

Relations between social skills and language and literacy outcomes among disruptive preschoolers: Task engagement as a mediator

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ABSTRACT

Preschool children with disruptive behavior problems are at risk for social and academic difficulties. Many studies have shown a positive link between social skills and child outcomes, but the mechanism driving the link is not well understood. One possibility is that children with better social skills are better able to engage in tasks within the classroom, since preschool classrooms place significant social demands on children. The purpose of this study was to examine task engagement as a mediator between social skills at the start of the year and gains in language and literacy among children with disruptive behavior problems. Participants were 470 children aged 30 to 66 months ($M = 48.7$, $SD = 6.7$). Preschool teachers rated children's social skills and language and literacy, and independent observers rated their task engagement across multiple classroom settings. Path models showed that task engagement significantly mediated the association between social skills and language and literacy gains. When task engagement was divided into engagement during free play and engagement during whole group, only task engagement during whole group time, and not free play, was a significant mediator, although the size of the indirect effect was very small. Results suggest that stronger social skills help disruptive children engage in classroom activities, which in turn leads to stronger language and literacy gains. Results provide very limited support for the idea that task engagement during whole group, rather than free play, is important to language and literacy gains, although this finding needs replication before conclusions can be drawn.

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1. Introduction

There is currently a great deal of debate over the roles of social-emotional learning versus academic learning in early childhood. Some preschool models have been criticized for focusing too much on providing opportunities for play, teaching emotional well being, and teaching other “soft” skills at the expense of time spent on academics (Finn, 2009; Marcon, 1999). These critics often point to the need for a greater focus on curriculum and structured learning and a reduced focus on social-emotional development. Opponents of this position argue that children learn critical relational and language skills through play, and that those skills are as important to healthy development as traditional academic topics (Nicolopoulou, McDowell, & Brockmeyer, 2006).

Despite the debate, there is a strong and growing consensus in the research literature that children's social-emotional functioning is related to psychosocial development and achievement

in substantive ways. One example of this is that research consistently shows associations between children's social skills and later developmental outcomes, including academic outcomes like language and literacy (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Doctoroff, Greer, & Arnold, 2006; Girard & Girolametto, 2013). Social skills may be especially salient for young children with disruptive behavior problems, who tend to have more difficulty engaging with peers and are also at elevated risk for academic difficulties (Bulotsky-Shearer, Bell, Romero, & Carter, 2012). As researchers continue to parse which types of instruction are best for different children and how much time should be spent in structured learning time, it seems important to better understand the mechanisms through which social-emotional factors, like social skills, affect disruptive children's development and learning. This may ultimately help stakeholders provide these children with the full range of supports that lead to positive developmental trajectories.

To advance this goal, the current paper examined a potential pathway through which social skills may affect learning. Specifically, we examined the associations between social skills, task engagement, and children's gains in language and literacy skills during preschool. Our sample included children identified by

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teachers as having high rates of disruptive behavior problems, which place them at high risk for ongoing challenges with social and academic adjustment (Bulotsky-Shearer et al., 2012). In this high-risk sample, understanding how social skills are associated with outcomes is particularly important.

1.1. Social skills in preschool

Social skills, also called pro-social behavior or social competence, are most simply defined as “successful initiation of peer relationships” (Denham et al., 2003p. 238). They are operationalized in terms of children’s helping, sharing, and cooperating with peers, as well as positive peer initiations and peer acceptance (Caprara et al., 2000; Doctoroff et al., 2006). Studies have shown that stronger social skills in preschool are linked with better approaches to learning as well as literacy, language, and math (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Doctoroff et al., 2006; Ziv, 2013). Furthermore, children who spend more time playing with peers tend to have better school readiness outcomes (Eggum-Wilkens et al., 2014). Social skills have been found to mediate the links between behavior problems and learning, suggesting that behaviors that disrupt positive social engagement in the classroom may negatively impact children’s learning (Bulotsky-Shearer et al., 2012). Longitudinal studies also provide evidence for the importance of establishing strong social skills during preschool, in that early social skills are associated with achievement over time (Hindman, Skibbe, Miller, & Zimmerman, 2010; Welsh, Parke, Widaman, & O’Neil, 2001).

This research strongly suggests that social skills contribute in important ways to children’s learning and may have special relevance for children with early disruptive behavior problems. The mechanisms through which this occurs are not well understood, though. The current study sought to address this gap by exploring children’s observed task engagement in the classroom as a potential mediator of the relation between social skills and gains in language and literacy skills among children at academic and social-emotional risk due to their elevated display of disruptive behaviors.

1.2. Task engagement

Task engagement is one of the primary mechanisms through which learning occurs in classrooms. It captures the degree to which children actively and positively participate in classroom activities in ways that are appropriate given the demands of the task (Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009); for example, listening attentively to a story, asking questions during a science activity, or preparing a pretend meal in the kitchen area. Engagement has been studied extensively in school-age children and has generally been associated with gains in reading achievement and math (Guo, Sun, Breit-Smith, Morrison, & Connor, 2014; Ponitz et al., 2009; Robinson & Mueller, 2014). Likewise, in preschool, active engagement in a specific subject area is positively associated with later achievement in that area (Hofer, Farran, & Cummings, 2013). Studies suggest that task engagement is, in part, a reflection of children’s attention and executive functioning skills, which have also been extensively linked to early achievement (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009).

