

## Household Socioeconomic Status and Parental Investments: Direct and Indirect Relations With School Readiness in Ghana

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This study examines how parent socioeconomic status (SES) directly and indirectly predicts children's school readiness through pathways of parental investment. Data come from direct assessments with preschool children and surveys with their primary caregivers in Ghana at the start of the 2015–2016 school year ( $N = 2,137$ ;  $M_{\text{age}} = 5.2$  years). Results revealed SES-related gaps in all parental investment characteristics and child school readiness skills. Preschool involvement served as the primary mediating mechanism in the path from SES to most school readiness skills, though it did not predict executive function. The number of books in the household was marginally positively predictive of early literacy, whereas at-home stimulation was negatively related to motor, literacy, and numeracy skills.

Approximately 155 million birth to 4-year-old children currently live in sub-Saharan Africa, making up nearly one quarter of the world's children in this age group (UNICEF, 2015). Projections estimate that by 2050, one in every three children under 18 will be African (UNICEF, 2014a). With some of the highest regional rates of child poverty in the world, nearly 80% of sub-Saharan African children live in families whose income per capita is  $< \$2$  per day (UNICEF, 2014b). In Ghana, in particular, 28.4% of children live below the national poverty line (equivalent to about  $\$1.83$  per day), and 47% of individuals living on less than  $\$1.25$  are under the age of 18 (UNICEF, 2015).

In addition to facing economic challenges, children and families in sub-Saharan Africa also face educational barriers. Despite significant progress in increasing universal primary school enrollment (UNESCO, 2014), educational quality and learning levels remain low. For example, the 2013 National Education Assessment in Ghana showed that only 22.1% of Primary 3 (P3; equivalent of third grade) students achieved proficiency in mathematics. Results worsened as students progressed through

primary school, with only 10.9% attaining proficiency in Primary 6 (P6; equivalent of sixth grade). In English, 28.1% of P3 students and 39.0% of P6 students achieved proficiency. For both grades, approximately 40% of the students failed to achieve even minimum competency in mathematics, and approximately 40% of P3 students failed to achieve minimum competency in English (Ministry of Education, 2014).

Countries' socioeconomic and educational characteristics are strongly correlated with their children's developmental well-being (McCoy et al., 2016). At the same time, recent research finds that parenting, rather than country environment, is the most important input to early childhood human capital formation (Schoellman, 2016). Yet very little is known about how individual families cope with economic hardships and prepare their children for school in sub-Saharan Africa. Indeed, nearly all of the research on the relations between socioeconomic status (SES), parental investments, and child development has taken place in North America and Western Europe (Bornstein et al., 2012), with some more recent work focusing on Asia and Latin America (e.g., Behrman et al., 2017; Fernald, Schnaas, Neufeld, Knauer, & Guerra, 2014).

In the present article, we address this gap by exploring the relations between household SES (measured by household wealth and parental

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education), parental investments in learning in and out of the home, and children's school readiness outcomes across five developmental domains at the start of kindergarten in Ghana. We argue that examining the pathways through which SES influences children's school readiness can provide insights into the types of interventions that might lessen disparities earlier in children's lives. Given that girls in Ghana have historically experienced lower educational outcomes than boys (UNESCO, 2014) and that gender parity in school enrollment in Ghana declines with school progression (UNGEI, 2012), we also examine whether these processes differ by child gender. This empirical evaluation is a first step in testing an adapted version of a family investment model for young children for use in low- and middle-income countries (LMICs). Ghana represents a particularly important context to study family investments given that it now provides 2 years of free, universal preprimary education and, as a result, has some of the highest preprimary enrollment rates on the continent.

### *SES and School Readiness*

For the purposes of the present study, we define school readiness as a multidimensional set of preacademic, cognitive, motor, and social-emotional skills that help children learn and succeed in primary school. A large body of research from the United States suggests that children's school success is predicted by a wide range of early skills, including their basic knowledge about letters and numbers, their ability to get along with peers, their fine motor skills, and their ability to control impulses and focus attention (Blair, 2002; Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010; UNESCO, 2013). At the same time, less is known about which skills are most central to school readiness in LMICs, with the majority of research on preprimary education focusing on cognitive and preacademic outcomes only (Nores & Barnett, 2010; Walker et al., 2011). In the present study, we expand the evidence base on school readiness outcomes in Ghana by applying a multidimensional measure of school readiness that aligns with standards and objectives set forth by the government of Ghana to promote language, math, psychosocial, and psychomotor development (Ghana Education Service, 2012).

In high-income country contexts, numerous studies have analyzed the association between family SES and children's school readiness skills. These studies show that low SES, as measured by income, wealth, and or parental education, is associated

with lower levels of cognitive development, academic knowledge, social-emotional skills, and other school readiness domains (e.g., Bradley & Corwyn, 2002; Kiernan & Mensah, 2009). Although gaps in cognitive and social-emotional skills tend to persist through the school years and into later life (Duncan et al., 2007), these SES-related developmental disparities are apparent before children even enter school (Janus & Duku, 2007).

In sub-Saharan Africa, where children and families face different macroeconomic contexts than those in the United States, emerging research has shown similar relations between exposure to poverty and various aspects of children's health and development. For example, the *Young Lives* project—a multicountry longitudinal study of child poverty including Ethiopia—has shown that children aged 12 living in low-resourced home contexts have lower cognitive and social-emotional outcomes than their peers in more advantaged households (Dercon & Krishnan, 2009). In Zambia, low household income and caregiver education were independently and negatively related to children's language, executive function, and nonverbal reasoning skills (McCoy, Zuilkowski, & Fink, 2015). In Madagascar, even in the context of extreme poverty, socioeconomic gradients were still predictive of child outcomes, particularly in receptive language and sustained attention (Fernald, Weber, Galasso, & Ratsifandrihamanana, 2011). Other research has shown that children residing in poverty within LMICs have worse physical health, including malnutrition, frequent disease, and higher rates of stunting (Grantham-McGregor et al., 2007). As far as we know, no research has explored these relations in Ghana.

### *Applying a Cognitive Stimulation Model to Understand School Readiness in Ghana*

Why might SES be associated with children's school readiness in Ghana? One of the main theories explaining this association in high-income contexts is the *cognitive stimulation model* (e.g., Haveman & Wolfe, 1994). This model posits that poverty makes it more difficult for families to invest (both financially and in terms of time) in practices to stimulate and support learning inside and outside the home, and that this lack of investment results in poorer cognitive and academic outcomes for children. In the United States, a number of studies have shown that cognitive enrichment in the home mediates much of the covariation between parental income and child cognitive

development (e.g., Chazan-Cohen et al., 2009; Yeung, Linver, & Brooks-Gunn, 2002). As a second key component of SES, parental education is also linked with children's outcomes and plays a key role in influencing the quantity and quality of time investments in children (Harding, Morris, & Hughes, 2015). Researchers have argued that these components of SES do act in concert to affect children's lives but have distinct impacts and are not necessarily interchangeable (Duncan & Magnuson, 2003).

