing word removed from a sentence or very brief paragraph), and Applied Problems (e.g., mathematic word problems). In preschool, children were administered the subscales in their preferred language, English or Spanish, as indicated by the child. Because we were interested in children's performance as assessed within the formal schooling contexts of kindergarten and first grade, all children received the WJ-III subscales in English to be consistent with standardized assessments in elementary school. Testing all children in English allowed us to understand how our Head Start children were performing relative to the typical demands and ways in which assessments are conducted in kindergarten and first grade – despite changing demographics, most standardized, content-based tests (such as math and reading) are written and administered in English (Abedi, 2002). We do, however, control for language preference in our analyses, because even when tests have been translated and administered in native language, non-English speaking students still perform lower than their English-speaking peers (Abedi & Dietel, 2004).

The WJ-III subscales provide two types of scores, the Standard Score (*SS*) and the W Score (*W*). *W* scores (converted raw scores) are a special transformation of the Rasch ability scale and were utilized in the current study because they are compatible across both versions of the test (i.e., English and Spanish). Muñoz-Sandoval et al. (2005) employed Item Response Theory (IRT) methods with 2000 Spanish-speaking individuals and concluded that equal levels of competence were being measured by the English and Spanish assessments (Woodcock & Muñoz-Sandoval, 1993, Woodcock & Muñoz-Sandoval, 1996a, 1996b). Research has shown that both the WJ-III and the Batería-III are reliable and valid measures of achievement and yield comparable scores; WJ-III alphas = 0.91, 0.83, and 0.92 for letter Word Identification, Passage Comprehension, and Applied Problems respectively (Schrank, McGrew, Ruef, & Alvarado, 2005; Schrank, McGrew, & Woodcock, 2001).

4.3.4. Covariates

Several demographic variables were included in preliminary analyses (i.e., repeated measures analyses of variance and correlations) and considered as covariates in the final model if they were significantly related to study variables. These include children's gender (female = 0, male = 1), language of academic assessment in preschool (English = 0, Spanish = 1), preferred language in kindergarten and first grade (English = 0, Spanish = 1), race/ethnicity (not Mexican/Mexican American = 0, Mexican/Mexican American = 1), and family income (range <$10,000 to >$140,000).

4.3.4.1. Verbal ability. To examine verbal ability at entry into the study as a potential control variable, during the fall semester of the preschool year we administered the Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997) and the Spanish equivalent Test de Vocabulario en Imagenes Peabody (TVIP; Dunn, Lugo, Padilla, & Dunn, 1986). Children were assessed in either English or Spanish based on student preference (52% were assessed in English and 48% were assessed in Spanish). The TVIP was developed using the most appropriate items from the PPVT-III for a Spanish population. The PPVT-III and TVIP have the same number of total questions and most questions are identical, although some items differ between versions. Both tests are reliable and valid measures of vocabulary knowledge (e.g., strong correlations with other measures of vocabulary, PPVT-III test-retest reliability correlation of 0.94; Dunn & Dunn, 1997; Dunn et al., 1986). Within the present study, the raw scores (sum of all correct responses) of the PPVT-III and TVIP are used because the standardized scores were normed on different populations and were not comparable.

4.4. Data reduction

Data reduction techniques were used to make the data more manageable for analyses. Children's positive social interaction skills, school

engagement, and academic achievement during preschool, kindergarten, and first grade were assessed using 3 measures and 10 subscales at each wave. Although more nuanced hypotheses regarding how specific behaviors and skills that comprise children's positive social interaction skills, school engagement, and academic achievement could be addressed examining subscales separately, estimating separate models for various subscales would not be ideal. The use of individual subscales would result in a number of models and would increase Type I error. Further, the subscales are correlated within construct; thus, if the subscales were entered into the models separately rather than as aggregates, we would want to obtain partial coefficients for each subscale in which the other subscales were controlled. This could be accomplished using separate subscales in the same model, but such a model would be too complex given our sample size.

To reduce the data, first correlations between subscales within scale and wave were examined to determine if a composite could be created for each of the following multi-subscale measures: positive social interaction skills (PIPPS), school engagement (TRSSA), and academic achievement (WJ-III). All were significantly correlated in the expected direction, with the exception of the TRSSA school avoidance and cooperative participation subscales and the WJ-III Word Identification and Passage Comprehension subscales in preschool (see Table 1). Neither theory nor previous research led us to expect different relations for the four school engagement subscales and three academic achievement subscales. The significant correlations between these subscales in kindergarten and first grade supported the decision to form composites. Thus, it was decided that composites would be formed in preschool as well to be consistent with the other time points.

The next step to reduce the data was to create composites for each scale. Thus, three composites (PIPPS, TRSSA, WJ-III) were created within each wave (preschool, kindergarten, first grade) by summing the raw subscale scores and dividing by the number of subscales administered (i.e., 2 or 3) to create a mean score for each scale. For example, the composite for PIPPS was created by summing the raw subscale scores for Play Interaction, Play Disruption (reverse coded), and Play Disconnection (reverse coded) and dividing by three. For each measure, higher scores indicated more positive outcomes or more positive social interaction skills, school engagement, and academic achievement (composite alphas presented in Table 2). Furthermore, the WJ-III composite was adjusted (divided by 100) to be consistent with the scale of the other composites.