Multiple studies have identified predictors of engagement in preschool and the early school years, including the type of activity, the quality of teacher–child relationships, specific teacher behaviors, and child age and gender (Kontos, Burchinal, Howes, Wisse, & Galinsky, 2002; Ponitz et al., 2009; Powell, Burchinal, File, & Kontos, 2008; Vitiello, Booren, Downer, & Williford, 2012). However, very little research has examined associations between task engagement and social skills among preschool students. In a

small, descriptive study, researchers observed that more time spent engaged in tasks during free play was associated with the presence of peers, suggesting that peer interactions may prolong task engagement (Test & Cornelius-White, 2013). Other studies have focused on negative behaviors as they relate to engagement, finding that behavior problems are associated with lower ratings of approaches to learning, a construct related to task engagement that captures children’s motivation, persistence, and attention along with engagement in learning (Domínguez & Greenfield, 2009).

Likewise, school-age research has mainly focused on the effects of peer rejection and behavior problems on task engagement. This research suggests that children who are socially withdrawn or excluded by peers participate less freely in the classroom, which, in turn, has a negative effect on achievement (Buhs, Ladd, & Herald, 2006). As in the preschool literature, behavior problems in school age students are negatively associated with task engagement (Cappella, Kim, Neal, & Jackson, 2013). Although the research on positive social skills is somewhat sparse, findings thus far indicate that negative social experiences and behavior problems disrupt children’s ability to engage in classroom learning; it may follow that social skills enhance children’s ability to engage. The presence of positive social skills may be particularly salient for children who have been identified as having disruptive behavior problems in preschool, as social skills may help these children compensate for the effects their disruptive behaviors may otherwise have on their engagement. We therefore hypothesized that task engagement may be a key mediator of the link between social skills and outcomes among disruptive preschool children.

1.3. Activity settings

Early childhood researchers are increasingly focused on the role that basic features of the classroom context play in promoting certain types of engagement and learning. Several studies have shown that activity settings (whole group, free play, meals, transitions, etc.) influence how children engage in the classroom. For example, the quality of instruction and children’s engagement with teachers tend to be highest during whole group activities, but free play and recess foster more positive interactions with peers (Cabell, DeCoster, LoCasale-Crouch, Hamre, & Pianta, 2013; Vitiello et al., 2012). Some research even links the use of certain activity settings, like free play, to stronger language and cognitive outcomes for children (Montie, Xiang, & Schweinhart, 2006). In examining task engagement as a mediator, it seemed likely that engagement during different activity settings might be differentially associated with social skills. Thus, we included a specific focus on whole group and free play engagement in addition to engagement measured across all classroom activity settings.

1.4. Behavior problems in early childhood

Most children exhibit some degree of externalizing behavior in early childhood. The majority of children outgrow these early behavior problems. For some, though, early problems persist into later childhood and can develop into stable and clinically significant patterns (Campbell, Shaw, & Gilliom, 2000). Behavior problems can interfere with learning as early as preschool: early behavior problems are associated with lower approaches to learning, lower language skills, and lower school readiness (Bulotsky-Shearer et al., 2012; Escalón, Shearer, Greenfield, & Manrique, 2009; Kaiser, Cai, Hancock, & Forster, 2002; Lonigan et al., 1999). Studies further suggest that social problems with peers act as a mediator between early behavior problems and outcomes. Behavior problems contribute to social difficulties, which in turn are associated with lower school readiness and later internalizing behavior problems (Bulotsky-Shearer et al., 2012; Mesman, Bongers, & Koot, 2001).