Several specific forms of investment have been hypothesized as mechanisms within this broader cognitive stimulation model. The first of these possible mechanisms is caregivers' engagement in *cognitively stimulating activities* with children in the home, such as reading books with children, teaching them about letters and numbers, and taking them on trips to libraries and museums (e.g., Chazan-Cohen et al., 2009; Yeung et al., 2002). Although research on these specific processes is relatively limited in LMICs, a body of related work supports this overall hypothesis. In particular, researchers have found that at the country level, the Human Development Index (HDI) score, average level of schooling, and gross domestic product are significantly correlated with levels of parent-reported stimulation (Bornstein & Putnick, 2012). The intervention literature also supports the importance of stimulation, with a number of parenting programs showing substantive impacts on child outcomes in LMICs (e.g., Engle et al., 2011; Neville, Pakulak, & Stevens, 2015). In Mexico, for example, Knauer et al. (2016) found that the amount of play activities and shared book reading explained up to 32% of the effects of a parenting support program on child development outcomes. A recent meta-analysis of early childhood interventions in LMICs found that programs that incorporated a component of parent education, care, or cognitive stimulation had the largest impacts on young children's cognitive outcomes compared to interventions solely focused on cash transfers or nutritional supplementation (Nores & Barnett, 2010). Another review found similar results: Increasing play and reading with young children in community-based interventions were effective in improving early development (Maulik & Darmstadt, 2009). Taken together, these studies suggest that at-home stimulation is an important pathway to improving school readiness in LMICs.

Second, research has supported the availability of *stimulating materials* such as print resources and books as important predictors of children's school

readiness (Bradley, Corwyn, Burchinal, McAdoo, & García Coll, 2001). In the United States, there is a well-documented association between household SES and the number of books and material resources available in the home (Bradley et al., 2001). Less is known about access to stimulating material resources outside of the United States, yet emerging research suggests these resources to be associated with children's early outcomes in LMICs. In analyzing data from 39 LMICs, Bornstein, Putnick, Bradley, Lansford, and Deater-Deckard (2015) found that household material resources, including basic facilities as well as the number of books in the household, mediated 48%–78% of the relation between caregiver education and infant growth, depending on the country. A study in Belize, Kenya, Nepal, and American Samoa showed that access to learning materials in early childhood, specifically, was related to children's cognitive development and levels of exploratory play (Gauvain & Munroe, 2009). In rural Bangladesh, controlling for SES, access to play and reading materials at home predicted cognitive development in 18-month-olds (Hamadani et al., 2010). Similarly, a study in Malawi child-care centers showed that controlling for other aspects of the learning environment, access to learning materials predicted infants' language development (Ferguson, 2008).

Finally, often less researched in early childhood is caregivers' levels of *school involvement*. In promoting achievement across elementary and secondary school, theories, research, and policies have identified the significant role of families, family-school relations, and caregiver involvement in education (Dearing, Kreider, Simpkins, & Weiss, 2006; Hill & Chao, 2009). In a review of the literature for middle school students in the United States, Hill and Tyson (2009) identified school-based involvement as being associated with children's achievement. They explained that such involvement can include visits to the classroom and interactions with children's teachers, which increase caregivers' knowledge about the curriculum, enhance social capital, and increase the effectiveness of involvement at home (Hill & Taylor, 2004). Similar associations between mothers' school involvement and students' academic achievement have been found in a socioeconomically diverse group of Ghanaian 15- to 20-year-olds (Nyarko, 2011).

Caregiver school involvement may also be particularly beneficial for younger children. Regular contact and communication between the parent and school allow the two to work together toward the goal of school readiness. In an attempt to extend

the literature to early childhood, Arnold, Zeljo, Doctoroff, and Ortiz (2008) found that caregivers' school involvement predicted preschool children's preliteracy skills in the United States. In addition, a longitudinal study found that the number of school activities in which caregivers participated during preschool and kindergarten was significantly associated with higher reading achievement in kindergarten and lower rates of grade retention at age 14 (Miedel & Reynolds, 2000).

Although parents differ in their ideas about their role in their children's learning (Strom & Slaughter, 1978), research in the United States has shown that parents who feel efficacious in their role as parents, who view their role as that of a teacher, and who view their children as less difficult engaged in higher involvement in their schooling (Grolnick, Benjet, Kurowski, & Apostoleris, 1997). In South Africa, research has shown that many early childhood teachers perceive low-income parents to be less interested or involved in their children's education, with negative implications for home-school communication (Bridgemohan, van Wyk, & van Staden, 2005). Additional research is needed to explore parental involvement in early childhood settings, particularly in the sub-Saharan African context, where parents have been shown to value early education (Bidwell, Perry, & Watine, 2014), yet where low adult literacy rates and education levels may limit parents' perceptions of their own efficacy in promoting their child's learning.

### *The Ghanaian Context*

In the present study, we build on a broad research base from high-income countries and an emerging body of research in LMICs to explore a cognitive stimulation model of parental investment in one specific country: Ghana. Ghana is a lower-middle-income country in West Africa with a population of 26.8 million people. With an adult literacy rate of 76.6% (World Bank, 2017), nearly one quarter (24.2%) of the population lives below the national poverty line, and the average life expectancy is 61 years of age.

Recent research estimates that 32.6% of 3- and 4-year-olds in Ghana struggle to meet basic developmental milestones, including following directions, working independently, avoiding distraction, getting along with others, and avoiding aggression (McCoy et al., 2016). Estimates suggest that levels of at-home stimulation provided to Ghanaian children are low, with only 33.1% of children having been read to in the previous 3 days (vs. an average

of 54.1% in all LMICs; McCoy et al., 2017). Indeed, compared to 13 other countries categorized as medium on the HDI (a composite indicator of life expectancy, education, and income per capita), Ghana ranked 12th, followed only by Yemen, in terms of the levels of cognitive stimulation parents reported engaging in with their child (Bornstein & Putnick, 2012).

Despite these relatively high levels of developmental challenges and low levels of stimulation, Ghanaian children have high exposure to out-of-home educational services. In 2007, the government expanded access to 2 years of preprimary education—called Kindergarten 1 (KG1; 4-year-olds) and Kindergarten 2 (KG2; 5-year-olds), respectively—by including it in the free and compulsory basic education provided by the state. Ghana is one of the first countries in sub-Saharan Africa to provide 2 years of free preprimary education and has one of the highest preschool enrollment rates on the continent at 68.7% for 3- and 4-year-olds (McCoy et al., in preparation).

Despite this progress, income-based disparities in early childhood services are prevalent in Ghana. Estimates suggest that children from households in the top wealth quintile were 2.4 times more likely to attend preprimary school and 3.1 times more likely to receive high levels of at-home stimulation than their peers from households in the bottom wealth quintile (McCoy et al., in preparation). Although tuition fees have been eliminated under Ghana's education policy, most schools have other fees associated with school uniforms and school supplies that place important economic burdens on families. In the sample of schools used in this study, public schools on average charged additional annual fees amounting to 30 Ghana cedis (the equivalent of approximately 7 USD). Private schools—which, according to one report, are preferred by parents relative to public schools (Bidwell et al., 2014)—had higher average fees of 340 Ghana cedis (the equivalent of 80 USD), though variability was large and affordable private options were available.

Furthermore, the structural and process quality of KG programs in both public and private sectors is low (UNESCO, 2006). All schools are mandated to follow the Ghana Education Service KG curricula (MOWAC, 2004), which emphasize developmentally appropriate, play-based methods for promoting a holistic grouping of skills relevant in the early childhood period. At the same time, government reports suggest that these curricula are not being implemented in most schools (Ghana Education



Service, 2012). The first study to systematically assess the state of quality in Ghana's preprimary education system, as well as testing approaches to train teachers to incorporate play-based, child-centered pedagogy as outlined in the GES curriculum, is currently underway (Wolf, Aber, & Behrman, 2017).