4.5. Classroom effects

Because children's assessments during preschool were clustered within teacher/classroom, the preschool positive social interaction skills, school engagement, and academic achievement variables were examined for potential differences that related to children's teacher/classroom (data were not nested to the same degree in kindergarten and first grade). The classroom-design effect (i.e., a function of the intraclass correlation and the average cluster size) was calculated. A classroom effect >2 indicates that the hierarchical nature of the data should be taken into account in analyses (Muthén, 1994). Classroom effects were above 2 for preschool positive social interaction skills (4.73), school engagement (3.71), and academic achievement (2.20) suggesting that the preschool data were related within teacher/classroom. Ideally, analyses in which the multilevel nature of the data was taken into account when computing standard errors (using M*plus*) would be utilized. However, a minimum of 30 classrooms is the recommended rule of thumb for this type of analysis and the current study had only 18 classrooms (Bell, Ferron, & Kromrey, 2008). Accordingly, children's preschool classroom was included as a fixed-effect covariate on the preschool study variables in analyses testing the study hypotheses.

Table 2
Descriptive statistics for social interaction skills, school engagement, and academic achievement for all children.

	n	α	*M*	*SD*	Min	Max	Skew	Kurtosis
Wave 1 - preschool								
Positive social interaction skills	239	0.75	2.48	0.42	1.42	3.24	−0.38	−0.62
School engagement	239	0.72	2.26	0.25	1.48	2.75	−0.80	−0.01
Academic achievement	237	0.48	3.71	0.19	2.84	4.17	−0.89	1.70
Wave 2 - kindergarten								
Positive social interaction skills	184	0.79	2.57	0.43	0.95	3.27	−0.95	0.93
School engagement	184	0.76	2.22	0.31	1.06	2.79	−1.21	1.55
Academic achievement	178	0.69	4.05	0.15	3.41	4.53	0.05	1.88
Wave 3 - first grade								
Positive social interaction skills	173	0.77	2.49	0.46	0.93	3.20	−0.82	0.23
School engagement	173	0.78	2.15	0.32	1.09	2.70	−0.68	−0.22
Academic achievement	168	0.81	4.41	0.18	3.73	4.77	−0.42	0.24

Note. Valid listwise = 159.

5. Results

Preliminary analyses were conducted using SPSS Version 22 to examine the descriptive statistics of all study variables (see Table 2). For all variables, skewness and kurtosis were low and did not indicate substantial deviations from normality (Tabachnick & Fidell, 2012). Repeated measures analyses of variance and follow-up analyses were conducted to examine differences in each set of variables (i.e., positive social interaction skills, school engagement, and academic

Table 1
Correlations between subscales within measures and wave.

	Preschool			Kindergarten			First Grade		
	1	2	3	1	2	3	1	2	3
Penn Interactive Peer Play Scale (PIPPS)									
1. Play Interaction	–			–			–		
2. Play Disruption	−0.42***	–		−0.49***	–		−0.48***	–	
3. Play Disconnection	−0.40***	0.68***	–	−0.58***	0.68***	–	−0.53***	0.65***	–
Teacher Rating Scale of School Adjustment (TRSSA)									
1. School Liking	–			–			–		
2. School Avoidance	−0.54***	–		−0.42***	–		−0.49***	–	
3. Cooperative Participation	0.49***	−0.11	–	0.62***	−0.45***	–	0.64***	−0.39***	–
4. Self-directedness	0.46***	−0.19**	0.66***	0.53***	−0.25***	0.66***	0.54***	−0.27***	0.64***
Woodcock-Johnson Tests of Achievement (WJ-III)									
1. Word Identification	–			–			–		
2. Passage Comprehension	0.04	–		0.49***	–		0.84***	–	
3. Applied Problems	0.41***	0.33***	–	0.50***	0.30***	–	0.47***	0.54***	–

Note. Degrees of freedom for correlations ranged from 149 to 239.
** $p < 0.01$.
*** $p < 0.001$.

achievement) across three waves of data (preschool, kindergarten, first grade) due to children's gender, language of academic assessment in preschool, preferred language in kindergarten and first grade, and race/ethnicity. Significant differences were found between girls and boys for positive social interaction skills, $F(1, 157) = 14.64$, $p < 0.001$, partial $\eta^2 = 0.09$, school engagement, $F(1, 157) = 16.26$, $p < 0.001$, partial $\eta^2 = 0.09$, and academic achievement, $F(1, 153) = 6.22$, $p < 0.05$, partial $\eta^2 = 0.04$. Specifically, teachers rated girls higher than boys on positive social interaction skills and school engagement, and girls outperformed boys on measures of academic achievement at all three waves.

Differences between children who took the preschool academic assessment in English versus Spanish were found for only academic achievement, $F(1, 153) = 23.47$, $p < 0.001$, partial $\eta^2 = 0.13$. Children who took the preschool academic assessment in English outperformed children who took it in Spanish on measures of academic achievement at all three waves. Children who preferred English in kindergarten significantly differed from children who preferred Spanish in kindergarten on positive social interactions skills, $F(1, 144) = 4.71$, $p < 0.05$, partial $\eta^2 = 0.03$, school engagement, $F(1, 144) = 5.12$, $p < 0.05$, partial $\eta^2 = 0.03$, and academic achievement, $F(1, 152) = 6.13$, $p < 0.05$, partial $\eta^2 = 0.04$. Specifically, children who preferred English in kindergarten were rated lower than their peers on positive social interaction skills and school engagement by their kindergarten teacher; however, these children outperformed their Spanish-speaking peers on academic achievement in preschool and kindergarten. There were no significant differences between children who preferred English in first grade and children who preferred Spanish in first grade. Differences between children who were of Mexican origin and those who were not of Mexican origin were found for positive social interactions skills, $F(1, 157) = 9.32$, $p < 0.01$, partial $\eta^2 = 0.06$, school engagement, $F(1, 157) = 7.87$, $p < 0.01$, partial $\eta^2 = 0.05$, and academic achievement, $F(1, 153) = 6.10$, $p < 0.05$, partial $\eta^2 = 0.04$. Again, children who were not of Mexican origin were rated lower than their peers on positive social interaction skills and school engagement by their kindergarten teacher; however, these children outperformed their Spanish-speaking peers on academic achievement in preschool and kindergarten. The means and standard deviations of study variables for each gender, language of preschool assessment, preferred language in kindergarten, and race/ethnicity are presented in Table 3. Following results of these preliminary analyses, child gender, language of preschool assessment, preferred language in kindergarten, and race/ethnicity were included as control variables in analyses testing the main study hypotheses.