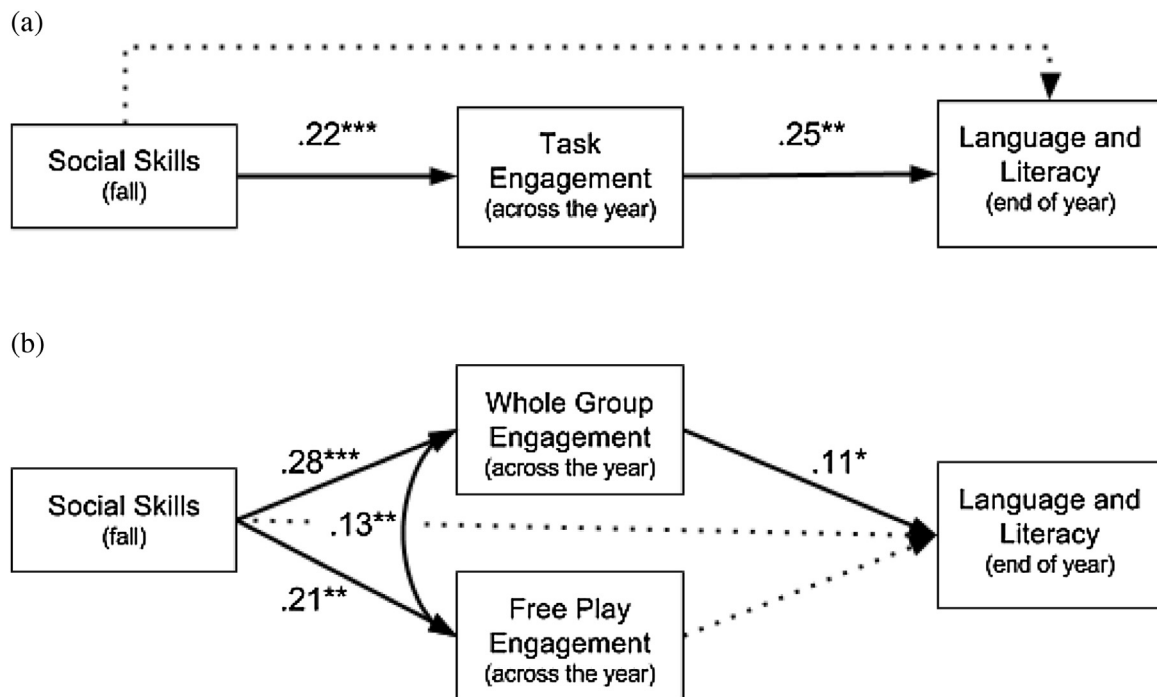


Fig. 1. All coefficients represent unstandardized betas. (a) Model 2 testing task engagement—all settings as the mediator. (b) Model 3 testing task engagement-whole group and task engagement-free play as the mediators. Solid lines represent associations significant at $p < .05$; dotted lines are non-significant. The curved bi-directional arrow in (b) represents a covariance.

Thus, it is especially important to understand how social skills contribute to outcomes among children exhibiting early externalizing problems.

1.5. The current study

Prior research has established a link between social skills and child outcomes, but very few studies have explored what drives this link, especially among disruptive children, for whom social skills and classroom engagement are particular areas of concern. In the current study we sought to examine one potential mechanism through which disruptive children's social skills may affect learning: the degree to which social skills predict higher levels of classroom engagement. We had three main hypotheses: first, that disruptive children's social skills at the start of the year would directly predict language and literacy gains at the end of the year; second, that these children's classroom engagement would mediate the association between social skills and gains; and third, that the effects of engagement would be most pronounced for engagement in free play, when children may rely more heavily on their ability to initiate and sustain contact with peers in order to engage fully in learning. We also tested disruptive behaviors and verbal ability as covariates to ensure that the effects of social skills were unique and could not be better explained by behavior or language problems in this at-risk group of children.

2. Method

2.1. Participants

Participants in the current study were enrolled in an efficacy trial testing *Banking Time*, an intervention designed to help teachers improve behavioral outcomes among children with externalizing behavior problems through the formation of stronger teacher–child relationships (Driscoll & Pianta, 2010). Specifically, *Banking Time* asks teachers to spend one-on-one time with disruptive children

using techniques that are designed to interrupt interaction patterns and expectations that can lead to escalating behavior problems. The intervention itself was not of interest in the current study and did not aim to improve children's social skills, task engagement, or language and literacy. Therefore, participants across three study conditions (the intervention condition, a control condition providing children with increased time with their teachers, and a business-as-usual control condition) were analyzed as a single group. Participants included 470 children from 173 classrooms drawn from urban and suburban child care centers at three sites in the mid-Atlantic region. The study was conducted in three cohorts of teachers and children, with each cohort participating for one year.

Children were mostly boys (66%) and ranged in age from 30 to 66 months at the start of their participation ($M = 48.7$ months, $SD = 6.7$ months). The majority of children (62.3%) were non-white, including black/African American (41.7%), multiracial/Asian/other (12.8%), and Hispanic/Latino (7.8%); 37.7% of children were white, not Hispanic. Most parents (95%) reported English as the child's primary language; 4% reported Spanish as the primary language, and 1% reported another language. Income-to-needs ratios, calculated using household income and the number of people living in the household, indicated that 61% of families earned less than twice the federal poverty threshold, suggesting a high level of financial need among participants (mean income-to-needs ratio = 1.89, $SD = 1.53$).

The 173 classrooms were led by 183 teachers over the study period (10 teachers left the study and were replaced). They were mostly female (96%) and were white (53.1%), black/African American (40.9%), multiracial (2.4%), Hispanic/Latino (1.2%), Native American (1.2%), Asian (.6%) or other (.6%). Teachers' average years of education was 15.4 ($SD = 1.6$ years); 14% had a master's degree, 51.8% had a bachelor's degree, 15.2% had a two-year degree, 4.3% had a high school degree or equivalent plus technical training or a certificate, 14.0% had some college but no degree, and .6% had a high school diploma or equivalent. Teachers had taught for an average of 12 years ($SD = 9.2$ years). Teachers reported having an

average of 15.1 students at the start of the year ($SD = 3.7$), with 7% of children who had limited English proficiency and fewer than 5% with an IEP. Classrooms represented Head Start (27%), state-funded public (26%), and private (47%) programs.

2.2. Measures

2.2.1. Demographic information

Parents completed a survey and demographic questionnaire when they consented to participate in the study. The demographic questionnaire included questions about children's ethnicity, date of birth, gender, family income, and household size.