The present study takes place in periurban communities in the Greater Accra Region in Ghana, the second highest populated and one of the fastest-growing regions in Ghana. Preschool enrollment rates in the Accra area are some of the highest in Africa, around 89% (McCoy et al., in preparation), with estimates of some neighborhoods having enrollment rates as high as 94% (Bidwell et al., 2014). Given these high rates of participation in early education, the periurban area surrounding Accra makes for a particularly rich case study of the intersection between caregivers' investments in home- and school-based opportunities for learning.

Focusing on the Ghanaian context also provides an important opportunity to examine the role that gender may play in shaping SES-related gaps in parental investments and school readiness. Although gender parity exists in preprimary education in Ghana (UNESCO, 2015), gender is an important determinant of later schooling outcomes in Ghana. Although there is near gender parity in primary and junior high school enrollment, the national gender ratio for completion of secondary high school (the equivalent of high school) is estimated at 67.5%. In other words, two girls for every three boys complete secondary high school. In addition, girls are more likely to be over age than boys (UNGEI, 2012), which has consequences for learning outcomes (Taylor, Mabogoane, Shindler, & Akoobhai, 2010). In the present study, we test whether the relations between SES, parental investment, and school readiness differ by child gender. Although research on these processes in relation to gender is relatively limited, prior research in Ghana shows that when caregivers cannot afford school fees, girls' school attendance declines but boys' attendance is not affected (Wolf, McCoy, & Godfrey, 2016). As such, we hypothesize that SES may place different constraints on the resources and outcomes for boys versus girls within this context.

### *The Present Study*

The primary aim of the present study is to test a comprehensive model of parental investment in children's learning and development in a sample of preprimary school-aged children in periurban

Ghana. In particular, we test the contributions of three distinct forms of parental investment—including at-home stimulation activities, at-home resources for learning, and school involvement—as mediators in the overall relations between household SES and five key domains of school readiness. Based on U.S.-based research and findings to date analyzing the relation between poverty and child development in LMICs, we hypothesize that all three dimensions of parental investment will mediate the association between household SES and child outcomes, with higher levels of SES and parental investments being associated with higher levels of children's school readiness. We also conduct an exploratory analysis to determine whether the fit of this model differs by child gender. In doing so, we test whether gender-based disparities in learning outcomes observed later in children's academic trajectories may begin prior to formal school entry. Note that although we use the term "parental investment" to be consistent with prior literature, our sample included both parents (i.e., mothers and fathers) as well as other types of primary caregivers (e.g., grandparents, older siblings, aunts, and uncles).

This study makes several contributions to the literature on family investments, early childhood development, and international child well-being. First, this is the first study to our knowledge to test the application of a cognitive stimulation model in West Africa. We use a large sample of children enrolled in both public and private preprimary schools in the second most populated area in the Greater Accra Region of Ghana, a linguistically and economically diverse region that accounts for 15.4% of Ghana's population. Second, by including three distinct types of in- and out-of-home investments in a single conceptual model, we build on several bodies of literature that have examined singular dimensions of parental investment. Doing so allows us to understand the substantive, independent contributions of these three diverse yet interrelated mediating mechanisms. In particular, we consider parental involvement in preprimary programming as a potentially important but underconsidered dimension of investment relevant to the present setting (e.g., Grolnick et al., 1997; Hill & Tyson, 2009). Third, we examine relations with multiple domains of children's school readiness not often included in a single model. In considering these diverse skills simultaneously, we build on a small but growing body of work exploring links between parental investment and children's cognitive functioning in sub-Saharan Africa (e.g., McCoy et al., 2015) to also

consider links with nonacademic dimensions of school readiness such as social and emotional competence, executive function, and fine motor skills (which are known to be strongly related to children's early writing skills and later school performance; Grissmer et al., 2010). Given the lack of information on mechanisms that support school readiness in LMICs (Bornstein et al., 2012), these findings are critical to explain why so many children are falling behind developmentally in Ghana (McCoy et al., 2016).

## Method

### *Participants and Procedures*

Data for this study were collected in September and October of 2015 and come from the baseline of a 2-year, three-wave impact evaluation of a teacher in-service training and parental engagement program implemented in six districts in the Greater Accra Region in Ghana. The districts were six of the nine most disadvantaged in the region (as defined by UNICEF's District League Table, 2015; out of 16 total) and included La Nkwantanang-Madina, Ga Central, Ledzokuku-Krowor, Adenta, Ga East, and Ga South. In the summer of 2015, 118 public schools and 490 private schools were randomly sampled from the six districts, stratified by district and public and private sector status. All public schools were included in the sample, and private schools were selected in a number proportional to the total number of private schools in the district. However, 10 public schools had no kindergarten classes and two private schools declined to participate in the study and were therefore excluded, resulting in a total sample size of 108 public schools and 132 private schools.

In accordance with Ghana Education Service, local district government, and [New York University's] Institutional Review Board standards, passive consent was received for all children within sample schools via a short form sent home to caregivers. A total of 10 caregivers refused their children's participation. Of the remaining sample, 15 children (8 from Kindergarten 1 [KG1],  $M_{\text{age}} = 4.7$  years and 7 from Kindergarten 2 [KG2],  $M_{\text{age}} = 5.8$  years) were randomly selected from each school roster to participate in direct assessments. If a school had fewer than 15 KG children, all children were sampled. Most schools had two KG classrooms separated by Levels 1 and 2, though a small portion of schools (10%)

had one combined KG classroom. In these cases, 15 children were randomly selected from the combined class.

The total sample selected for child assessments was 3,435 children, with an average of 14.3 children per school (range = 4–15). Primary caregivers of these children (41.6% mothers, 44.6% fathers, and 13.8% other) were then contacted via telephone to participate in a survey in which data on household SES and parental investments were collected. A preinterview was conducted to determine whether the caregiver was the child's primary caregiver, defined as

the person who takes primary responsibility for the child's education and who could best talk about the child and his or her experiences in school and at home. It may be the child's parent, a family member, guardian, or another individual

Given the difficulty of obtaining correct phone numbers from school administrative records for all caregivers, the caregivers of 2,220 children were reached, 12 of which declined to participate in the survey (a response rate of 99.1%). Thus, the analytic sample of the present study comprised 2,137 (64%) of the original 3,435 children. Children whose caregivers were reached were different from those not reached in two ways: They were more likely to be enrolled in a private school (56.0% vs. 49.2%,  $t = 3.89$ ,  $p < .01$ ) and had slightly higher literacy scores (45.5% vs. 43.7%,  $t = 2.34$ ,  $p < .05$ ). The groups were not statistically significantly different on other child outcomes or in locale (see Appendix). Following receipt of verbal assent, children's school readiness skills were assessed directly in their schools. Data collectors for both the caregiver survey and child outcome measures had prior experience working with children, were trained extensively in study protocols and research methodology, and spoke English, Ga, Twi, Ewe, and Hausa languages. When data collectors arrived at the school, they worked with the head teacher to designate a few quiet spaces on the school grounds that were out of sight of other children where assessments could be conducted (e.g., an empty classroom). They then spoke with the teacher and with her permission, sang a song or played a short game with the entire class before beginning the assessments. Data collectors also spent several minutes informally chatting with the children to help them feel comfortable prior to beginning the assessments. Children were administered the assessment in the language with which they were most

comfortable, which was determined by assessors in advance of administration.

For child assessments, the data collectors were trained for 5 days and 2 additional days of field practice. The training was facilitated by a master trainer, as designated by the assessment tool developers (Pisani, Borisova, & Dowd, 2015). Interrater reliability was assessed by pairing data collectors who scored two children together during field practice. Cohen's kappa values were calculated for each pair across each item in the entire assessment, and values ranged from .67 to .97, with an average kappa value of .86.