Pearson product-moment correlations were conducted to examine zero-order correlations between the study variables and to determine whether age and initial verbal ability (PPVT-III, Dunn & Dunn, 1981; TVIP, Dunn et al., 1986) were related to the study variables and should be considered as control variables. Positive social interaction skills,

Table 3
Means and standard deviations of study variables by group.

	Preschool (Wave 1)			Kindergarten (Wave 2)			First grade (Wave 3)		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Child gender									
Girls									
Positive social interaction skills	117	2.62	0.37	87	2.69	0.34	82	2.59	0.40
School engagement	117	2.32	0.20	87	2.31	0.23	82	2.24	0.27
Academic achievement	115	3.75	0.17	83	4.08	0.15	81	4.44	0.17
Boys									
Positive social interaction skills	122	2.36	0.42	97	2.47	0.48	91	2.39	0.48
School engagement	122	2.20	0.27	97	2.14	0.34	91	2.07	0.33
Academic achievement	122	3.68	0.21	95	4.03	0.15	87	4.38	0.19
Language of preschool assessment									
English									
Positive social interaction skills	119	2.46	0.41	85	2.47	0.46	82	2.47	0.31
School engagement	119	2.25	0.25	85	2.16	0.32	82	2.15	0.46
Academic achievement	120	3.79	0.15	88	4.10	0.16	80	4.45	0.19
Spanish									
Positive social interaction skills	120	2.51	0.42	99	2.67	0.39	91	2.50	0.32
School engagement	120	2.27	0.25	99	2.26	0.28	91	2.15	0.46
Academic achievement	117	3.63	0.20	90	4.01	0.13	88	4.37	0.17
Preferred language in kindergarten									
English									
Positive social interaction skills	108	2.48	0.40	101	2.51	0.45	98	2.47	0.31
School engagement	108	2.27	0.25	101	2.17	0.32	98	2.13	0.46
Academic achievement	109	3.76	0.17	110	4.09	0.15	98	4.42	0.19
Spanish									
Positive social interaction skills	66	2.56	0.43	62	2.71	0.36	59	2.53	0.34
School engagement	66	2.29	0.25	62	2.32	0.26	59	2.18	0.44
Academic achievement	63	3.68	0.15	66	4.01	0.12	60	4.41	0.17
Ethnicity									
Mexican/Mexican-American									
Positive social interaction skills	186	2.50	0.40	151	2.63	0.40	138	2.52	0.31
School engagement	186	2.27	0.23	151	2.25	0.30	138	2.17	0.45
Academic achievement	185	3.69	0.19	144	4.03	0.15	137	4.40	0.17
Not Mexican/Mexican-American									
Positive social interaction skills	53	2.42	0.45	33	2.31	0.50	35	2.35	0.33
School engagement	53	2.22	0.29	33	2.06	0.31	35	2.06	0.48
Academic achievement	52	3.81	0.18	34	4.13	0.15	31	4.45	0.21

Note. Girls and boys significantly differ on all of the study variables, *ts*(166–237) = range 1.99 to 5.07, *ps* < 0.05, Cohen's *ds* range 0.30 to 0.66. Children who took the preschool assessment in English significantly differed from children who took the preschool assessment in Spanish on academic achievement at all three waves, *ts*(166–235) = range 2.25 to 7.06, *ps* < 0.01, Cohen's *ds* range 0.47 to 0.92. Children who preferred English in kindergarten significantly differed from children who preferred Spanish in kindergarten on positive social interaction skills and school engagement in kindergarten (Wave 2) and on academic achievement in preschool (Wave 1) and kindergarten (Wave 2), *ts*(161–174) = range 2.86 to 3.51, *ps* < 0.05, Cohen's *ds* range 0.47 to 0.56. Children who are of Mexican/Mexican-American origin significantly differed from children not of Mexican/Mexican-American origin on positive social interaction skills in kindergarten (Wave 2) and on school engagement and academic achievement in preschool (Wave 1) and kindergarten (Wave 2), *ts*(171–235) = range 2.02 to 4.12, *ps* < 0.05, Cohen's *ds* range 0.21 to 0.73.

Table 4
Zero-order correlations for study variables and control variables.

	1	2	3	4	5	6	7	8	9	Child age	Initial verbal ability	Family income
Wave 1 - preschool												
1. Positive social interaction skills	–									−0.09	−0.05	0.04
2. School engagement	0.79***	–								−0.01	−0.03	0.12
3. Academic achievement	0.11	0.13*	–							0.24***	0.54***	0.26***
Wave 2 - kindergarten												
4. Positive social interaction skills	0.51***	0.42***	0.12	–						−0.13	−0.20**	−0.10
5. School engagement	0.41**	0.37**	0.16*	0.69***	–					0.00	−0.18*	−0.08
6. Academic achievement	0.13	0.18*	0.62***	0.15*	0.29***	–				0.15*	0.35***	0.17*
Wave 3 - first grade												
7. Positive social interaction skills	0.46**	0.38**	0.21**	0.53***	0.42***	0.23**	–			−0.06	0.02	0.04
8. School engagement	0.45***	0.37***	0.28***	0.50**	0.52***	0.32***	0.72***	–		0.03	0.01	0.02
9. Academic achievement	0.17	0.14	0.56***	0.22**	0.31***	0.67***	0.34***	0.40***	–	0.11	0.30***	0.10

Note. Degrees of freedom for correlations ranged from 153 to 235.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

school engagement, and academic achievement were stable across the three transition points (see Table 4). The study variables were also positively correlated with one another from preschool to kindergarten and from kindergarten to first grade (with the exception of positive social interaction skills and academic achievement from preschool to kindergarten; Table 4). Correlations between child age, initial verbal abilities, family income, and study variables are presented in Table 4. Following results showing significant correlations with study variables, children's age, initial verbal abilities, and family income were used as controls on some but not all variables.

