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LEARNING-RELATED SOCIAL SKILLS AS A MEDIATOR BETWEEN TEACHER INSTRUCTION AND CHILD ACHIEVEMENT IN HEAD START

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Abstract

Using a subsample of the Family and Child Experiences Survey (FACES) 2006, this study examined the associations between the amount of teacher instruction in 292 Head Start classrooms with changes in young children's ($n = 936$) early academic achievement and learning-related social skills from ages 3 to 5. In general, during the early years, children exhibited relatively stable academic and learning-related social skills. Although the amount of teacher instruction did not predict children's short-term academic growth directly, it did predict it indirectly through improvements in learning-related social skills, with benefits lasting through the end of kindergarten. These findings demonstrate that gains in children's learning-related social skills may be necessary before academic gains can be realized.

Keywords

learning-related social skills; academic achievement; teacher instruction; Head Start

The foundations of children's academic success are formed at a very young age, well before entry into the public school system (Duncan & Magnuson, 2005). During the preschool years, children exhibit a wide range of early academic and social abilities, with children from low-income families disproportionately represented among those who struggle with early learning (Duncan & Magnuson, 2005). Policymakers have long considered large-scale early education programs, like Head Start, as one means of minimizing early gaps in achievement and learning-related social skills between children from low-income and high-income families.

Within preschool programs and especially within Head Start, there has been growing emphasis on the role of teachers in promoting children's early school success. Researchers and policymakers have often emphasized the importance of teachers' level of education and years of experience as key determinants of children's school readiness (Loeb, Fuller, Kagan, & Carrol, 2004; NICHD ECCRN & Duncan, 2003). Emerging studies, however, have begun to question how predictive such factors are of children's early skill growth given recent

evidence that teacher educational degree alone does not predict greater gains in children's early school success (Early et al., 2006, 2007; Pianta et al., 2005). Accordingly, there have been calls in the literature for research to focus on more specific process measures, including what teachers are actually doing in classrooms (Howes et al., 2008; Justice, Mashburn, Hamre, & Pianta, 2008; Pianta et al., 2005).

Teacher instruction, namely the amount of time teachers spend teaching academic content, has been identified as a key determinant of achievement gains in preschool and kindergarten, such that children exposed to more frequent instruction exhibit greater skill growth (Connor, Morrison, & Slominski, 2006; Crosnoe & Cooper, 2010; Xue & Meisels, 2004). Moreover, researchers have found that when at-risk children experienced high-levels of classroom instruction, they displayed academic skills that were similar to their low-risk peers (Hamre & Pianta, 2005). Thus, children who experience more frequent instruction are more likely to succeed upon elementary school entry than children who experience less frequent instruction (Howes et al., 2008), especially children who are considered to be at-risk. It is important to note, however, that there remains great variability across preschool classrooms with regard to children's exposure to instructional activities and that many children do not receive high levels of instructional time (Burchinal et al., 2008; Connor et al., 2006; Justice et al., 2008).

Two recent studies, however, have led to some uncertainty about the role of instruction in promoting children's academic skills. Specifically, analyses of the Family and Child Experiences Survey-2006 (FACES 2006), a nationally representative longitudinal study of children enrolled in Head Start, revealed that teacher instruction was *not* associated with gains in children's early academic skills across the Head Start year (Hindman, 2013; Hindman & Wasik, 2013). Although this finding is puzzling, it may point to the fact that young children may need to master learning-related social skills before they can attend to and learn from their teachers' lessons. In other words, they need to learn *how* to learn in a structured environment. If children cannot sit still or take turns, they will have difficulty learning when teachers provide instruction to an entire class. Learning-related social skills, which involve the ability to self-regulate and to get along with others, have been identified as necessary prerequisites for learning in the early years (Denham, 2006; McClelland et al., 2007; Raver, 2003; Snow, 2006).

Support for the importance of fostering learning-related social skills in early childhood settings comes from preschool teachers' reports that children's behaviors are their greatest challenge in the classroom (Arnold, McWilliams, & Arnold, 1998). It is also the case that children with stronger learning-related social skills demonstrate greater future academic success (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Denham et al., 2012; Fantuzzo et al., 2007; McClelland Acock, & Morrison, 2006; McClelland et al., 2007). Given the associations between learning-related social skills and later academic skills, it is likely that these two sets of skills operate reciprocally, with early academic skills also fostering later learning-related social skills. Much of the work in early childhood, however, focuses on the role of learning-related social skills in facilitating later learning (e.g., Denham et al., 2012; McClelland et al., 2007; Raver et al., 2011), with less empirical attention on the role of academic achievement in facilitating learning-related social skills.

Therefore, understanding the magnitude of these relations is necessary, especially during the initial stages of academic development for at-risk preschoolers (Arnold et al., 2012).