Sample characteristics are shown in Table 1. Of the 2,137 children in the analytic sample, 50.2% were female, 22.9% spoke primarily English in the home, 66.3% spoke primarily Twi, and 10.8% spoke another local language (e.g., Ga, Ewe, Hausa). Children were an average of 5.16 years old ( $SD = 1.34$ ) and caregivers were an average of 38.17 years old ( $SD = 8.92$ ). Overall, 79.6% of caregivers were married or living with a partner. A total of 56.0% of children were enrolled in a private school, and 50.4% were in KG1, 44.7% were in KG2, and 5.0% were in a mixed KG1 & KG2 classroom.

### Measures

#### Household Wealth

Two representations of household SES were used in the present analysis. First, household wealth was measured using the Simple Poverty Scorecard for Ghana (Schreiner & Woller, 2010). This tool was developed using the national 2005–2006 Ghana Living Standards Survey, administered by the Ghana Statistical Service, to construct a scorecard that estimates the likelihood that a household has expenditures below a given poverty line. The scorecard uses 10 indicators, including number of household members, number of school-aged children enrolled in school, the highest grade completed by the female head or spouse, the primary job of the male head, the construction material used for the roof of the household, the main source of lighting for the dwelling space, the main source of drinking water for the household, the presence of a working stove, the possession of a working iron, and the possession of a working radio, radio cassette, record player, or 3-in-1 radio system. Scores on each response were assigned a numerical value with total scores ranging from 1 to 100, where higher scores indicate greater household wealth. The poverty scorecard values have been shown to be

accurate and precise estimations of household poverty levels. For example, when compared with the national poverty line, measured by household consumption expenditures, the average difference between scorecard estimates and the national poverty line was +0.8 percentage points (Schreiner & Woller, 2010).

#### Caregiver Education Level

Caregiver education was included as a separate SES variable. Primary caregivers were asked the highest level of education they completed. Responses were grouped into five categories: none (0), some primary (1), completed primary school (2), completed junior high school (3), completed secondary high school (4), and completed a bachelor's or postgraduate degree (5). For analysis, caregiver education was considered as an ordinal variable based on these categories, with possible scores ranging from 0 to 5.

#### At-Home Stimulation

Caregivers' participation in cognitively stimulating activities with their child was assessed with six adapted questions from the Multiple Indicators Cluster Survey (MICS; UNICEF, 2014c). The MICS is a nationally representative, internationally comparable household survey of protective and risk factors of child development in more than 60 LMICs, including Ghana. The stimulation items, in particular, were designed to capture a core set of practices that are predictive of child development outcomes in low-resourced, low-literacy environments like Ghana (Bornstein et al., 2012). In the present study, caregivers answered "yes" or "no" to the following questions: "In the past 30 days (4 weeks), did you or any household member over 15 years of age engage in any of the following activities with [CHILD NAME]?" (a) Read books to or looked at picture books with [CHILD NAME]?; (b) Told stories to [CHILD NAME]?; (c) Sang songs to or with [CHILD NAME], including lullabies?; (d) Named, counted, or drew things to or with [CHILD NAME]?; (e) Taken [CHILD NAME] outside the home? For example, to the market, to events, visit relatives?; and (f) Played with [CHILD NAME]? ( $\alpha = .66$ ). The 30-day time period used in the present study differed from the original MICS study's 3-day time period due to an administrative error that occurred when developing the data collection forms. As a result, the data from the current study are not directly comparable to those collected in the

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Table 1  
Sample Descriptive Characteristics

Variable	N (total = 2,137)	M or %	SD
Household socioeconomic status			
Household wealth (Ghana poverty scorecard; range = 0–100)	2,114	60.81	13.64
Caregiver education (range = 0–5)	2,122	2.88	1.55
Parental investment			
Stimulation in past 30 days (%)			
Reading	2,097	76.2	
Stories	2,064	53.1	
Counting	2,099	75.8	
Playing	2,105	94.3	
Taking outside	2,108	63.7	
Singing	2,085	65.8	
Number of books in the home	1,822	2.91	2.73
Parental school involvement (no. of times last academic year)			
Attended PTA meeting	1,856	1.66	1.29
Attended scheduled meeting with teacher	1,822	1.21	1.68
Participated in school or class event	1,752	0.58	0.89
Volunteered on school committee	1,736	0.14	0.53
Participated in school fundraiser	1,740	0.46	0.83
Child school readiness (% correct)			
Numeracy	2,137	45.1	19.8
Literacy	2,137	45.4	21.2
Motor	2,137	70.6	26.4
Social-emotional	2,137	41.9	20.3
Executive function	2,137	55.6	26.4
Covariates			
Child is female	2,137	50.2	
Child age (months)	1,830	5.16	1.34
Home language			
English		22.9	
Twi		66.3	
Other		10.8	
Caregiver age (years)	2,119	38.17	8.92
Caregiver relationship with the child			
Mother	2,129	41.6	
Father		44.6	
Other		13.8	
Caregiver married or living with partner	2,125	79.6	
Child attends private school	2,137	56.0	
Grade level			
KG1	2,137	50.4	
KG2		44.7	
Mixed KG1 and KG2 classrooms		5.0	

MICS study. Despite this error, sufficient variation in reporting on each of these questions was observed, and no ceiling effects were found (see Table 1). Each of these activities was coded as yes = 1 and no = 0 and included as an observed indicator of the latent construct of at-home stimulation. Items showed positive bivariate correlations with one another ( $r_s = .13-.52$ ) and an internal consistency of  $\alpha = .66$ .

### Caregiver School Involvement

Caregiver school-based involvement was self-reported by caregivers using a set of indicators developed for a previous study in Accra, Ghana (Bidwell et al., 2014). We consulted with Ghanaian teachers about the availability of each activity in schools and concluded that the list of activities sufficiently covered the types of involvement opportunities local



schools provide to caregivers. Specifically, caregivers reported how many times they or other adults in their household engaged in the following five activities during the last academic year: (a) attended a Parent Teacher Association (PTA) meeting; (b) attended a scheduled meeting with [CHILD'S NAME]'s teacher; (c) attended a school or class event such as a play, sports events, culture fair; (d) volunteered or served on a school committee; (e) participated in fund raising for [CHILD NAME]'s school ( $\alpha = .55$ ). The frequency of each of these activities was included as an observed indicator of the latent construct of caregiver school involvement.

#### *Number of Books in the Household*

Also from the MICS survey (UNICEF, 2014c), caregivers answered the following question: How many children's books or picture books do you have for [CHILD NAME]? Prior research has used children's books as a representation of formal learning resources in low-resourced contexts where access to more advanced educational toys or technologies is low (Bradley & Putnick, 2012). Given the low frequency with which parents reported having greater than 10 books (2.3% of the sample), answers were top coded at 10.

#### *Child School Readiness*

Children's school readiness was assessed directly using the International Development and Early Learning Assessment (IDELA; Pisani et al., 2015). The IDELA is a direct measure of holistic child learning and development designed for use in LMICs. It has been used in over 30 countries and has been found to have good psychometric properties across a diverse set of countries (Pisani et al., 2015). It takes approximately 35 min to administer. The initial set of items was inspired by and conceptually adapted from existing assessments of children's school readiness such as the Early Development Instrument (Janus & Duku, 2007), Ages and Stage Questionnaire (Squires & Bricker, 2009), the Malawi Development (Gladstone et al., 2010), and the East Asia Pacific-Early Child Development Scales (EAP-ECDS; Rao et al., 2014). See Pisani et al. (2015) for details on the development of the IDELA items. Although the IDELA was designed to be implemented widely across culturally diverse settings, the current protocol was reviewed by local child development experts and piloted with 10 children in the Accra metropolitan area and 10 children in the Greater Accra Region to

confirm its appropriateness for the study context. Only minor or superficial adaptations were required (e.g., removing the word "please" from the start of several questions and simplifying the instructions by removing excessive words).