5.1. Cross-lagged model for positive social interaction skills, school engagement, and academic achievement

A cross-lagged model between children's positive social interaction skills, school engagement, and academic achievement across preschool (Wave 1), kindergarten (Wave 2), and first grade (Wave 3) was used to explore potential bidirectional and transactional relations among these variables over time. To do this, a path analysis model was estimated (see Fig. 1). In addition to paths depicted in Fig. 1, measures of positive social interaction skills, school engagement, and academic achievement at all three waves were also regressed on a set of control variables identified in preliminary analyses (see Table 5). This model allowed us to determine whether early positive social interaction skills, school engagement, and academic achievement were associated with later positive social interaction skills, school engagement, and academic achievement after controlling for stability in positive social interaction skills, school engagement, and academic achievement.

Based on the Missing At Random (MAR) assumption (Enders, 2010), all models were estimated using Full Information Maximum Likelihood (FIML) using M*plus* 7 (Muthén & Muthén, 1998–2012). Though methods are not available to test the MAR assumption, it was believed to be reasonable for these data because no significant differences were found between participants with missing data and participants with complete data. Indirect effects were examined using M*plus*' 'model indirect' command and tested with bias-corrected bootstrapped confidence intervals (5000 bootstrap draws; MacKinnon, 2008). This procedure addresses the problem that indirect paths rarely follow a multivariate normal distribution by correcting estimates of standard errors and confidence intervals (MacKinnon, 2008).

Model fit was assessed using four fit indices: chi-square statistic (χ^2), the standardized root-mean-square residual (SRMR), the root-mean-square error of approximation (RMSEA), and the comparative fit index (CFI). The chi-square statistic is a test for perfect fit. A significant chi-square test result indicates a poor fit (Kline, 2005). RMSEA and SRMR were used as measures of absolute fit, where scores below 0.08 typically indicate adequate fit and scores below 0.05 indicate good fit (Kline, 2005). The CFI was used to measure incremental fit, where a good fit is indicated if this score is above 0.95 (Kline, 2005). The CFI null model was recomputed to be appropriate for longitudinal data (Little, 2013). Overall, the model had adequate fit with the data, χ^2 (N = 241; 160) = 223.84, $p < 0.001$, SRMR = 0.04, RMSEA = 0.04, and CFI = 0.96 (standardized estimates [STDYX for continuous predictors and STDY for categorical predictors] between control and study variables are presented in Table 5; see Fig. 2 for standardized estimates [STDYX] among study variables).

Table 5
Standardized partial regression coefficients between control and study variables from the autoregressive cross-lagged model.

	Positive social interaction skills			School engagement			Academic achievement		
	W1 β	W2 β	W3 β	W1 β	W2 β	W3 β	W1 β	W2 β	W3 β
Gender	−0.33***	−0.09	−0.10	−0.24***	−0.15*	−0.10	−0.20***	−0.04	−0.03
Age	–	–	–	–	–	–	0.16**	−0.05	–
Initial verbal ability	–	−0.12	–	–	−0.13	–	0.42***	0.01	0.16*
Language of preschool assessment	–	–	–	–	–	–	−0.16	0.08	0.00
Preferred language in kindergarten	–	0.08	–	–	0.15*	–	0.15	−0.13	–
Ethnicity	–	0.22**	0.01	–	0.15	–	0.05	−0.11	–
Family income	–	–	–	–	–	–	0.09	0.03	–

Note. 1 = Wave 1. W2 = Wave 2. W3 = Wave 3. β = standardized beta estimates [STDYX for continuous predictors and STDY for categorical predictors]. Study variables were regressed according to preliminary analyses upon child gender (female = 0, male = 1), age, initial verbal ability, language of preschool assessment (English = 0, Spanish = 1), preferred language in kindergarten (English = 0, Spanish = 1), ethnicity (not Mexican/Mexican American = 0, Mexican/Mexican American = 1), family income, and 17 dummy code variables for preschool teacher (not reported). Dashes (–) indicate that the paths were not estimated. All covariates were allowed to covary.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