Although we know that teachers can promote children's learning-related social skills (e.g., Raver et al., 2008) and that these behaviors are malleable, it remains less clear whether teachers' instructional practices have ramifications for young children's learning-related social skills. During these early years, teacher instruction tends to be socially engaging and activity-based with an emphasis on interactive and cooperative group play (Connor et al., 2006; Ladd, Herald, & Kochel, 2006). Vygotsky's (1978) theory and Bronfenbrenner's (2005) bio-ecological theory both emphasize that children learn through interactions with their social environment and such interactive and engaging activities are important for fostering children's learning-related social skills. The constructivist approach to early learning suggests that children are active agents in their own development and, therefore, the more opportunities teachers provide children to develop early academic and learning-related social skills, the more likely they are to succeed (e.g., developmentally appropriate practice; Copple & Bredekamp, 2009).

Why should the amount of teacher instruction predict changes in learning-related social skills? We propose that teacher instruction during these early years teaches children skills such as how to attend to lessons, how to take turns, and how to ask questions—in short, how to learn—in addition to academic content. Teachers can use these instructional activities, as “teachable moments” where they can help children manage their frustration and take turns. Teachers can also facilitate problem resolution with children as conflicts arise, and during periods of group play, teachers can invest in children's social cooperation. Indeed, instruction during these early years is often through play (Connor et al., 2006; Ladd et al., 2006) and these early activities provide children the time to socialize with each other, and by working with one another, children learn social rules such as: waiting, taking turns, cooperation, sharing, and using language skills to resolve conflict (instead of hitting or yelling). Thus, not only can these instructional activities promote children's immediate academic achievement, but these early investments can also facilitate social development. Once these early skills have been established, then children may experience later gains in their achievement (Ladd et al., 2006; Raver, 2003). In other words, even if teacher instruction does not appear to be associated with learning in the short-term (e.g., Hindman, 2013; Hindman & Wasik, 2013), it may set the foundation for later learning by improving learning-related social skills (Heckman & Kautz, 2012).

Research Questions and Hypotheses

In this paper, we consider the possibility that children may need to develop learning-related social skills within the context of Head Start before they can advance in their academic skills. We also consider whether amount of instruction in early childhood settings may serve the secondary goal of promoting learning-related social skills that will promote later learning more than it serves the primary goal of promoting academic skills, and that by promoting learning-related social skills, instruction may indirectly facilitate later academic achievement. We used cross-lagged panel analysis with data from a nationally representative sample of Head Start children to test three research questions: 1) Does children's early

learning-related social skills predict gains in their academic achievement over time?, 2) Does children's academic achievement predict gains in their learning-related social skills?, and 3) Does the amount of math and literacy instruction provided by Head Start teachers have indirect effects on gains in children's achievement through improvements in their learning-related social skills?

We hypothesized that children's learning-related social skills would predict more optimal academic achievement and children's achievement would predict stronger learning-related social skills over time (Fantuzzo et al., 2007; McClelland et al., 2007). We knew from prior research with this dataset that greater instructional time did not directly predict short-term improvements in children's academic achievement (Hindman, 2013; Hindman & Wasik, 2013), but based on arguments that early learning-related social skills are the foundation of later learning (Ladd et al., 2006; Raver, 2003), we hypothesized that there might be an indirect effect of amount of instruction on achievement that is mediated through improvements in children's learning-related social skills. It may be a case of suppression (Hayes, 2009; MacKinnon, Krull, Lockwood, 2000), such that teacher instruction reduces other sets of behaviors that, in turn, increase children's achievement. Furthermore, if the effects of teacher instruction on children's academic achievement are *only* delivered through learning-related social skills, traditional tests for mediation would overlook this key mediating pathway.

To test these research questions, we first examined the transactional relations between children's learning-related behaviors and academic skills across four waves of data. We then examined associations between amount of instruction in each Head Start year and gains in children's academic and learning-related social skills. In order to test these relations longitudinally, we focused on the 3-year-old cohort of FACES 2006 in this study. To be confident that we are isolating the role of instruction specifically and not other aspects of the classroom or teachers' overall style, we control for teachers' initial sensitivity and responsiveness as well as classroom and instructional quality.

Method

Participants

This study used data from FACES 2006, a national probability sample of 2,020 3-year-old children who were newly enrolled in Head Start classrooms across the country in the fall of 2006 (for information on sampling see: West et al., 2010). For this study, we restricted our sample to those children who had a valid longitudinal weight and experienced two years of Head Start ($n = 1,203$) in order to best examine these dynamic and longitudinal processes over a two-year period (data were not collected on individuals who left the program). Further, we excluded children who changed language of assessment (e.g., Spanish at one point and English at another; $n = 267$) given measurement issues as these children might demonstrate smaller gains that are indicative of their limited "English" language skills. These restrictions resulted in a sample of 936 (50% male) children and families enrolled in 292 Head Start classrooms with an average of three to four children nested within each class (see Table 1 for weighted descriptives).