The IDELA includes items that cover five domains of children's school readiness. Specifically, *emergent numeracy* was captured using 39 items grouped into eight subtasks and covers constructs of number knowledge, basic addition and subtraction, one to one correspondence, shape identification, sorting abilities based on color and shape, size and length differentiation, and completion of a simple puzzle ( $\alpha = .72$ ). *Emergent literacy* was measured using 38 items grouped into six subtasks and covers constructs of print awareness, letter knowledge, phonological awareness, oral comprehension, emergent writing, and expressive vocabulary ( $\alpha = .74$ ). *Social-emotional development* was measured using 14 items grouped into five subtasks and covers constructs of self-awareness, emotion identification, perspective taking and empathy, friendship, conflict, and problem solving ( $\alpha = .69$ ). *Motor development* was measured using nine items grouped into three subtasks assessing fine motor skills ( $\alpha = .83$ ). *Executive function* was measured using 10 items grouped into two subtasks focused on working memory (i.e., forward digit span) and impulse control (i.e., head-toes task). For the forward digit span, assessors read aloud five digit sequences (beginning with two digits and increasing up to six digits) and children were asked to repeat the digit span and marked as correct or incorrect. For the head-toes task, assessors asked children to touch their toes when the assessor touched his or her head, and vice versa in a series of five items ( $\alpha = .83$ ).

Previous research has validated the factor structure of the IDELA in Ethiopia (Wolf et al., 2017). Each item on the IDELA was scored as correct or incorrect. Although scoring in our study was for the most part consistent with the original IDELA developers' standards, additional flexibility was provided on two of the social-emotional items to allow children to receive a "correct" score for more than one response deemed by local experts to be relevant within the local context. (For details IDELA scoring, see Pisani et al., 2015; Wolf et al., 2017). Children's IDELA scores were used as observed variables representing the percent correct in each domain.

#### *Covariates*

In addition to providing information on SES, caregivers also reported on a set of demographic

characteristics that were used as covariates, including child age (in months); language spoken in the home, with indicators for English and Twi (vs. other); caregiver age (in years); whether the caregiver was the mother (vs. other); whether the caregiver was living with a partner or married (vs. single); and whether the child's KG was private (vs. public). Child gender was recorded during the child assessments and was also included as a covariate.

### *Analytic Plan*

To meet the overall aim of the present study, several analytic strategies were used. First, descriptive statistics were examined to determine the average levels of SES, parental investment, and school readiness experienced in the sample. Second, confirmatory factor analysis (CFA) was used to confirm the factor structure of the at-home stimulation and caregiver school involvement latent variables. Third, a partially latent structural equation model (SEM) was used to test the direct and indirect relations between all study variables. Specifically, observed scores (i.e., recorded values) on the poverty scorecard and caregiver education were included in the model as two exogenous, observed variables representing household SES. Mediating mechanisms related to parental investment included at-home stimulation and caregiver school involvement—which were included as latent variables comprised of the specific indicators listed above—as well as an observed score for the number of books in the home. Finally, children's observed scores (represented by the percentage of correct answers) on each IDELA domain (numeracy, literacy, motor, social-emotional, and executive function skills) were included as school readiness outcomes. In addition to including direct paths between all study variables, we also included the above-listed set of covariates as predictors of each of children's school readiness scores. Covariances between exogenous variables and covariances between the error terms of endogenous variables (within the mediators and within the outcomes) were also included. Prior to analysis, we used linear transformations to recode several variables to ensure approximately equal variances across variables. Specifically, maternal age and the poverty scorecard values were divided by 100, the number of books in the home was divided by 10, and the proportion of correct responses on each IDELA domain was multiplied by 10.

All analyses for the present study were conducted in Mplus (version 7.0; Muthén & Muthén,

2012). For both the CFA and SEM models, we used a weighted least squares with missing values (WLSMV) estimator with a Theta parameterization, which allows for the inclusion of the categorical (i.e., noncontinuous, non-normal) at-home stimulation and school involvement indicators (Brown, 2006). The WLSMV approach has been shown to be an appropriate method for addressing data that are missing at random, conditional on the other variables in the model (Asparouhov & Muthén, 2010). Most variables in the present study—including covariates—were missing only a small amount of data, with an average missingness of 4.8% (range = 0.0%–18.6%; see Table 1).

Intraclass correlations (ICCs) for children's school readiness scores ranged from 0.12 for executive function to 0.23 for literacy, indicating that a non-negligible portion of the variance in children's performance was attributable to schools. As such, we used Mplus' CLUSTER command to adjust standard errors and account for children's recruitment from 240 schools. We also used the MODEL INDIRECT command to test the significance of the indirect effects between SES and school readiness. For all models, adequate model fit was considered to be a root mean square error of approximation (RMSEA) of  $< .06$ , a confirmatory fit index (CFI) of  $> .95$ , and a weighted root mean square residual (WRMR; a variance-weighted fit statistic similar to the Standardized Root Mean Square Residual (SRMR) that is appropriate for categorical outcome data) of  $< 1.0$  (Hu & Bentler, 1999; Muthén & Muthén, 2012).

Finally, we used multigroup analysis to test whether results of our primary structural model were invariant (i.e., consistent) across child gender. To do so, we used a chi-square difference test to examine the relative fit of a model in which parameters were estimated without regard to group membership to a model in which parameters were estimated freely across groups. A significant test indicates differences in the parameter estimates across groups.

## **Results**

### *Descriptive Statistics*

Results of descriptive analyses can be found in Table 1. Results suggest substantial heterogeneity in SES within the present sample, with an average poverty scorecard score of 60.81 ( $SD = 13.64$ ). Overall, 13.0% of caregivers had no education, 7.7% completed some primary school, 7.3% completed primary school, 40.5 completed junior high school,

13.2% completed secondary high school, and 18.4% completed a bachelor's or postgraduate degree. Household wealth and parent education were correlated at  $r = .45, p < .01$  (see Table 2). Parental investment characteristics also varied, with levels of stimulation ranging from 53.1% of children having been told stories in the past 30 days to 94.3% of children having been played with. On average, children owned 2.91 books ( $SD = 2.73$ ), though this figure ranged from 0 to 10. The least common form of school involvement was volunteering in a school committee, which averaged 0.14 times ( $SD = 0.53$ ). The most common was attending a PTA meeting, which averaged 1.66 times ( $SD = 1.29$ ) in the last academic year.

*Confirmatory Factor Analyses*

Standardized factor loadings from the CFA conducted for at-home stimulation and caregiver school involvement are shown in Table 3. These results suggest adequate convergent validity for all indicators onto their respective factors (standardized loadings all  $> .40$ ). CFA model fit was adequate at  $\chi^2(43) = 187.95, p < .01$ ; RMSEA = .04; CFI = .95; WRMR = 1.46. Although the WRMR in this CFA model was higher than the typically suggested cutoff of 1.0, this statistic is less well established and previous work has suggested that it may be ignored when it diverges from other fit statistics (Diemer et al., 2010).