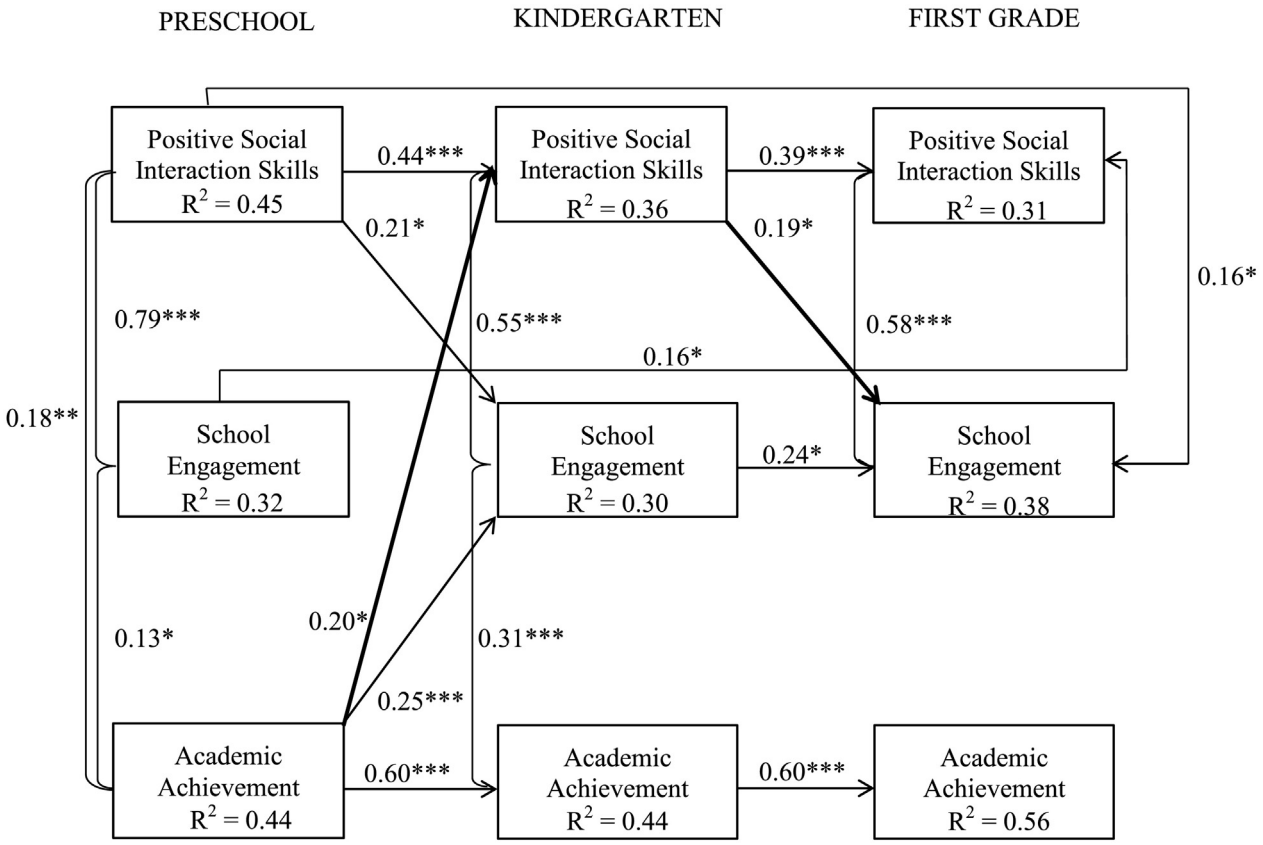

Fig. 2. Autoregressive cross-lagged model of positive social interactions skills, school engagement, and academic achievement. *Note*. Significant paths, standardized beta estimates [STDYX] and *p*-values are reported. Non-significant paths were dropped from the illustration. Bold lines represent significant indirect effect [$\beta = 0.04$, bias-corrected bootstrapped 95% confidence interval (CI): $LL = 0.003$, $UL = 0.10$]. R-squares (proportion of variance accounted for in each variable by its predictors) are reported for endogenous variables. χ^2 ($N = 241; 160$) = 223.84, $p < 0.001$, SRMR = 0.04, RMSEA = 0.04, and CFI = 0.96. Study variables were regressed according to preliminary analyses upon child gender (female = 0, male = 1), age, initial verbal ability, language of preschool assessment (English = 0, Spanish = 1), preferred language in kindergarten (English = 0, Spanish = 1), ethnicity (not Mexican/Mexican American = 0, Mexican/Mexican American = 1), and 17 dummy code variables for preschool teacher (see Table 5). All covariates were allowed to covary. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Modeling the stability of positive social interaction skills, school engagement, and academic achievement across the critical developmental transition from preschool to elementary school for high-risk samples was particularly important in the current study to assess the degree to which these skills relate longitudinally - above and beyond stability in those skills from preschool to first grade. Interestingly, not all autoregressive paths were significant. Children's positive social interaction skills demonstrated rank-order stability across all waves (W1–W2 $\beta = 0.44$; W2–W3 $\beta = 0.39$, $ps < 0.001$). The model also indicated rank-order stability across all waves for academic achievement (W1–W2 $\beta = 0.60$; W2–W3 $\beta = 0.60$, $ps < 0.001$). Children's school engagement in preschool was not significantly related to their school engagement in kindergarten; however, their kindergarten school engagement was predictive of first grade school engagement (W2–W3 $\beta = 0.24$, $p < 0.05$)

5.1.1. Transactional effects

Potential transactional pathways (tested as indirect effects) among positive social interaction skills, school engagement, and academic achievement from preschool to first grade were examined (6 possible transactional effects). Analyses revealed a weak but significant transactional effect: [W1 academic achievement → W2 positive social interaction skills → W3 school engagement; $\beta = 0.04$, bias-corrected bootstrapped 95% confidence interval (CI): $LL = 0.003$, $UL = 0.10$] in which first grade school engagement was predicted by preschool academic achievement through kindergarten positive social interaction skills.

5.1.2. Positive social interaction skills and school engagement

To examine the bidirectional relations between positive social interaction skills and school engagement over time, the cross-lagged paths of the model between these study variables were considered. Several cross-lagged paths were significant even after taking into account the covariates and controlling for stability in these constructs over time (see Fig. 2). Specifically, preschool (Wave 1) positive social interaction skills was associated with kindergarten (Wave 2) school engagement ($\beta = 0.21$, $p < 0.05$), and kindergarten positive social interaction skills was associated with first grade (Wave 3) school engagement ($\beta = 0.19$, $p < 0.05$). Additionally, preschool (Wave 1) positive social interaction skills was associated with first grade (Wave 3) school engagement ($\beta = 0.16$, $p < 0.05$), and preschool (Wave 1) school engagement was associated with first grade (Wave 3) positive social interaction skills ($\beta = 0.16$, $p < 0.05$).