FACES 2006 gathered data from a combination of sources, namely direct child assessments, parent and teacher-self reports, and classroom observations. Children and families were followed over the course of 33 months from the start of their first Head Start year through the end of kindergarten, yielding four assessments: fall of the 3-year-old preschool year (2006), spring of the 3-year-old preschool year (2007), spring of 4-year-old preschool year (2008), and spring of kindergarten (2009). During the first Head Start year children were, on average, 3 years and 4 months and due to Head Start eligibility criteria, nine in ten children (87%) were living at or below 185% of the federal poverty line. The majority of children were either Black (40%) or Latino (27%) with a smaller portion identifying as White (23%) or other (e.g. Asian, American Indian; 10%). Approximately seven in ten children came from single-parent households (66%) whereas one in three children had mothers who had yet to receive a high school diploma (33%). In general, our measures for family demographics were fairly stable across time, but to ensure that we rule out potential family- or individual-level confounds, we include these demographic characteristics as time-varying covariates in the analyses below.

Measures/Procedures

Literacy and math instruction—In the spring of each Head Start year, teachers reported on how often they engaged in instructional practices over the previous year for both literacy (11 items) and math (10 items) instruction on a 6-point Likert scale (1 = never; 2 = once a month or less; 3 two or three times a month; 4= once or twice a week; 5= three or four times a week; 6= every day). The full list of items and their descriptives are available in Table 2. This approach to assessing frequency of instruction has been commonly used in the literature (Crosnoe, 2012; Crosnoe & Cooper, 2010; Hindman, 2013; Hindman & Wasik, 2013; Xue & Meisels, 2004). We followed past conventions of creating teachers' instructional practices from the FACES data (Hindman 2013; Hindman & Wasik, 2013) and averaged each set of items to create a composite score (literacy instruction, $\alpha = .81$; math instruction, $\alpha = .77$). The literacy and math instruction variables were strongly correlated across both years ($r_s = .65$); thus, they were used as indicators of a single latent factor of teacher instruction in the models below. On average, teachers tended to deliver math and literacy instruction three-to-four days per week ($M = 5.15-5.37$, $S.D. = .55-.63$, Range = 1–6). Although there was variation across centers in teachers' reported instructional practices, most centers had teachers who reported weekly instruction, with a few reporting less frequent practices. Despite the fact that most teachers endorsed these activities, these instructional measures were not skewed (skew ranged from -1.09 to $-.70$ across the measures) as there was considerable variability in the number of teachers who reported providing instruction once or twice a week, three-to-four times a week, or every day.

Children's academic achievement—Children's literacy skills were assessed in the fall and spring of the first Head Start year and the spring of each following year using the *Peabody Picture Vocabulary Test* (PPVT; Dunn & Dunn, 1997). Spanish-speaking children were administered both the PPVT and the *Test de Vocabulario en Imágenes Peabody* (TVIP; Dunn, Padilla, Lugo, & Dunn, 1986); however, we used the TVIP for these children ($n = 138$) as these are better indicators of children's language skills, whereas the English assessments may capture children's limited "English" language skills. Both versions are

norm-referenced and have strong published reliabilities ($\alpha = .89$ to $.97$; West et al., 2010). All children were also assessed using the Woodcock Johnson III (WJ-III; Woodcock, McGrew, & Mather, 2001) to measure their literacy skills (Letter Word and Spelling Word) and math skills (Applied Problems). The Woodcock Johnson is also a norm-referenced assessment with strong published reliabilities ($\alpha = .79$ to $.90$; West et al., 2010). Spanish-speaking children who did not pass a language screener were assessed using the Spanish version of the Woodcock Johnson, the *Woodcock-Muñoz* (W-M III; Woodcock & Muñoz-Sandoval, 1996). The *Story and Print Concepts* task (Mason & Stewart, 1989) was administered to evaluate children's comprehension of basic story concepts and knowledge of how print is used to convey meaning ($\alpha = .70$ to $.78$; West et al., 2010). Finally, children's math skills were also evaluated with nationally normed assessments that were developed for the Early Childhood Longitudinal Study, Birth Cohort (Snow et al., 2007). This assessment has demonstrated strong reliability ($\alpha = .81$ to $.91$; West et al., 2010) and was used to evaluate children's classification, comparison, pattern, and shape recognition skills.