*Direct Paths*

The SEM model testing the relations between SES, parental investments, and child school

Table 3  
Factor Loadings of At-Home Stimulation and Caregiver Involvement

Variable	Standardized loading	SE
At-home stimulation		
Reading	.715	.031
Stories	.684	.029
Counting	.889	.025
Playing	.515	.053
Taking outside	.447	.031
Singing	.738	.025
Caregiver school involvement		
Attend PTA meeting	.411	.030
Attended scheduled meeting with teacher	.431	.029
Attended school or class event	.603	.023
Volunteered on school committee	.427	.016
Participated in school fundraiser	.723	.022

readiness in the full sample was found to have adequate model fit:  $\chi^2(211) = 461.15, p < .01$ ; RMSEA = .02; CFI = .95; WRMR = 1.08. Standardized coefficients of the direct paths of this model are shown in Figure 1 and presented in text. Results suggest positive and statistically significant direct relations between both representations of household SES and all three parental investment variables. Specifically, higher levels of parental education were associated with higher levels of at-home stimulation,  $\beta = .26, SE = .03, p < .001$ , school involvement,  $\beta = .17, SE = .04, p < .001$ , and number of books in the home,  $\beta = .16, SE = .03, p < .001$ . Household wealth according to the poverty scorecard was also positively associated with cognitive stimulation,  $\beta = .29, SE = .04, p < .001$ ,

Table 2  
Correlations Between Core Study Variables

	1	2	3	4	5	6	7	8	9	10
1. Household wealth	—									
2. Caregiver education	.448	—								
3. At-home stimulation <sup>a</sup>	.267	.290	—							
4. School involvement <sup>a</sup>	.160	.188	.664	—						
5. Number of books in the home	.273	.293	.199		—					
6. Child numeracy domain score	.123	.088	.032	.064	.063	—				
7. Child literacy domain core	.182	.135	.056	.080	.100	.764	—			
8. Child motor domain score	.049	.011	-.011	.027	.032	.609	.612	—		
9. Child social-emotional domain score	.033	.048	.009	.033	.027	.502	.532	.400	—	
10. Child executive function domain score	.047	.027	-.021	-.020	.024	.514	.484	.436	.421	—
11. Child age	-.252	-.207	-.072	-.202	-.060	.408	.319	.424	.276	.265

Note. Italics indicate correlation is not statistically significant at  $p < .05$ . <sup>a</sup>Latent scores derived in factor analysis used in correlation calculations.

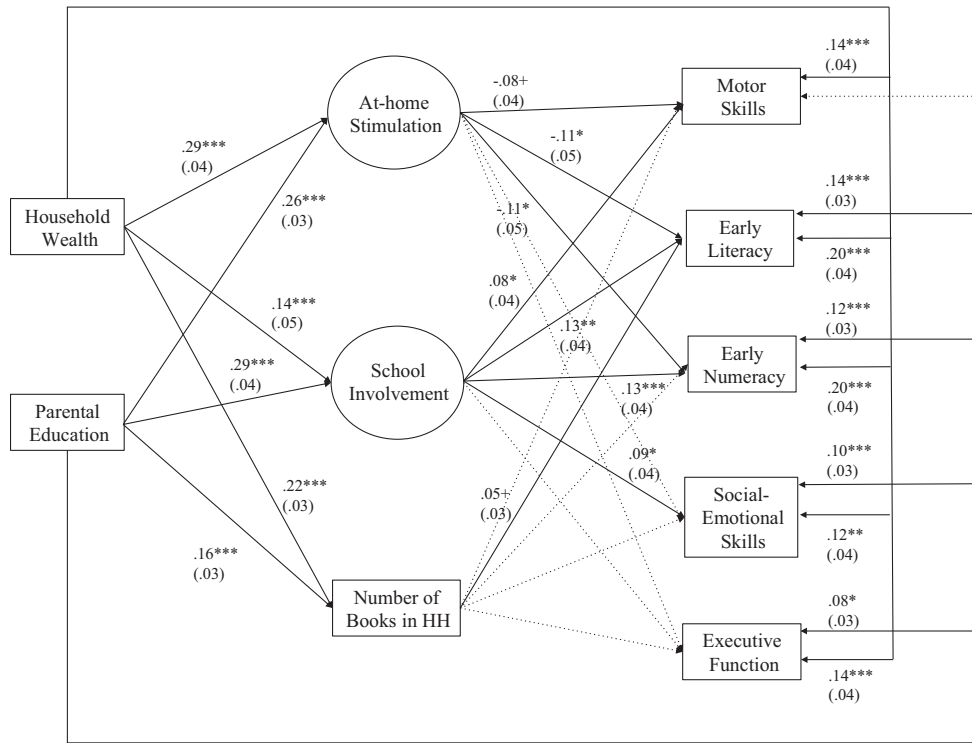


Figure 1. Standardized coefficients and SEs of direct paths in parental investment model.

Note. Significant paths shown in solid lines with accompanying standardized coefficients and SEs. Nonsignificant paths shown using dotted lines without coefficients. Child gender, child age, home language, caregiver age, caregiver relationship with the child, caregiver relationship status, and school type included as covariates predicting child outcomes but not shown; Covariance terms also estimated but not shown.

<sup>+</sup> $p < .10$ .  $^{*}p < .05$ .  $^{**}p < .01$ .  $^{***}p < .001$ .

school involvement,  $\beta = .14$ ,  $SE = .05$ ,  $p < .001$ , and number of books in the home,  $\beta = .22$ ,  $SE = .03$ ,  $p < .001$ .

Positive and significant relations were also observed between both representations of household SES and all child school readiness outcomes, with the exception of a nonsignificant path between caregiver education and child motor skills. Specifically, caregiver education was positively predictive of child numeracy,  $\beta = .12$ ,  $SE = .03$ ,  $p < .001$ , literacy,  $\beta = .14$ ,  $SE = .03$ ,  $p < .001$ , social-emotional skills,  $\beta = .10$ ,  $SE = .03$ ,  $p < .001$ , and executive function,  $\beta = .08$ ,  $SE = .03$ ,  $p < .05$ . Household wealth was positively predictive of child numeracy,  $\beta = .20$ ,  $SE = .04$ ,  $p < .001$ , literacy,  $\beta = .21$ ,  $SE = .04$ ,  $p < .001$ , motor skills,  $\beta = .14$ ,  $SE = .04$ ,  $p < .001$ , social-emotional skills,  $\beta = .12$ ,  $SE = .04$ ,  $p < .01$ , and executive function,  $\beta = .14$ ,  $SE = .04$ ,  $p < .001$ .

Significant and direct relations were also found between several parental investment characteristics and child school readiness outcomes. Specifically, caregiver school involvement was positively

predictive of children’s numeracy skills,  $\beta = .13$ ,  $SE = .04$ ,  $p < .001$ , literacy skills,  $\beta = .14$ ,  $SE = .04$ ,  $p < .01$ , motor skills,  $\beta = .08$ ,  $SE = .04$ ,  $p < .05$ , and social-emotional skills,  $\beta = .09$ ,  $SE = .04$ ,  $p < .05$ , but not their executive function. Number of books in the household was positive and marginally significantly associated with children’s literacy skills,  $\beta = .05$ ,  $SE = .03$ ,  $p < .10$ , but was not significantly related to any other child outcome. Finally, and unexpectedly, caregivers’ reports of at-home stimulation were negatively predictive of children’s numeracy skills,  $\beta = -.11$ ,  $SE = .04$ ,  $p < .05$ , and literacy skills,  $\beta = -.11$ ,  $SE = .05$ ,  $p < .05$ . Stimulation was also marginally and negatively predictive of motor skills,  $\beta = -.08$ ,  $SE = .05$ ,  $p < .10$ . Stimulation was not, however, significantly associated with either social-emotional scores or executive function.