5.1.3. School engagement and academic achievement

Next, the cross-lagged paths between school engagement and academic achievement were considered. Only one cross-lagged path between school engagement and academic achievement was significant after taking into account the covariates and controlling for stability in these constructs over time (see Fig. 2). Specifically, preschool (Wave 1) academic achievement was associated with kindergarten (Wave 2) school engagement ($\beta = 0.25$, $p < 0.001$).

5.1.4. Positive social interaction skills and academic achievement

Only one cross-lagged path between positive social interaction skills and academic achievement was significant after taking into account the covariates and controlling for stability in these constructs over time (see Fig. 2). Specifically, preschool (Wave 1) academic achievement was associated with kindergarten (Wave 2) positive social interaction skills ($\beta = 0.20$, $p < 0.05$).

6. Discussion

The present study extends previous research by utilizing a longitudinal cross-lagged design that allowed for the examination of transactional relations between Head Start children's positive social interaction skills, school engagement, and academic achievement while accounting for stability in these constructs over time. This design enabled us to control for previous levels of each variable in testing direct and indirect effects, and to test indirect pathways across two time periods and a school transition. The present study is the first to examine these transactional relations across the transition from preschool to elementary school, and the first to examine the transactional development of positive social interaction skills, school engagement, and academic achievement for low-income and largely Mexican/Mexican American children.

6.1. Transactional model of development

The results provide some support for a transactional model of development. The current study utilized a stringent test for transactional development that required an indirect effect between all three constructs (positive social interaction skills [A], school engagement [B], and academic achievement [C]) across all three years. In other words, only six transactional effects (i.e., A → B → C, A → C → B, B → A → C, B → C → A, C → A → B, C → B → A) were examined. Only one small but significant transactional relation was found (Sameroff, 2009). Specifically, an indirect effect of preschool academic achievement on first grade school engagement through kindergarten positive social interaction skills was supported. Previous research has suggested that academic achievement is related to later school engagement (e.g., Hughes, Luo, Kwok, & Loyd, 2008); however, this is the first study to suggest that positive social interaction skills may play a role in the relation between academic achievement and school engagement. Given this transactional effect, we might speculate that children who are academically skilled prior to kindergarten are more likely to be accepted by peers and have opportunities to build positive social interaction skills during the kindergarten year, which in turn leads to more positive feelings about school and engagement in classroom activities by first grade.

Although, potential transactional relations between two of three constructs (e.g., A → B → A) were not explored, various short-term and bidirectional effects were found across two of the three years studied suggesting some support for transactionality. Specifically, children's preschool academic achievement was significantly related to kindergarten positive social interaction skills and school engagement but the same relations were not present between kindergarten academic achievement and first grade positive social interaction skills and school engagement. Interestingly, children's preschool school engagement was a significant predictor of their first grade positive social interaction skills; however, the relation did not hold from preschool to kindergarten or from kindergarten to first grade. The most consistent pattern of relations was for positive social interactions skills on later school engagement that was present from preschool to kindergarten, kindergarten to first grade, and preschool to first grade.

This transactional model of development indicates that by the end of preschool children's positive social interaction skills, school engagement, and academic achievement are important predictors of their success in these same domains and in particular of their school engagement across the transition to kindergarten and first grade. Although speculative, these results suggest that successful interventions during Head Start focused on either positive social interaction skills or academic achievement could have lasting implications for these skills and children's school engagement in the early years of elementary school.

6.2. Positive social interaction skills and school engagement

Results of the longitudinal path analysis revealed significant direct associations from positive social interaction skills to school engagement from preschool to kindergarten, from kindergarten to first grade, and from preschool to first grade, as well as a direct association from school engagement to positive social interaction skills from preschool to first grade, above and beyond control variables and stability. These findings are consistent with previous correlational research of children in older grades (Birch & Ladd, 1996; Buhs & Ladd, 2001; Coolahan et al., 2000; Ladd & Burgess, 2001).Moreover, several researchers have found relations between positive social interaction skills and later school engagement (Birch & Ladd, 1996; Ladd et al., 1999; Ladd et al., 1997). This is the first study, however, to show bidirectional relations between positive social interaction skills and school engagement spanning preschool and elementary school. Results suggested positive social interaction skills consistently predicted changes in school engagement over time, and school engagement predicted positive social interaction skills over time (albeit less consistently). These bidirectional relations suggest that children's skill development in these two domains is intertwined. Although speculative, children's positive feelings toward school and their cooperative classroom involvement across the transition from the changing social ecologies of preschool to formal school may serve as protective factors in the development of new relationships with peers.

This study is also the first to examine the relations between positive social interaction skills and school engagement in a sample of low-income and largely Mexican/Mexican American Head Start children. Given that Head Start children typically attend low-quality elementary schools (Pigott & Israel, 2005), providing a targeted intervention during preschool may better prepare low-income, ethnic minority children for later success in school. The current findings suggest that interventions to improve positive social interaction skills and/or school engagement before, during, and after formal the formal school transition may propel positive development in both domains.

When examining descriptive statistics of the study variables it was notable that teachers rated Spanish-speaking and Hispanic children higher on positive social interaction skills and school engagement than their English- and non-Hispanic peers at each wave. These findings may support recent research showing that Hispanic children are socialized by their families in ways that provide a strong foundation for positive social behavior for children in school (Calzada, Fernandez, & Cortes, 2010). This early resilience in social skills and school engagement is worthy of further study.