Children's learning-related social skills—Teachers provided reports of children's learning-related social skills in the fall and spring of the initial Head Start year and subsequently in the spring of the following two years. Assessment items were drawn from the *Behavioral Problems Index* (BPI; Peterson & Zill, 1986), the *Preschool Learning Behaviors Scale* (PLBS; McDermott, Green, Francis, & Scott, 2000), and the *Personal Maturity Scale* (PMS; Alexander, Entwisle, Blyth, & McAdoo, 1988); all items were rated on a 3-point Likert scale (1 = never, 2 = sometimes, 3 = very often). We reverse coded the BPI for consistency and, thus, higher scores represented more optimal skills across each assessment. Fourteen items from the BPI were used to create a composite for **behavioral and attentional control** (low aggressive behavior, low hyperactive behavior, and low anxious/withdrawn behavior). Twenty-nine items from the PLBS were also combined into a composite variable of **positive learning behaviors** (motivation, persistence, and attitudes toward learning). Twelve items from the PMS were used to tap children's **engagement in learning**, namely interest and participation in classroom activities and cooperation and compliance with teacher directions. Within the FACES 2006 sample, all three scales have been found to have high internal consistency ($\alpha = .85$ to $.92$; West et al., 2010). Although these skills encompass a wide variety of capacities that can be broken down further into more narrowly defined constructs, we treat these as an overall latent measure of learning-related social skills for three reasons: 1) the three subscales were strongly correlated, ($r_s = .60$ – $.87$), 2) at the broadest level, each of these learning-related social skills have been found to have important ramifications for early achievement (Arnold et al., 2012; Berhenke, Miller, Brown, Seifer, & Dickstein, 2011; McClelland et al., 2006), and 3) this latent construct closely matches work done in the economic literature on non-cognitive skills (Heckman & Kautz, 2012).

Child and family covariates—During the Head Start years, parent interviews were conducted to gather information on children and their families, including parents' age, highest degree attained, employment status (full-time, part-time, not employed), marital status (not two parent household, not married, married), family income, family size, and

household language (English or Spanish/Other). Families also provided information on their children's ages (in months), gender, and race (White, Latino, Black, Other).

Teacher covariates—During interviews at the beginning of the first school year, and subsequently, during the spring of each of the following years, teachers reported their own demographic and job/classroom characteristics (see Table 1 for a full list). In order to isolate the role of teacher instruction over and above their overall approach to teaching, we controlled for the sensitivity and responsiveness of teachers as rated during the spring of the first year by trained observers using the Arnett Caregiver Interaction Scale (Arnett, 1989; $\alpha = .94$). We also controlled for overall classroom quality as rated by observers using the Early Childhood Environment Rating Scale-Revised Edition (ECERS-R, $\alpha = .92$; Harms, Clifford, & Cryer, 2005) and classroom instructional quality using the Instructional Support domain of the Classroom Assessment Scoring System (CLASS, $\alpha = .79$; Pianta, La Paro, & Hamre, 2008). Note that observational quality data were only collected during year one.

Results

Measurement Model

Before addressing our research questions, we first wanted to ensure that our proposed latent factors were reliable constructs. We tested a single measurement model using the *Mplus* program (Muthén & Muthén, 1998-2013) for the ten latent variables: teacher instruction (Spring Age 3, Fall Age 4) and children's achievement and learning-related social skills (Fall Age 3, Spring Age 3, Spring Age 4, Spring Age 5). All models included: 1) full-information maximum likelihood estimation to account for missing data (5–10%), 2) the clustering of variables (TYPE = COMPLEX) to account for shared variances (intraclass correlations = .03–.21), and 3) a longitudinal weight (PRA16WT) to account for sampling stratification and non-response among those selected.

All latent factor loadings were statistically significant ($p < .001$) and were comparable across time (see Table 3 for factor loadings and mean child scores on assessments). The final measurement model indicated good fit: Comparative Fit Index (CFI) = .96, Root-Mean Square Error of Approximation (RMSEA) = .03, Standardized Root-Mean-Square Residual (SRMR) = .05, and $\chi^2 (df = 635) = 1141.07$, $p < .001$ when compared to the standards recommended by Hu and Bentler (1998; CFI > .90; RMSEA and SRMR < .05).

Cross-Lagged Models

The fit for the final hypothesized model (depicted in Figure 1) was also good: CFI = .90, RMSEA = .03, SRMR = .05, and $\chi^2 (df = 2041) = 3861.37$, $p < .001$. To address our first research question, we examined the interrelations of children's learning-related social skills and academic achievement across time using a cross-lagged panel design. A benefit of cross-lagged models is that they allow the prediction of change in child outcomes above and beyond children's initial levels through auto-regressive pathways (Selig & Little, 2011). Results from these analyses revealed that learning-related social skills at entry to Head Start (Fall of Age 3) did not predict gains in achievement from Fall to Spring of that year. Children's learning-related social skills at the end of the first Head Start year, however, did

predict gains in academic achievement through the end of the second Head Start year ($\beta = .11, p < .001$). There was, again, no association between learning-related social skills at the end of the second Head Start year and gains in academic achievement through the end of kindergarten. To test for longitudinal associations between learning-related social skills and kindergarten achievement (i.e., mediation) we used the INDIRECT command in the *Mplus* program (Muthén & Muthén, 1998-2013). Results from these analyses suggested that the associations between learning related social skills at the end of the first Head Start year and kindergarten achievement were mediated through achievement at the end of the second Head Start year (age 3 learning-related social skills $\rightarrow$ $\uparrow$ age 4 achievement $\rightarrow$ $\uparrow$ age 5 achievement; $\beta_{indirect} = .08, p < .001$).