#### Indirect Paths

In addition to the direct effects described above, several indirect effects were observed, suggesting various aspects of parental investment may



partially explain the relations between household SES and child school readiness. In particular, caregiver school participation was found to be a significant mediator of the relation between wealth and numeracy,  $\beta = .02$ ,  $SE = .01$ ,  $p < .05$ ; the relation between maternal education and numeracy,  $\beta = .02$ ,  $SE = .01$ ,  $p < .05$ ; the relation between wealth and literacy,  $\beta = .02$ ,  $SE = .01$ ,  $p < .05$ ; the relation between maternal education and literacy,  $\beta = .02$ ,  $SE = .01$ ,  $p < .05$ ; and the relation between wealth and social-emotional skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .05$ . Caregiver school participation was found to be a marginally significant mediator of the relation between maternal education and social-emotional skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .10$ , wealth and motor skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .10$ , and maternal education and motor skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .10$ .

In addition, the number of books in the home was found to be a marginally significant mediator of the relation between wealth and literacy skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .10$ , and the relation between maternal education and literacy skills,  $\beta = .01$ ,  $SE = .01$ ,  $p < .10$ .

Finally, at-home stimulation was found to be a significant negative mediator of the relation between wealth and numeracy,  $\beta = -.03$ ,  $SE = .02$ ,  $p < .05$ ; the relation between maternal education and numeracy,  $\beta = -.03$ ,  $SE = .01$ ,  $p < .05$ ; the relation between wealth and literacy,  $\beta = -.03$ ,  $SE = .02$ ,  $p < .05$ ; and the relation between maternal education and literacy,  $\beta = -.03$ ,  $SE = .01$ ,  $p < .05$ . Stimulation was also a marginally significant mediator of the relation between wealth and motor skills,  $\beta = -.02$ ,  $SE = .01$ ,  $p < .10$ , as well as the relation between maternal education and motor skills,  $\beta = -.02$ ,  $SE = .01$ ,  $p < .10$ .

#### Total Paths

When combining both indirect and direct paths, the overall relations between wealth and child outcomes were generally stronger than those between maternal education and child outcomes. Specifically, the total effects of wealth on motor skills were  $\beta = .14$ ,  $SE = .04$ ,  $p < .01$ ; on literacy skills were  $\beta = .20$ ,  $SE = .04$ ,  $p < .01$ ; on numeracy skills were  $\beta = .19$ ,  $SE = .04$ ,  $p < .01$ ; on social-emotional skills were  $\beta = .11$ ,  $SE = .04$ ,  $p < .01$ ; and on executive function were  $\beta = .13$ ,  $SE = .03$ ,  $p < .01$ . In contrast, the total effects of maternal education on literacy skills were  $\beta = .14$ ,  $SE = .03$ ,  $p < .01$ ; on numeracy skills were  $\beta = .11$ ,  $SE = .03$ ,  $p < .01$ ; on social-emotional skills were  $\beta = .10$ ,  $SE = .03$ ,  $p < .01$ ; and on executive function were  $\beta = .06$ ,  $SE = .03$ ,  $p < .05$ .

The total effect of maternal education on motor skills was nonsignificant.

#### Differences by Child Gender

We tested the full SEM model for two subgroups, boys and girls, to assess if the relations observed were different for the two groups. We find no differences, as indicated by the nonsignificant chi-square difference test comparing a fully constrained and fully freed version of the model,  $\chi^2$  diff (211) = 235.1,  $p = .113$ .

#### Discussion

The overall aim of the present study was to test the relevance of a cognitive stimulation model of parental investments in young children's learning and development within a sample of Ghanaian preschoolers. In particular, we aimed to understand whether three different forms of parental investment—caregivers' engagement in cognitively stimulating activities in the home, their provision of children's books, and their participation in children's early childhood schooling—might partially explain the relation between SES and five distinct domains of school readiness. Overall, the results suggest that a cognitive stimulation model developed in high-income, Western settings and operationalized for use in Ghana can partially explain children's early outcomes in this particular lower middle-income country setting. At the same time, our results also present several new findings for the field.

Like in the United States, gaps in children's school readiness were observed based on both family wealth and caregiver education levels. In terms of total effects, we observed that a 1 *SD* increase in Ghana's poverty scorecard was associated with a 0.11–0.20 *SD* increase in children's school readiness scores, depending on developmental domain. Similarly, for caregiver education, a 1 *SD* increase in parents' education levels was associated with a 0.05–0.14 *SD* increase in children's school readiness scores. This confirms that even in low-resourced settings, household SES is an important, direct predictor of children's school readiness outcomes in preschool. SES was also directly related to the investments parents make in their children early in life, with strong relations observed between both household wealth and education and all three parental investment variables. Importantly, both aspects of SES were independently related to both

parental investment and child outcomes, with wealth showing slightly stronger relations than education. This is consistent with prior work from sub-Saharan Africa (e.g., McCoy et al., 2015) and suggests that interventions to improve household income and boost parental education can each have independent—and possibly additive—impacts on positive family and child processes. Recent research in Mexico also shows this to be the case for poor families (Fernald et al., 2017).

Despite clear links between SES and parental investment processes, parents' investments were not consistently related to children's levels of school readiness, as hypothesized based on prior work from the United States (e.g., Chazan-Cohen et al., 2009; Gershoff et al., 2007; Yeung et al., 2002). In particular, the number of books in the home was weakly predictive of early literacy, which is in keeping with prior work. At the same time, this characteristic (when accounting for other forms of investment and household SES) was not directly related to math, motor skills, executive function, or social-emotional skills. It is possible that in addition to the number of books in the home, the nature of parent-child interactions with the books is critical for promoting a broader range of skills (e.g., Whitehurst et al., 1994). For example, research in other contexts has shown the amount of time parents spent reading and engaging in activities with children, in addition to materials in the home, was an important mediator in explaining the relation between SES and children's school readiness outcomes (Yeung et al., 2002).

Interestingly, and contrary to the original hypothesis, cognitive stimulation was negatively predictive of children's motor skills, early literacy, and early numeracy. Notably, the measure used in the present study to operationalize parental stimulation asks exclusively about whether a somewhat limited set of interactions has occurred over the previous month and does not account for the timing, frequency, duration, or quality of these interactions. Indeed, parent-child interaction *quality*, rather than quantity, has been shown to predict low-income children's school readiness in other contexts, including social, communication, and vocabulary skills (Connell & Prinz, 2002). Other types of interactions that are correlated with parents' reports of stimulation but not accounted for in this study may therefore underlie the associations observed. For example, measuring parental stress and mental health may shed light on the nature of interactions children experience with their caregivers (e.g., Peterson & Albers, 2001). Alternatively, it is possible

that parents invest more in children who are delayed in development, or in younger children who have less school experience, and thus the negative association observed. Indeed, parental investments were negatively correlated with age. Given the cross-sectional nature of the data, the direction of the relation cannot be determined.