2.2.2. Children's verbal ability

Children's receptive language ability was measured with the Peabody Picture Vocabulary Test—4th Edition (PPVT; Dunn & Dunn, 2007). The PPVT demonstrates excellent reliability with high internal consistency for 3–5 year old children ($\alpha = .95-.97$) and high test-retest reliability ($r = .91-.94$) over approximately one month (range 14–42 days) (Dunn & Dunn, 2007). It also demonstrates good validity with other measures of children's verbal abilities (Dunn & Dunn, 2007). The PPVT consists of a series of cards with four pictures that are shown to the child as the examiner reads a word that matches one of the pictures. The child identifies which picture corresponds to the word, which becomes increasingly challenging. Children's scores were standardized by age so that a child's score represents their verbal ability relative to same-age peers.

2.2.3. Teacher reports

2.2.3.1. Social skills. The Teacher–Child Rating Scale (TCRS; Hightower et al., 1986) is a 38-item measure rated on a scale of 1–5, with 1 indicating that the item is “not at all” characteristic of the child, and 5 indicating that the item describes the child “very well”. The TCRS has multiple subscales assessing aspects of children's problem behaviors, learning-to-learn skills, and social competence. It has shown strong evidence of validity when used with preschoolers (Mashburn et al., 2008). The current study used the Social Skills subscale, which included 5 items assessing pro-social behaviors and peer acceptance (e.g., “well-liked by classmates”). The TCRS Social Skills subscale showed strong internal consistency, with Cronbach's alpha of .93, and a high degree of stability from the beginning to the end of the school year ($r = .78, p < .001$).

2.2.3.2. Language and literacy. The Academic Rating Scale (ARS), developed for the Early Childhood Longitudinal Study–Kindergarten Cohort (West, Denton, & Germino-Hausken, 2000), includes a 13-item Language and Literacy subscale that asks teachers to use a 5-point scale in rating children on items such as “Reads simple books independently” and “Produces rhyming words.” Past research has demonstrated that the ARS correlates above .70 with directly assessed early literacy skills (Perry, Meisels, National Center for Education Statistics, Educational Resources Information Center (U.S.), 1996). Internal consistency estimates were .83 and .89 in this sample for the baseline and end of year time points, respectively, and the correlation between the two time points was $r = .48$ ($p < .001$), indicating a moderate degree of stability.

2.2.3.3. Disruptive behavior problems. Teachers completed a survey that contained all items from the ADHD Rating Scale (ADHD-RS-IV; DuPaul, Power, Anastopoulos, & Reid, 1998) as well as the ODD Rating Scale (Anastopoulos, 1999; Hommersen, Murray, Ohan, & Johnston, 2006). Both are psychometrically sound behavior rating scales often used in clinical research with preschool-aged children (Barkley et al., 2000; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Johnston, Hommersen, & Seipp, 2009) and have been shown to be

valid and reliable in the preschool population (McGoey, DuPaul, Haley, & Shelton, 2007). The ADHD-RS-IV is an 18-item scale based upon the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV; American Psychiatric Association, 1994) symptoms of ADHD. Nine items correspond to symptoms of inattention and 9 items measure hyperactivity/impulsivity. Modeled after the ADHD-RS-IV, the ODDRS contains 8 items corresponding to the DSM-IV criteria for ODD. Correlations between the scales were $r = .65$ ($p < .001$) between inattention and hyperactivity/impulsivity, $r = .38$ ($p < .001$) between inattention and ODD, and $r = .55$ ($p < .001$) between hyperactivity/impulsivity and ODD. To identify the most disruptive children in each classroom across these different types of behaviors, scores were summed across the dimensions to create a Total Disruptive score ($\alpha = .96$).

2.2.4. Observations

2.2.4.1. Task Engagement. The inCLASS (Downer, Booren, Hamre, Pianta, & Williford, 2010) is an observational assessment of young children's behavior during everyday interactions with teachers, peers, and tasks in preschool classrooms. The inCLASS measures ten dimensions of children's behavior on a 7-point scale, including: (a) positive engagement with teacher, (b) teacher conflict, (c) teacher communication, (d) peer sociability, (e) peer conflict, (f) peer assertiveness, (g) peer communication, (h) engagement within tasks, (i) self-reliance, and (j) behavior control. Trained observers watch children for 10 min, and immediately following this period, they take 5 min to code children's positive or negative patterns of behavior based upon the child's display of clearly defined behavioral indicators that characterize each dimension. Each observation period, consisting of 10 min to observe and 5 min to code, is called a “cycle.” Children are observed over multiple cycles to estimate a child's typical behavior pattern displayed in the classroom. In validation studies, the inCLASS has shown construct and criterion validity (Downer, Booren, Lima, Luckner, & Pianta, 2010) in addition to predicting children's self-regulation and language and literacy skills (Williford, Maier, Downer, Pianta, & Howes, 2013; Williford, Whittaker, Vitiello, & Downer, 2013).

The dimension of interest in the current study was children's task engagement, which captures children's sustained and active engagement in activities, averaged across all four observation time points. Correlations across the time points ranged from $r = .24$ ($p < .001$) to $r = .57$ ($p < .001$), indicating low to moderate stability. We examined both a total score taken from observations across all activity settings and scores derived from observations in which the majority of the cycle (more than 50%) was conducted during whole group or free play settings. Variables for task engagement—all settings, whole group task engagement, and free play task engagement were created by averaging scores across all of the relevant observation cycles. For the total task engagement score, children were observed for an average of 23.2 cycles ($SD = 8.5$). For whole group task engagement, children had an average of 5.5 cycles ($SD = 3.3$). For free play task engagement, children had an average of 9.0 cycles ($SD = 4.8$).