6.3. Positive social interaction skills and academic achievement

In the present study, positive social interaction skills were not related to later academic achievement, and the lack of relations is consistent with other research examining the relations between children's social behaviors (defined more broadly) and academic achievement. For example, using six diverse samples, Duncan et al. (2007) showed that measures of socioemotional behaviors, including internalizing and externalizing problems and positive social interaction skills, were generally not related to later academic performance from preschool to kindergarten or beyond after controlling for prior levels of academic achievement (Duncan et al., 2007). Furthermore, Caemmerer and Keith (2015) found inconsistent evidence that children's positive social interaction skills (including an indicator of self-control) predicted academic achievement (i.e., literacy and math) across elementary and middle school. However, previous Head Start literature that utilized teacher reports of both positive social interaction skills and academic achievement, in models that did not account for prior levels of academic achievement, showed a strong link between positive social interaction skills and academic achievement (Bulotsky-Shearer et al., 2012; Hampton & Fantuzzo, 2003; Sekino, 2006).

Although positive social interactions skills were not significantly related to later academic achievement, preschool academic achievement was significantly predictive of kindergarten positive social interaction skills. Interestingly, studies of low-income elementary-aged children

have not supported the directional link from academic abilities to positive social skills (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Miles & Stipek, 2006; Wentzel, 1993). We suspect that the difference in findings between prior research and the current study are explained by differences in the ages of the children that were tested in our study versus earlier studies. In our study, younger children were assessed. Positive social interaction skills are likely more malleable when children are younger and during a critical transition period (Rimm-Kaufman & Pianta, 2000) as reputational bias and resistance to change are less entrenched. Preschool and early elementary school teachers are also more likely than teachers of students in older grades to emphasize the development of both positive academic and social interaction skills (NICHD, 2002; 2005). Given the expectations in kindergarten classrooms that students collaborate with peers to accomplish academic tasks, it stands to reason that children who are more academically skilled are likely better at supporting and engaging with their classmates during academic activities. In prior studies with elementary aged children, reputational biases were likely more entrenched so academic performance may not have been as influential in social interactions with peers.

6.4. School engagement and achievement

School engagement did not predict academic achievement at any wave. Our findings are somewhat surprising given previous research confirming longitudinal associations of children's school engagement on later academic achievement controlling for prior waves of academic achievement (Hughes & Kwok, 2007; Hughes et al., 2008; Iyer et al., 2010; Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006). In the current study, school engagement and academic achievement were significantly correlated within and across waves. However, when accounting for stability (prior levels of academic achievement) and other predictors/covariates of academic achievement (gender, age, initial verbal ability) that were not included as controls in earlier studies, neither positive social interaction skills nor school engagement were robust predictors of academic achievement. It may be that the relatively high rank-order stability of achievement, coupled with the associations with the control variables, left little variance to be predicted by positive social skill interactions or school engagement. Although positive social interaction skills and school engagement may be associated with academic achievement within the same school year, neither predicted change in achievement from one year to the next.

In addition to high stability in academic achievement, there are important differences between the current study and previous research linking school engagement and academic achievement that may have contributed to discrepancies between results. First, the previous research examined longitudinal relations for children in later elementary or middle school (Hughes & Kwok, 2007; Hughes et al., 2008; Iyer et al., 2010; Zimmer-Gembeck et al., 2006). Perhaps there is less variability in school engagement at younger ages because school is more 'fun' and thus relations are attenuated. Another possibility is that preschool teachers experience more difficulty rating children's engagement. Previous research examining validity of teacher's ratings has shown that preschool teachers' ratings had a lower association with children's observed skills and abilities than kindergarten teachers' ratings (Mashburn & Henry, 2004). In the current study, school engagement did not show stability from preschool to kindergarten. Preschool and kindergarten engagement were correlated; however, once other factors such as gender and language preference in kindergarten were considered, preschool teachers' ratings of school engagement were not significantly related to kindergarten teachers' ratings of school engagement. Although speculative, the environments of preschool compared to elementary school, may be different enough that children who enjoy and engage in one context might not necessarily enjoy and engage to the same extent in the other context.

The idea that the ethnic and linguistic-minority children in the current sample are rated as better students in terms of their interactions with peers and engagement in the classroom, despite their poorer performance on academic assessments, supports a relatively new area of research around the incongruence of behavior and achievement among Hispanic students (Hill & Torres, 2010). As Hill and Torres (2010) describe, Hispanic children tend to lag behind their ethnic majority peers academically despite the fact that Hispanic families view "educación" as encompassing more than academics and believe that they are responsible for developing moral, responsible, respectful, and well-behaved children, because these skills are the foundation for academic achievement. It is possible that the cultural view of education explains the higher positive social interaction skills and school engagement in the Hispanic subsample relative to the non-Hispanic sample.

6.5. Considerations and future directions

Although results revealed important significant relations between positive social interaction skills, school engagement, and academic achievement across the critical transition from Head Start to kindergarten and first grade, we acknowledge that there were aspects of the current investigation that need to be taken into account when assessing the value of this research. First, it is important to consider the current findings in light of the sample from which they were drawn. The majority of the Head Start children in this study were from low-socioeconomic Mexican or Mexican-American families (approximately 80%) and at least half of the children were dual-language learners. There is a need for understanding processes related to a successful transition to elementary school for Head Start children who are at-risk for academic failure both due to low-socioeconomic status or cultural/language issues (Fryer & Levitt, 2006; Hernandez, 2004; Oller & Jarmulowicz, 2007), and the combination of the two. However, teasing out the contributions that low SES and culture/language play in affecting children in Head Start is difficult, especially in the current study. For example, we identified and controlled for children's reported language preference. However, there are limitations with this method. First, a language screener would be a more accurate method to identify children's language abilities. Additionally, controlling for language preferences does not provide a lens for understanding how children's language influences their positive social interaction skills, school engagement, and academic achievement. More culturally sensitive research that carefully examines language is needed to examine these processes separately for dual-language learners. Thus, greater attention to explicating these influences is needed.