We also found evidence that children's academic achievement led to increases in their learning-related social skills over time. Children's academic achievement predicted improvements in their learning-related social skills between the end of the first Head Start year (Spring of Age 3) and the end of the second Head Start year (Spring of Age 4; $\beta = .18, p < .001$), as well as between the end of the second Head Start year (Spring of Age 4) and end of kindergarten ($\beta = .32, p < .001$). We again found an indirect link revealing that academic achievement at the end of the first Head Start year indirectly predicted end of kindergarten learning-related social skills (age 3 achievement $\rightarrow$ $\uparrow$ age 4 learning-related social skills $\rightarrow$ $\uparrow$ age 5 learning-related social skills; $\beta_{indirect} = .06, p < .001$).

We next turned to the role of the amount of teachers' instruction in facilitating both learning-related social skills and academic achievement. As was reported by Hindman and colleagues (Hindman, 2013; Hindman & Wasik, 2013), there were no short-term direct associations between amount of teacher instruction and children's academic skills. We did, however, find that greater frequency of instruction during children's 3-year-old year was predictive of increases in their learning-related social skills from Fall to Spring of that year ($\beta = .13, p < .01$), with benefits persisting through the second year of Head Start (instruction $\rightarrow$ $\uparrow$ age 3 learning-related social skills $\rightarrow$ $\uparrow$ age 4 learning-related social skills; $\beta_{indirect} = .06, p < .01$) and the end of kindergarten (instruction $\rightarrow$ $\uparrow$ age 3 learning-related social skills $\rightarrow$ $\uparrow$ age 4 learning-related social skills $\rightarrow$ $\uparrow$ age 5 learning-related social skills; $\beta_{indirect} = .02, p < .05$). A similar mediational pathway was not found for amount of teacher instruction during children's 4-year-old year to kindergarten outcomes.

Although we did not find direct effects of the amount of teacher instruction on children's achievement, there is the possibility of mediation even without the direct relation between the two, in part because detection of both direct and indirect effects can be difficult in models that include autoregressive paths (Hayes, 2009; MacKinnon et al., 2000). Accordingly, we examined whether the influence of instructional time in children's 3-year-old year on their achievement at ages 4 and 5 was mediated through improvements in their learning-related social skills at age 3 (instruction $\rightarrow$ $\uparrow$ age 3 learning-related social skills $\rightarrow$ $\uparrow$ age 4 achievement $\rightarrow$ $\uparrow$ age 5 achievement). After adjusting for covariates and all other variables, we found that the associations of teacher instruction with children's achievement at ages 4 and 5 were in fact mediated by children's learning-related social skills. Although indirect estimates were small ($\beta_{indirect} = .01, p < .05$, for both age 4 and age 5 achievement),

these results do reveal that the benefits of teacher instruction for children's achievement may be delivered through improvements in their learning-related social skills.

As a final check on these associations, we examined whether teachers' instructional time only promoted children's academic achievement in higher quality classrooms by testing whether classroom quality moderated the link between instructional time and children's development. We tested this in two ways: 1) by creating a latent construct of classroom quality (ECERS-R and Arnett) and 2) treating each dimension of quality as individual constructs. In each case, however, there was no evidence for moderation; therefore, the link between teachers' instructional practices and child outcomes did not vary according to these quality factors.

Discussion

Children from low-income families, on average, enter kindergarten less prepared to learn than their higher-income peers, especially in areas of early academic achievement (Duncan & Magnuson, 2005); accordingly, continued research is necessary to shed light on the processes by which we can help minimize the achievement gap between poor and non-poor children. Indeed, there is an abundance of literature revealing that quality (both structural and process) preschool programs foster children's early school success (Burchinal et al., 2008; Dearing, McCartney, & Taylor, 2009), yet it is unclear whether the quantity of instruction promotes children's early skill growth, particularly when it comes to children's non-cognitive abilities. When looking within early education programs, most of the prior literature and recent policy efforts have focused on teachers' educational attainment and qualifications (Loeb et al., 2004; NICHD ECCRN & Duncan, 2003), but there remains little information on teacher's instructional time and those investigations that exist, at least in the Head Start literature, are not promising (see, Hindman, 2013; Hindman & Wasik, 2013). Thus, the current investigation responds to two recent studies that found that teachers' instructional time in Head Start did not promote children's academic skills (Hindman, 2013; Hindman & Wasik, 2013). We extended this literature by examining whether teachers' instructional practices predict changes in children's achievement as well as their learning-related social skills over the course of early childhood, either directly or indirectly.