Twenty percent of all observations were independently double coded by two data collectors and these data were used to estimate inter-rater reliability. Intraclass correlations (ICCs) were as follows: task engagement (all activity settings): .70; task engagement (whole group only): .62, task engagement (free play only): .60. These ICCs are indicative of fair to good agreement between raters (Cicchetti et al., 2006), although values below .70 may be cause for concern and should be viewed as a potential limitation. Of note, these ICCs (particularly for whole group only and free play only) are likely underestimates of agreement as there was a much smaller number of double coded cycles ($M = 6.3, SD = 3.9$ for total task engagement, $M = 2.1, SD = 1.3$ for whole group only, and $M = 2.9, SD = 1.8$ for free play only) available to create the task engagement

reliability estimates as compared to the aggregates of the variables themselves (see above). For the activity setting codes, ICCs were .75 for proportion of whole group and .78 for proportion of free play. These ICCs are indicative of good agreement between raters (Cicchetti et al., 2006).

2.3. Procedures

2.3.1. Recruitment

First directors, then teachers, and then parents were invited to participate in the study. Directors were contacted via mailings, emails, or site visits. Once a director consented to the study, teachers within that program were invited to participate. Teachers who consented then assisted in obtaining parental consent for their children's participation. Consent rates for parents averaged 69.2% and ranged from 65.6% to 72.2% across sites.

Children were enrolled in the study based on teacher ratings of externalizing problem behaviors as measured by the ADHD Rating Scale (DuPaul et al., 1998) and ODD Rating Scale (Anastopoulos, 1999). Teachers completed ratings on all consented children in their classrooms, for a total of 2379 children. Of these, two children (for Site 1, one boy and one girl) or three children (Sites 2 and 3, two boys and one girl) with the highest externalizing scores were selected for participation. Children who withdrew from the study were replaced with the next highest scoring child. Selected children were rated significantly higher on externalizing behaviors than non-selected children ($t[2369] = -24.921, p < .001$, effect size [Cohen's δ] = 1.22).

2.3.2. Study protocol

During each year of the project, data collection occurred at four points of time during the academic year. For the current study, direct assessments of children's verbal ability were conducted at the start of the school year (Time 1). Teacher reports of social skills and language and literacy were collected at the start and end of the year (Times 1 and 4). Classroom observations of children's engagement were collected at four time points across the year (Times 1–4).

2.3.3. Observation Protocol

Children were observed in the classroom setting using the inCLASS (Individualized Classroom Assessment Scoring System; Downer et al., 2010). Data collectors attended a two-day training to learn how to code the inCLASS observation measure prior to data collection. At the end of the training, data collectors were required to reliably code five clips by scoring within 1 point of a master code on 80% of the inCLASS dimensions. Across the sites, 43 data collectors conducted the observations. Data collectors' initial reliability scores ranged from 80 to 94%. Following successful training but before data collection began, data collectors practiced the coding scheme on children in preschool classrooms that were not part of the study with a master trainer. In addition, data collectors watched and coded practice videos to ensure that they had not drifted from initial reliability. Inter-rater reliability was estimated by double coding 20% of all field observations; these estimates are provided in the description of the inCLASS measure above.

Within each data collection time point, children were observed across at least two days, with each day of observation lasting approximately four hours from the start of the day until mid-day. Data collectors observed the selected children in a series of alternating cycles starting at the beginning of the school day; each cycle consisted of observing a child for ten minutes and then coding the observation for five minutes. Data collectors shifted their observation across the selected children (i.e., they observed child 1, child 2, then child 3, and began again with child 1; on the next day children were observed in a different repeating order, such as child 2, child

Table 1

Descriptive statistics for study variables.

	<i>n</i>	Mean	SD	Minimum–Maximum
Social skills	398	3.20	.96	1–5
Verbal ability	432	99.72	15.77	59–138
Disruptive behavior	468	28.43	16.18	0–78
Language and literacy, Time 1	395	2.52	1.00	1.00–4.92
Language and literacy, Time 2	334	3.10	1.04	1.00–5.00
Task engagement—all settings	453	4.84	.67	2.25–6.67
Task engagement—whole group	428	4.51	1.02	1.00–7.00
Task engagement—free play	450	5.28	.80	1.00–7.00

3, then child 1), with the goal of collecting at least eight cycles per child at each time point. Coders were blind to study condition.

2.4. Data analysis

Data were analyzed using two-level modeling in MPlus Version 7 (Muthén & Muthén, 1998–2010) with children (level 1) nested within classrooms (level 2). Three separate path models were run to address the research questions. In the first model, fall social skills were tested as a direct predictor of residualized gains in language and literacy. In the second model, child engagement, averaged across all four observations, was tested as a mediator of the relations between social skills and gains in children's language and literacy. In the third model, child engagement was disaggregated by activity setting and the mediation was tested again using only observations that took place during whole group or free play, with whole group and free play engagement tested as separate variables. We used full-information maximum likelihood (FIML) to account for missing data; this uses all available information to estimate each covariance rather than discarding observations with missing data (Kline, 2005). For the full model, the percent of data available in estimating each covariance ranged from 71% to 100%. Sample size for each study variable is provided in Table 1. To provide a robust test of the significance of the indirect effects, we used Monte Carlo methods to construct standard errors around the estimates (Preacher & Selig, 2010).