There are other directions for future research with samples of ethnically diverse Head Start children that should be noted. Specifically, collecting data on a broader range of child-, family-, and school-level characteristics could provide researchers with greater control over potential confounds unique to Head Start populations (Rauh, Parker, Garfinkel, Perry, & Andrews, 2003). For example, in the current study, examining cultural factors (e.g., parental beliefs, acculturation) that may influence children's experiences across the transition to formal school may have improved our understanding of the developmental processes at play for the Mexican/Mexican-American populations within Head Start (Garcia Coll et al., 1996). Furthermore, although diverse populations create methodological challenges, the presence of diversity in Head Start classrooms is also likely a strength that may contribute to enhanced outcomes for children and families in Head Start. Exposure to diverse peers and cultures can enhance, under the right conditions, social resilience and promote positive school climates. For example, in older children, greater ethnic diversity and cross-ethnic friendships for older children have been related to psycho-social and academic benefits (Graham, Munniksma, & Juvonen, 2013; Newgent, Lee, & Daniel, 2007). Given this, the examination of the potential positive benefits of classroom diversity in Head Start seems an important next step.

Future research should widen the range of measures examined to include other important characteristics of success across the transition to school, such as children's effortful control, problem solving, motivation, grit, or relationships with teachers (Greenberg et al., 2003). For example, research by Hughes and colleagues suggest that school engagement mediates the relation between teacher-child relationships and later academic achievement (Hughes et al., 2008). Teacher-child relationships are also related to children's positive interactions with peers (Curby, Brock, & Hamre, 2013; Howes & Hamilton, 1993). Furthermore, individual differences in children's effortful control, or their ability to voluntarily manage attention and inhibit behavior, have been found to be related to positive social interaction skills, school engagement, and academic achievement (see Eisenberg, Valiente, & Eggum, 2010; Valiente, Lemery-Chalfant, & Castro, 2007). Thus, it is possible that teacher-child relationships and effortful control are variables which account for observed relations between positive interaction skills, school engagement, and academic achievement. Thus, considering a broader range of measures would allow for a more comprehensive explanation of how positive social interaction skills, school engagement, and academic achievement interact as Head Start children transition to elementary school.

Future research should also consider other forms of measurement of children's positive social interaction skills, school engagement, and academic achievement. Research has shown that 15% to 30% of the total variance in preschool teachers' ratings of children's behavior was attributed to mean differences between raters (Mashburn, Hamre, Downer, & Pianta, 2006). The current study made efforts to control for potential reporter bias by children's including preschool teacher as a covariate; however, research that utilizes observational measures of children's positive social interaction skills and school engagement would help to determine if these trends are upheld, regardless of reporter. Future research could explore both emotional (i.e. feelings toward school) and behavioral (i.e., academic compliance) engagement as unique constructs. Additionally, the current study collapsed the social interaction and academic achievement subscales; however, it may be important to examine positive social interaction skills and negative social behaviors, and language, literacy, and mathematics separately. Although not hypothesized in this study, it may be that the different sub-domains tapped by our larger composites are associated with different explanations for the associations among the variables studied. For example, certain academic skills (e.g., language development) are more closely related to children's successful interactions with peers and school engagement than other skills (Palermo & Mikulski, 2014). Our sample size did not support examination of such nuanced hypotheses.

6.6. Conclusions and implications for practice

Head Start is the largest federally-funded early childhood education program serving at-risk children in the United States; therefore, understanding the relations between positive social interactions skills, school engagement, and academic achievement has potential to influence many children. The current study confirms that Head Start children who were both socially and academically better prepared to start formal school were rated by their kindergarten teachers as enjoying school more and being more engaged in classroom activities than their less socially and academically prepared peers. Moreover, our analysis suggests that children's positive social interaction skills and school engagement are related to one another concurrently and there are some significant relations over time for these at-risk children. Children's academic achievement also influenced school engagement indirectly through positive social interaction skills. Thus, findings suggest that positive social interaction skills, school engagement, and academic achievement are related across the transition to formal school.

Findings from the present study have important policy implications for Head Start programs, as well as practical implications for educators and school psychologists. Specifically, these findings highlight the importance of developing positive social interaction skills because these skills set the stage for and relate to how much children enjoy school and engage in kindergarten and first grade classrooms. Currently, curriculum in Head Start programs focuses on development of the "whole child" and emphasizes developing children's social skills in addition to their academic skills (Zigler & Bishop-Josef, 2006). Yet, kindergarten and first-grade curricula are characterized by a downward shift of academic instruction and a significant reduction in opportunities for learning through social interaction with peers (Stipek, 2006). Because children who display positive social interactions skills also demonstrate positive school engagement behaviors, Head Start and elementary school teachers should incorporate instructional activities that promote positive peer interaction skills such as cooperation, prosocial play, and peer negotiation techniques.

Given that kindergarten teachers identify poor school engagement as a primary factor associated with a difficult transition to school (Rimm-Kaufman & Pianta, 2000), the current findings also highlight the importance of assessing children's positive social interaction skills in addition to academic achievement as a marker of school readiness. Public discourse and policy in early education have devoted considerable attention to identifying aspects of children's performance that likely lead to success in formal school. The current research suggests that policy needs to be developed concerning the inclusions of positive social interaction skills in kindergarten readiness assessments. Furthermore, school psychologists should attend to children's positive social interaction skills as a potential precursor of school engagement and a successful transition to formal school.

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