In this study, we found that 3-year-old children's learning-related social skills at the end of the first Head Start predicted improvements in their academic achievement through the next year directly and at the end of kindergarten indirectly. These results highlight that learning-related social skills are important precursors to children's later academic achievement, which is consistent with the existing literature emphasizing a more holistic approach to studying school readiness (Denham et al., 2012; Raver, 2003; Raver & Knitzer, 2002; Snow, 2006). The fact that these associations were found only for learning-related social skills at age 3, and that they persisted through to kindergarten, point to the importance of fostering learning-related social skills early in a child's development. Early interventions that target learning-related social skills as early as possible may be best able to facilitate academic learning, especially during the critical transition to kindergarten.

As did Hindman and colleagues (Hindman, 2013; Hindman & Wasik, 2013) with the same dataset, we found that instructional practices did not directly predict the short-term academic performance of Head Start children. Although difficult to explain, it may be that our sample of low-income children were not equipped with the behavior skills necessary to benefit from instructional activities. This notion is supported by studies that suggest that at-risk children are less likely to benefit from instructional time than their low-risk peers (Sonnenschein, Stapleton, & Benson, 2010). It might also be that the restricted variability in the instruction measure inhibited our ability to find associations with child achievement. Our null findings may have also resulted because children in this sample displayed fairly stable academic skills. Considering that children are less likely to experience change in these early skills indicates that interventions prior to age 3 might be necessary, especially for children who are behind. Even so, it is encouraging that most preschool teachers provide young children ample opportunities to practice early math and literacy skills (three-to-four days a week). Finally, although we know how frequently teachers engaged in these activities, we do not know the quality of how they engaged children in academic learning. The question of how, rather than merely whether, teachers provide instruction has been a part of a broader debate in the field of early childhood education regarding the need for developmentally appropriate practices (Copple & Bredekamp, 2009). It may be that Head Start teachers could benefit from training in developmentally appropriate forms of instruction, a possibility that is an important topic for future research.

We did, however, find that greater teacher instruction predicted improvements in learning-related social skills within the 3-year-old year, even when controlling for classroom quality and teacher and child covariates. Once these skills were established, children were then able to experience gains in their achievement by the end of their 4-year-old year, which in turn, persisted through the end of kindergarten. This effect of early instruction on children's learning-related social skills also led to indirect improvements in age 4 and kindergarten learning-related social skills. That is, during each of these instructional activities, which often involve interactive and group play (Connor et al., 2006; Ladd et al., 2006), children were actively developing learning-related social skills such as waiting, taking turns, sharing, and using language skills to resolve conflict—the very skills that are necessary for later academic success (Raver, 2003). Although these instructional activities may not have explicitly emphasized children's learning-related social skills, the more teachers engaged in these activities, the more likely children were to learn these behaviors. Thus, although our findings are consistent with prior analyses of Head Start classrooms suggesting that teacher instruction does not directly promote children's academic skills (Hindman, 2013; Hindman & Wasik, 2013), our findings do reveal that instructional time can be one important means of fostering children's learning-related social skills. These findings also support arguments from the economic literature that soft skills (i.e., learning-related social skills) are necessary for future academic and life success (Heckman & Kautz, 2012). Given the continued expansion of preschool programs across the country, the current findings have important policy implications, suggesting that teachers' instructional time serves as an important component of successful early education programs.

Results from the current investigation also suggest that future studies that examine instructional practices should examine their effects longitudinally and with children's

learning-related social skills as a possible mediator. In other words, during these early years, teachers' instructional practices can have cross-domain benefits for children, which is an area of inquiry that has received little empirical attention. Future research should also examine other moderators and mediators of these relations, which might help explain why there are few direct effects of teachers' instructional practices on children's achievement. It might be that children who enter Head Start with greater academic or social abilities benefit more from early instruction or that children who enter school with the poorest academic and learning-related social skills make greater strides. Such possibilities warrant continued attention. Finally, these analyses reiterate the importance of testing for mediated effects, even in the absence of direct effects (Hayes, 2009).

Although we used a large and longitudinal dataset to examine the effects of teachers' instructional time on an understudied and diverse sample of children, there are a few limitations to this study. First, the FACES sample consisted of children and families who were living in poverty and although representative of children enrolled in Head Start, the sample was not nationally representative of all preschool-age children. Likewise, we dropped children who switched language of assessment from our analyses and, therefore, our findings might not generalize to those children who are considered to be dual language learners. We were also limited to teacher self-reports, which was the basis for our factors of teacher instruction and of children's learning-related social skills; thus, our factors share method variance that may have inflated the observed associations. For the range of teacher practices covered in the current investigation, however, it is unlikely that brief observations can capture this range and, thus, the best reporters may in fact be teachers themselves. Indeed, self-reported instructional frequency has been commonly used in the existing literature (Crosnoe, 2012; Crosnoe & Cooper, 2010; Hindman 2013; Hindman & Wasik, 2013; Xue & Meisels, 2004).