The associations of interest were modeled at level 1, and all level 1 variables were free to vary across level 2 units. We tested a series of covariates and removed those that showed no associations with task engagement or language and literacy skills; this was done to ensure that the models were parsimonious and not over-fitted (Kline, 2005; Raudenbush & Bryk, 2002). In all cases, removal of non-significant control variables did not affect the magnitude or significance of the associations of interest. Covariates tested included data collection site and intervention condition (both dummy coded), child age in months, child ethnicity (0 = white, 1 = non-white), child's primary language (0 = not English, 1 = English), family income-to-needs ratio, child gender (0 = girl, 1 = boy), verbal ability, and disruptive behaviors. Of these, child age, child ethnicity, family income-to-needs ratio, and verbal ability were retained. All continuous predictors were grand-mean centered. Verbal ability scores were divided by 10 to put them on a metric more similar to the metrics of the other study variables and to ensure that model convergence was not affected by the wide variation in variance components. Exogenous variables were allowed to correlate and fall language and literacy scores were correlated with the engagement mediators. Fall language and literacy ratings were included in predicting spring language and literacy outcomes so that the effects of predictors on spring language and literacy represented predictions of child gains over the year. All models were fully saturated and therefore no fit indices were generated.

3. Results

Descriptive statistics for the study variables are presented in Table 1. A repeated-measures ANOVA indicated that children's teacher-rated language and literacy skills improved significantly from the start to the end of the school year ($F[1,300] = 89.103$, $p < .001$, effect size $[\eta_p^2] = .229$). Standardized PPVT-R scores had a mean of 99.7, indicating that children on average demonstrated age-appropriate receptive language skills at the start of the year. The task engagement variables suggested that children's engagement was higher during free play compared with whole group; a repeated-measures ANOVA showed that this difference was significant ($F[1] = 254.829$, $p < .001$, effect size $[\eta_p^2] = .375$).

Bivariate correlations showed small to moderate associations between the predictors and end-of-year language and literacy ratings (Table 2). As expected, both disruptive behaviors and verbal ability were significantly correlated with social skills although the associations were relatively small (respectively, $r = -.28$, $p < .001$ and $r = .18$, $p = .001$).

3.1. Predicting language and literacy gains

Model 1 (see Table 3) tested the direct effects of children's incoming social skills on end-of-year language and literacy, controlling for fall language and literacy, receptive language, disruptive behavior problems, and child demographic characteristics. Social skills did not significantly predict language and literacy gains. Verbal ability did significantly predict gains ($b = .10$, $SE = .03$, $p = .001$).

3.2. Engagement as a mediator

Model 2 (Table 3 and Fig. 1a) tested the full task engagement variable as a mediator of the relation between social skills and language and literacy. Social skills significantly and positively predicted task engagement ($b = .22$, $SE = .04$, $p < .001$). Task engagement significantly and positively predicted language and literacy gains ($b = .25$, $SE = .09$, $p = .003$). As above, social skills did not significantly predict language and literacy gains; however, a test of the indirect effect from social skills to task engagement to language and literacy gains was significant ($b = .06$, $SE = .02$, $p = .018$) and Monte Carlo confidence intervals did not include zero (95% CI [.02, .11]), indicating a significant (although small) indirect effect. The point estimate indicates that as social skills increase one point, language and literacy gains increase by .06 points, or about 6% of a standard deviation.

3.3. Whole group and free play engagement as mediators

The final model (Model 3 in Table 3) replaced the total task engagement variable with the two variables representing engagement in whole group and free play, respectively (Fig. 1b). Social skills significantly and positively predicted engagement in both whole group ($b = .28$, $SE = .07$, $p < .001$) and free play ($b = .21$, $SE = .06$, $p = .001$). Only whole group engagement significantly predicted language and literacy gains ($b = .11$, $SE = .05$, $p = .012$); the effect of free play engagement was not significant. The direct association between fall social skills and language and literacy gains was also not significant. Estimates of the indirect effects showed a significant indirect effect from social skills to whole group engagement to language and literacy gains ($b = .03$, $SE = .015$, $p = .041$) and 95% confidence intervals constructed using Monte Carlo methods also indicated a non-zero (although very small) effect (95% CI [.005, .066]). The indirect effect via free play engagement was not significant ($b = .02$, $SE = .018$, $p = .264$). The point estimate for whole group engagement indicates that as social skills increased one point, language and literacy gains increased .03 points, or about 3% of a standard deviation.

Finally, because the point estimates for the effects of whole group and free play engagement on language and literacy gains were so close (.11 and .10, respectively), we used a Wald test to determine whether the point estimates were substantively different from each other; the results of this test indicate that they did not differ significantly ($Wald = .02$, $df = 1$, $p = .882$).