More research is needed to examine these relations within diverse cultural settings, as are better measures to capture the quality and quantity of interactions between parents and children in the home environment to begin to unpack these findings. In particular, research examining the link between parenting practices and early childhood development in sub-Saharan Africa may benefit from applying an indigenous motivational caregiving practices model as suggested by Wadende, Oburu, and Morara (2016). This model suggests that caregivers engage in many unwritten practices based on culturally specific expectations of children, such as cleaning themselves or babysitting their siblings (Nsamenang, 2008). These skills build children's sense of self-efficacy and are highly scaffolded, allowing them to integrate new skills into what they already knew. Future studies should incorporate such a framework to guide what types of investments are measured in future work.

Finally, the present study also examined a relatively unexplored form of parental investment *out* of the home: involvement in children's early childhood educational programs. Given the growing involvement of Ghanaian children in preprimary programs, exploring the ways that parents engage with their children's early schooling is of particular relevance in this context. Results suggest that school involvement is strongly and positively associated with all child outcomes except executive function and serves as the primary mediating mechanism in the path from SES to school readiness. These results highlight the barriers faced by low-SES parents in participating in their children's school experiences (Kohl, Lengua, & McMahan, 2000; Weiss et al., 2003) and reinforce the need for interventions to support parent-school partnerships across socioeconomic groups. Notably, parents with children enrolled in private schools in this sample reported higher rates of participation in two of the five activities assessed (attending scheduled meetings with the teacher and participation in school or class events). It is not known whether this is due to differences in *opportunities* for involvement offered by private and public schools, or if parents in private schools simply invest more in their children. Although we control for private sector status in our

analysis, understanding how differing opportunities for school involvement may shape parental investments is an important area for future research.

Despite differential educational outcomes for boys and girls in primary and secondary school in Ghana, we find no differences in the current analytic model based on gender. This indicates that the pattern of relations between SES, investments, and early child outcomes operate similarly for boys and girls. Along the same lines, in this sample, the mean level of investments in children does not differ for boys and girls (data not shown). As such, these results suggest that for a sample of children already enrolled in preprimary school, SES-related disparities in investment and children's school readiness are stable across gender. In the future, additional research is needed to understand if, when, and how gender differences in parental investments and SES-related disparities unfold as children progress through school. Furthermore, additional work is needed using samples of Ghanaian children who are *not* enrolled in preschool and who live in more rural settings, as it is possible that these processes may operate differently in these settings, which tend to face higher levels of gender inequity (Porter et al., 2011; Shabaya & Konadu-Agyemang, 2004; UNGEI, 2012). Such information would be valuable to Ghana and to the international community's efforts in achieving the Sustainable Development Goal 4 (United Nations, 2015), which explicitly aims to eliminate gender disparities in educational achievement.

#### *Limitations*

There are several limitations of this work that must be considered when interpreting these results. First, the results of this study are noncausal due to the cross-sectional and nonexperimental nature of the data used. Although we controlled for several potential confounding characteristics in our analysis (e.g., school type, home language, caregiver age), we are unable to determine the direction of the relations observed. For example, it is likely that parents' school involvement may change in direct response to how well their children are doing developmentally, with children who are struggling or those who are doing well becoming more involved with time. Two additional rounds of data collection are planned for this sample. The availability of longitudinal data in this and other LMIC samples will allow for more nuanced understanding of how parental investments relate to children's developmental trajectories in the early school years.

Second, the measures used to capture parental investment were all reported by a single caregiver, did not assess the quality of interactions during the named activities, and were likely not fully representative of all possible ways that caregivers invest in their children in this context. In particular, the at-home stimulation measure lacks specificity with regard to the frequency, variety, and quality of activities that various caregivers used to stimulate their children. Furthermore, due to a data collection error, findings from this scale are noncomparable to previous results due to the fact that caregivers were asked to report activities in the past 30 days instead of the intended 3-day window. Indeed, this error may explain the higher prevalence of stimulation activities identified in the present study compared to prior work from the MICS (Ghana Education Service, 2012). In the future, additional work is needed using more robust and objective metrics of parental investment quality and quantity (e.g., the HOME Inventory) that have been appropriately adapted to ensure their relevance and comprehensiveness in particular cultural settings. In addition, careful attention to field data collection quality assurance is necessary to avoid unintentional errors. Furthermore, the measure used to assess children's developmental outcomes (IDELA) is a relatively new measure that has not been validated against other measures of ECD in the Ghanaian context.

Third, although this study uses a diverse sample of children living in the Greater Accra region of Ghana, these findings cannot generalize beyond this specific study context. More work is needed to examine similar models of parental investment in diverse cultural, linguistic, and geographical contexts, not only in sub-Saharan Africa but in other LMICs. Additionally, because not all caregivers of children in our sample could be reached, and those reached were more likely to be enrolled in private schools and had slightly higher literacy scores, there is possible bias in the external validity of the findings within the region. Finally, although our measure of school readiness was designed with low-resourced contexts in mind, it was not developed to specifically capture the skills most central to long-term success *in Ghana*. For example, although nutrition and physical development have been shown to be important markers of early development in LMICs (e.g., Hoddinott, Alderman, Behrman, Haddad, & Horton, 2013), these variables were not captured in this study. Similarly, potentially culturally relevant aspects of creativity and confidence deemed important by the Ghana Education Service were also excluded (UNESCO, 2006).

Future research examining models of children's school readiness should incorporate such culturally specific measures for a more comprehensive model of learning and development.

### Conclusions

Children in LMICs are exposed to a great variety of macroenvironmental risks, which are reflected in the relatively low levels of educational attainment and achievement outcomes observed in these settings. We find that within this Ghanaian context, household SES-based school readiness gaps exist, and parental investments—and particularly school involvement—account for some of these associations. These findings contribute to theory building by providing evidence in an underresearch context characterized by high levels of child poverty and low levels of adult literacy. Development economists have emphasized the importance of direct investment in a variety of strategies that promote “human capital” in low-income families with young children, such as promoting better nutrition, health care, parental education, and enrichment (Hoddinott et al., 2013). Similarly, developmental psychologists have argued for multipronged interventions that target multiple settings of children's lives (Engle et al., 2011).

Both of these approaches highlight the potential utility of two-generation programming to simultaneously address the needs of both children and their parents with the ultimate goal of improving school readiness in high-risk environments. Indeed, there is strong evidence that interventions supporting parents and children together (e.g., home visiting) can improve outcomes for families in poverty (Engle et al., 2011; Neville et al., 2015). Assuming that the associations observed in this study reflect causal effects, our findings support this perspective in Ghana and highlight that caregiver education, household wealth, and parental investment are three targets of intervention that could support child outcomes and mitigate SES disparities at the start of formal schooling.

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### Appendix

Comparison of Child Characteristics, Locale, and School Sector Status for Children With and Without Caregiver Data

	Missing caregiver survey	Not missing caregiver survey	t- or F-stat	p Value
Numeracy	0.447	0.451	−0.652	.515
Literacy	0.437	0.454	−2.340	.019
Motor	0.715	0.706	0.945	.345
Social-emotional	0.420	0.419	0.164	.870
Executive function	0.556	0.556	0.023	.982
Female	0.474	0.502	−1.607	.108
District (%)			0.090	.769
La Nkwantanang-Madina	25.6	24.2		
Ga Central	10.2	15.4		
Ledzokuku-Krowor	20.9	23.0		
Adenta	12.5	13.1		
Ga East	13.2	9.4		
Ga South	17.5	14.9		
Private school (%)	49.2	56.0	−3.890	.000

Note. Sample includes all children directly assessed at baseline (N = 3,435). Differences in subgroups assess for each outcome separately either through an independent samples *t* test (for continuous variables) or an analysis of variance (for categorical variables).