Further, our self-reported measures of teacher instruction may be indicators of a third variable, such as being a good teacher overall, that may account for the associations between instruction and children's learning-related social skills; however, this possibility is minimized in the current study because we controlled for teachers' sensitivity and responsiveness as well as classroom and instructional quality. Moreover, the correlations between our instructional measure and teacher/classroom quality was small in size (absolute value $r_s = .03$ to $.10$) as were the correlations between instructional time and our teacher/classroom covariates (absolute value $r_s = .05$ – $.23$); therefore, we can be fairly confident that our instruction measure is distinct from teachers' overall teaching style and instructional quality. Finally, in this study we examined the relation between more global estimates of children's academic achievement and learning-related social skills. Future studies could examine the interrelations among these learning-related social skills (i.e., behavioral and attentional control, positive learning behaviors, engagement in learning) to determine if they serve as unique mediators between teacher instruction and children's academic achievement..

With these limitations in mind, our findings contribute to a better understanding of the role of teachers' instructional time in promoting children's early academic and learning-related social skills. Although exposure to instruction might not be an optimal or sufficient process

for improving children's immediate math and literacy skills (Hindman, 2013; Hindman & Wasik, 2013), it may represent an avenue for improving children's learning-related social skills, which in turn supports the growth of low-income children's academic success. The implications of our findings are that efforts to facilitate young children's achievement must also address learning-related social skills, and that teacher instruction may be an important avenue for doing so.

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Figure 1.

Observed model for the influence of the amount of teacher instruction on children's early achievement and learning-related social skills from children's 3-year-old preschool year to kindergarten. Note. Standardized direct path coefficients are shown; dashed paths were not significant whereas bolded paths were significant. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Table 1

Weighted Description of Sample.

	Percent or Mean (Standard Deviation)		
	Head Start		Kindergarten
	Fall, Year 1 (Age 3)	Spring, Year 2 (Age 4)	Spring, Year 3 (Age 5)
Child and family information			
Child race			
Black	39.9	-	-
Latino	27.4	-	-
White	23.2	-	-
Other	9.5	-	-
Child gender			
Female	49.9	-	-
Child age (months)	40.87 (3.65)	-	-
Father's age	32.20 (7.58)	-	-
Mother's age	28.62 (6.00)	-	-
Father's education			
Less than a H.S. diploma	38.6	-	-
H.S. diploma	36.3	-	-
Some college	17.5	-	-
Bachelor's degree or more	7.6	-	-
Mother's education			
Less than a H.S. diploma	33.1	-	-
H.S. diploma	32.5	-	-
Some college	28.2	-	-
Bachelor's degree or more	6.2	-	-
Parent marital status			
Married	34.2	32.0	-
Not married	17.2	22.0	-
Not two parent household	48.6	46.0	-
Mother's employment status			
Full-time	31.4	35.2	34.2
Part-time	23.4	23.6	23.6
Unemployed	45.2	41.2	42.2
Father's employment status			
Full-time	72.7	70.1	66.9
Part-time	11.1	10.5	8.7
Unemployed	16.2	19.4	24.4
Household size	4.50 (1.51)	4.80 (1.60)	4.93 (1.59)
Ratio of income to poverty	2.72 (1.43)	2.79 (1.54)	2.95 (1.62)
Teacher/classroom information			

	Percent or Mean (Standard Deviation)		
	Head Start		Kindergarten
	Fall, Year 1 (Age 3)	Spring, Year 2 (Age 4)	Spring, Year 3 (Age 5)
Teacher's education			
High school diploma	4.5	4.2	0.0
Some college or less	15.6	12.2	0.0
Associate's degree	43.5	46.6	0.0
Bachelor's degree	30.7	30.3	25.5
MA or graduate school	5.7	6.7	74.5
Teachers' experience	11.65 (7.33)	11.41 (7.41)	14.10 (9.10)
Class size	17.57 (2.17)	18.11 (1.98)	19.84 (4.50)
Child-teacher ratio	9.34 (2.89)	9.07 (1.79)	13.98 (5.94)
Teachers' responsiveness (Arnett) ^a	65.98(9.84)	-	-
Instructional quality (CLASS) ^a	1.92 (.86)	-	-
Classroom quality (ECERS) ^a	3.58 (.58)	-	-

Note. There is no sample description of the spring of children's 3-year-old year because children were still in the same classrooms.

^a Measures were only measured during year 1.