4. Discussion

The results of this study provide support for the hypothesis that social skills affect language and literacy outcomes by supporting greater task engagement among children at risk for emotional and behavioral problems, although results were not conclusive as to the specific driver of this association. Due to the social nature of learning in preschool and the emphasis many programs place on self-directed learning during free play, we expected that task engagement during free play would be the strongest mediator of the association. Instead, task engagement across all activity settings showed the strongest mediation effect. In addition, limited evidence suggested that whole group engagement significantly mediated the association between social skills and outcomes while free play engagement was not a significant mediator. The nature of this finding, though, and the small associated effect size, indicate a need for further research and replication.

The first model failed to confirm the direct association between social skills and child language and literacy that has been found in other studies (Arnold et al., 2012). While in the past, this may have been seen as evidence that no mediation exists, modern perspectives hold that there can be a significant indirect effect from a predictor to a dependent variable even if no direct effect is present (Preacher & Hayes, 2008). One possible explanation for the lack of a significant direct effect is that the current study examined residualized gains in language and literacy, while prior studies have looked at concurrent associations or prediction over short periods of time without controlling for prior skill levels (Doctoroff et al., 2006; Ziv, 2013); thus, the current study set a higher bar for finding significant associations. Bivariate correlations between social skills and language and literacy were significant. This suggests that, in early childhood, social and academic competencies are not highly differentiated from each other, and that these competencies tend to hang together. This idea is supported by several profile analyses examining school readiness in preschoolers. These show that the majority of children have high, average, or low profiles of social and academic skills, while much smaller subsets of children show patterns of strength and weakness that differ across the two skill sets (Hair, Halle, Terry-Humen, Lavell, & Calkins, 2006; McWayne, Hahs-Vaughn, Cheung, & Wright, 2012).

In addition, the current study differed from previous studies in examining a population of children who displayed elevated disruptive behaviors in the classroom. We were particularly interested in associations between social skills, task engagement, and outcomes in this subgroup of children because of prior research indicating that social and task engagement are especially challenging for these children (Kaiser et al., 2002; Lonigan et al., 1999). It is possible that direct associations between social skills and outcomes are less pronounced in this group, but further research is needed examining the full range of behavior problems to determine if this is the case.

The second model found a significant association between children's social skills and task engagement, indicating that better social skills were associated with children's engagement in learning. This finding complements the extensive literature showing that disruptive behaviors and peer rejection are associated with lower task engagement (Buhs et al., 2006), and presents a counterbalance to those findings: when children with disruptive behavior problems share, cooperate with peers, and make positive social

Table 2
Correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11
1 Social skills											
2 Verbal ability	.18										
3 Disruptive behavior	-.28	-.08									
4 Language and literacy, Time 1	.28	.42	-.12								
5 Language and literacy, Time 4	.24	.34	-.14	.68							
6 Task engagement—all settings	.27	.23	-.14	.24	.30						
7 Task engagement—whole group	.23	.17	-.06	.24	.32	.68					
8 Task engagement—free play	.23	.18	-.19	.18	.21	.71	.40				
9 Child age	-.06	-.15	.01	.18	.29	.05	.06	.13			
10 Child ethnicity	-.14	-.44	.12	-.18	-.20	-.22	-.15	-.18	.13		
11 Child gender	-.04	-.01	.18	-.08	-.14	-.14	-.14	-.11	-.04	-.03	
12 Family income-to-needs ratio	.18	.54	-.16	.34	.20	.26	.13	.14	-.20	-.53	.02

Note: All values larger than $\pm .11$ are significant at $p < .05$ or greater. For ethnicity, 0 = white, 1 = non-white. For gender, 0 = female, 1 = male.

Table 3
Path model results.

Dependent variables:	Model 1		Model 2				Model 3					
	Lang/lit time 4		Task engagement—all settings		Lang/lit time 4		Task engagement—whole group		Task engagement—free play		Lang/lit time 4	
	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE
Lang/lit time 1	.77***	.08			.73***	.08					.73***	.08
Social skills	.04	.06	.22***	.04	.00	.06	.28***	.07	.21**	.06	.01	.06
Verbal ability	.10**	.03	.02	.02	.10**	.03	.07*	.04	.04*	.03	.09**	.00
Engage-All					.25**	.09						
Engage-WG											.11*	.05
Engage-FP											.10	.08

Note: Coefficients represent unstandardized betas. Engage-All = Task engagement—All settings; Engage-WG = Task engagement—Whole group; Engage-FP = Task engagement—Free play. All analyses control for child age, gender, and family income to needs ratio.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

overtures, they are observed to be engaged in classroom activities in more active and sustained ways. This suggests that social skills may give these children an entryway into classroom learning activities. A child who feels comfortable joining a group and engaging with adults and children is more successful at joining and maintaining attention to learning activities. Given the social demands of most early childhood classrooms, good social skills are a key to full engagement in learning.

This notion is further supported by the finding that task engagement mediated the association between social skills and language and literacy gains. As hypothesized, disruptive children who were more socially adept were more likely to be observed engaging in classroom activities in active and sustained ways and, in turn, made greater language and literacy gains across the school year. This suggests that one pathway through which social skills are associated with outcomes is through children's task engagement. It is important to note that size of the indirect effect was small – each point increase in social skills was associated with about 6% of a standard deviation greater gain in language and literacy over the school year. However, a 6% effect is not meaningless – because we are examining differences in gains rather than differences in simple mean scores, over time an effect of this size could contribute to substantial gaps between children with stronger and weaker social skills. However, it does raise questions about whether there are other pathways through which social skills affect these children's outcomes and whether this mediation pathway would be larger or smaller in settings that vary in the degree to which learning places social demands on children.

The final set of analyses indicated that whole group engagement, and not engagement during free play, significantly transmitted the effects of social skills to learning gains. This finding must be

interpreted with caution for two reasons. First, a follow-up test indicated that the estimated effects of whole group and free play engagement on language and literacy gains did not differ significantly from each other, despite the fact that one effect was statistically significant and the other was not. Whole group engagement was measured with slightly higher reliability than free play engagement, so it is possible that the lack of effects from free play engagement to gains in outcomes is due to measurement error rather than true differences in the importance of engagement across the two settings. Further measurement work in this area is needed to ensure that task engagement can be measured with equal reliability across diverse activities and settings. If further studies do replicate the finding that free play engagement does not predict language and literacy gains, it may be worth considering whether free play provides adequate opportunities for language and literacy learning. Prior studies have shown that preschool children spend relatively little time engaged in meaningful language and literacy instruction outside of structured learning time (Cabell et al., 2013). However, free play and whole group are broad categories that may subsume many different types of activities with differing levels of educational value. Future research delving into the educational opportunities provided by these different settings should describe in more detail the content and format of these settings to better delineate the opportunities they afford children.

Second, the effect of the full task engagement variable on gains was more than twice the magnitude of the effect of whole group engagement alone, suggesting that little was gained in terms of predictive power by breaking the engagement variable into activity-setting-specific components. In addition, while the effect size for full task engagement was small, the effect size for whole group engagement was smaller. This supports the idea that

engagement is associated with learning gains across different types of activities. Although such a finding is in line with the idea that preschoolers are learning throughout the day and that many types of activities can provide learning opportunities, it is somewhat in contrast with emerging research showing that the quality and content of instruction and child engagement vary throughout a school day (Cabell et al., 2013; Vitiello et al., 2012). More research is needed in this area to untangle the associations between classroom activity settings, child engagement, and how learning occurs within the preschool classroom.

4.1. Limitations and future directions

This study adds to our understanding of why social skills matter for early learning among disruptive children by demonstrating that task engagement mediated associations between social skills and language and literacy outcomes. However, there were certain limitations to the study that must be noted. First, because the children in this study were high on teacher-rated disruptive behavior problems, the results may not generalize to children with more typical development. In addition, focusing on this specific group of children may have limited the variability seen in social skills, task engagement, and language and literacy outcomes. Examination of these associations in a broader sample of children may have given us more power to detect significant associations. Second, our reliance on teacher reports for social skills and language and literacy outcomes is a limitation. We have adjusted for teacher effects through our analyses, but a multi-method, multi-informant approach to assessment would have provided a stronger test of the models under study. Third, our observational data did not capture the content of lessons, so we were not able to examine how and when literacy instruction occurred in the study classrooms.

Despite these limitations, this study raises several directions for future research in this area. It would be interesting to better understand how social skills enable more active participation in learning, perhaps by using a more fine-grained observation of children's behaviors. The general behaviors assessed by the teacher report measure used in the current study – e.g. cooperation, social overtures – appear at face value to be the types of skills employed during free play activities rather than during structured learning activities like whole group. A more detailed observation of children's social exchanges during different classroom activities may reveal that these skills are deployed during structured learning, as well; or it may be the case that other forms of social skills – compliance, interest and engagement when peers and adults speak, emotion knowledge, or prosocial behaviors like turn-taking – may be more appropriate social skills during structured learning. It therefore seems worthwhile to unpack social skills as a construct to determine whether certain social skills help children engage in unstructured learning, while others are key to engaging during structured learning activities. It is also important to better understand how teachers structure time and activities across the school day, and how that use of time, combined with child factors like social skills, jointly affect what children learn during preschool.

In addition, this study raises the question of how child preferences and skills influence their ability to maintain attention, resist distraction, and demonstrate cognitive control. As discussed in the introduction, task engagement likely reflects the joint contributions of children's attention and executive functions as well as the external supports for engagement provided by the learning environment. It may be that for children with stronger social skills, social learning environments like those found in many preschool classrooms support engagement because these children are socially interested and are motivated to engage when that engagement brings them into greater social contact; in other words, children with stronger social skills may be better able to “deploy” their

cognitive control skills in socially-demanding settings. It would therefore be very interesting to examine variations in the social demands that children face during tasks, and determine how social skills or other characteristics, such as shyness, are associated with task engagement in settings that place greater or lesser social demands on children. Our observation system and sample do not allow us to examine this within the current study, but this may be of interest in future work.

In sum, this study underscores the importance of social skills for early learning and suggests a mechanism for their effects. Preschool classrooms are social places and the majority of learning takes place in group settings. Social skills enable children to enter into and get the most out of these group-learning opportunities, especially during structured learning tasks where, arguably, the majority of new content is presented. Focusing on social skills and other early social-emotional skills should not be seen as detracting from an academic focus, but as complementary to both social and academic learning.

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