Table 2

Weighted Descriptives for Teacher-Reported Mathematics and Literacy Instruction Items

<i>Descriptive Statistics</i>	Head Start Year 1		Head Start Year 2	
	<i>Mean (SD)</i>	<i>Range</i>	<i>Mean (SD)</i>	<i>Range</i>
Amount of math instruction				
Counting out loud	5.93 (0.30)	3–6	5.93 (0.29)	4–6
Geometric manipulatives	5.54 (0.89)	1–6	5.67 (0.67)	3–6
Counting manipulatives	5.43 (1.04)	1–6	5.44 (0.86)	2–6
Math-related games	5.02 (1.01)	2–6	5.21 (1.01)	1–6
Music to understand math concepts	4.78 (1.43)	1–6	5.00 (1.26)	1–6
Movement and drama to understand math	4.78 (1.43)	1–6	4.72 (1.58)	1–6
Measuring instruments	4.62 (1.36)	1–6	4.78 (1.16)	1–6
Calendar-related activities	5.65 (0.97)	1–6	5.57 (1.18)	1–6
Activities related to telling time	4.45 (1.79)	1–6	4.94 (1.49)	1–6
Activities with shapes and patterns	5.44 (0.90)	2–6	5.57 (0.84)	1–6
Amount of literacy instruction				
Learning names of letters	5.74 (0.61)	3–6	5.82 (0.48)	3–6
Writing letters of the alphabet	5.29 (1.00)	1–6	5.46 (0.86)	1–6
Discussing new words	5.50 (0.87)	2–6	5.56 (0.80)	1–6
Dictating stories	4.91 (1.12)	1–6	4.86 (1.26)	1–6
Working on phonics	5.16 (1.15)	1–6	5.27 (1.27)	1–6
Listening to stories	5.81 (0.61)	1–6	5.87 (0.45)	3–6
Retelling stories	4.98 (1.10)	1–6	5.04 (1.11)	1–6
Learning about conventions of print	5.36 (1.06)	1–6	5.47 (1.04)	1–6
Writing names	5.51 (0.88)	1–6	5.68 (0.65)	1–6
Rhyming words and word families	4.65 (1.20)	1–6	4.82 (1.04)	1–6
Learning about common prepositions	5.09 (1.03)	2–6	5.15 (1.15)	1–6

Note. The rating scale for teacher instruction is: 1= never; 2 = once a month or less; 3 two or three times a month; 4= once or twice a week; 5= three or four times a week; 6= every day.

Table 3

Standardized Factor Loadings and Weighted Descriptive Statistics of Predictor and Dependent Variables

<i>Latent Variables</i>	Standardized Factor Loadings			
	Head Start			Kindergarten
	Fall, Year 1 (Age 3)	Spring, Year 1 (Age 3)	Spring, Year 2 (Age 4)	Spring, Year 3 (Age 5)
Academic achievement				
ECLS-B Math	.82***	.98***	.92***	.90***
WJ-Applied Problems	.44***	.91***	.80***	.77***
WJ-Letter Word	.52***	.60***	.66***	.49***
WJ-Spelling	.38***	.54***	.64***	.65***
Story & Print Concepts	.47***	.47***	.60***	.73***
PPVT	.45***	.62***	.62***	.63***
Learning-related social skills				
Attentional and behavioral control	.96***	.96***	.95***	.96***
Positive learning behaviors	.88***	.90***	.88***	.92***
Engagement in learning	.71***	.73***	.74***	.79***
Teachers' instructional time				
Math	-	.89***	.85***	-
Literacy	-	.78***	.73***	-
<i>Descriptive Statistics</i>	Mean (Standard Deviation)			
Academic achievement				
ECLS-B Math	6.18 (2.41)	8.64 (3.02)	12.31 (3.63)	19.08 (3.82)
WJ-Applied Problems	368.30 (25.19)	379.70 (23.04)	399.64 (20.67)	428.66 (18.81)
WJ-Letter Word	297.50 (18.95)	312.96 (24.97)	336.84 (25.90)	389.26 (26.48)
WJ-Spelling	336.21 (29.08)	350.48 (29.14)	382.56 (27.96)	427.70 (21.65)
Story & Prints Concepts	2.95 (2.08)	3.88 (2.20)	5.98 (2.08)	9.26 (2.11)
PPVT	86.26 (14.29)	86.63 (13.72)	90.01 (14.49)	94.07 (12.42)
Learning-related social skills				
Attentional and behavioral control	25.45 (6.05)	24.77 (6.34)	22.96 (5.61)	23.15 (6.78)
Positive learning behaviors	49.25 (9.67)	49.48 (10.11)	53.40 (8.86)	52.85 (10.66)
Engagement in learning	15.08 (4.69)	16.61 (4.78)	18.73 (4.06)	18.05 (4.70)
Teachers' instructional time				
Math		5.15 (0.63)	5.29 (0.63)	-
Literacy		5.27 (0.55)	5.37 (0.57)	-

Note. HS = Head Start; ECLS-B = Early Childhood Longitudinal Study-Birth Cohort; PPVT = Peabody Picture Vocabulary; WJ = Woodcock Johnson.

 $p < .001$