

**PARENTS' EDUCATIONAL BELIEFS AND CHILDREN'S EARLY ACADEMIC
SKILLS: EXAMINING HOW BELIEFS OPERATE ACROSS THE SES CONTINUUM**

by

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In this study, we tested whether associations between parents' educational beliefs and growth in their children's achievement in kindergarten were moderated by socioeconomic status (SES) and whether this moderation effect was mediated by parental enrichment practices. Participants included 13,400 children drawn from the Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011) and their parents. Educational beliefs included parents' beliefs about the skills necessary for a child entering kindergarten and parents' expectations for their children's eventual educational attainment. SES was operationalized as both income and parental educational attainment, and enrichment was measured as academically-related practices in the home and community. Educational beliefs were significantly and positively related to achievement, such that children whose parents rated early skills as more important and held higher expectations for their children tended to have higher math and reading scores at the end of kindergarten. A marginally significant interaction emerged between school readiness beliefs and income such that beliefs were less predictive of achievement at higher levels of income. In addition, both school readiness beliefs and expectations were positively related to home enrichment practices, but only expectations were associated with community enrichment practices. However, neither enrichment measure mediated the educational beliefs by SES interaction. Implications and directions for future research are discussed.

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	PARENTS’ EDUCATIONAL BELIEFS	3
1.1.1	Guiding Theoretical Frameworks.....	3
1.1.2	Relations to Academic Achievement.....	4
1.1.3	Parental Enrichment as a Mediating Mechanism	7
1.2	MODERATION BY SES IN THE ASSOCIATIONS BETWEEN EDUCATIONAL BELIEFS AND ENRICHMENT.....	9
1.3	RESEARCH QUESTIONS AND HYPOTHESES.....	12
2.0	METHOD	15
2.1	PARTICIPANTS	15
2.2	MEASURES AND PROCEDURES.....	16
2.2.1	Educational beliefs.....	17
2.2.1.1	School readiness beliefs	17
2.2.1.2	Educational expectations.....	17
2.2.2	Parents’ enrichment practices.....	18
2.2.2.1	Home based enrichment	18
2.2.2.2	Community based enrichment.....	19
2.2.3	Children’s academic achievement.....	19

2.2.4	SES	20
2.2.4.1	Household income	20
2.2.4.2	Parental Education	21
2.2.5	Covariates.....	21
2.3	ANALYSIS PLAN	22
2.3.1	Aim 1.....	23
2.3.2	Aim 2.....	24
2.3.3	Aim 3.....	24
3.0	RESULTS	26
3.1	AIM 1	29
3.2	AIM 2	33
3.3	AIM 3	38
3.4	ALTERNATIVE MODEL SPECIFICATIONS.....	39
4.0	DISCUSSION	45
4.1	PARENTS’ EDUCATIONAL BELIEFS, CHILDREN’S ACADEMIC ACHIEVEMENT, AND SES.....	45
4.2	ENRICHMENT AS A MEDIATING MECHANISM OF INTERACTIONS ON ACHIEVEMENT	47
4.3	LIMITATIONS AND CONCLUSIONS.....	52
	APPENDIX A	54
	BIBLIOGRAPHY.....	56

LIST OF TABLES

Table 1. Imputed, weighted descriptive statistics for all study variables (N = 13,400).....	27
Table 2. Predicting achievement from educational beliefs, SES interactions, and enrichment....	30
Table 3. Regression models predicting enrichment practices from educational beliefs.....	35
Table 4. Predicting achievement without baseline achievement	41

LIST OF FIGURES

Figure 1. Moderation by SES in associations between educational beliefs and achievement.....	13
Figure 2. Mediated moderation by SES operating through enrichment practices	13
Figure 3. Income by school readiness beliefs interaction predicting achievement.....	32

1.0 INTRODUCTION

Children's early academic skills at the start of school are a strong predictor of later school success and even adult socioeconomic status (SES; Duncan et al., 2007; Ritchie & Bates, 2013). However, substantial individual differences in children's early reading and math skills are evident at kindergarten entry. In the domain of math, for instance, the average child starting kindergarten can count to 10, yet around 5% of children can already do simple arithmetic, while another 5% are unable even recognize numbers (Zill & West, 2001). To understand the nature and sources of these early individual differences in achievement, a great deal of research has focused on the importance of parental actions and behaviors. This work has shown that parenting practices, such as providing children with cognitively stimulating experiences and opportunities for learning both inside and outside of the home, can foster children's school readiness and later education (Lagacé-Séguin & Case, 2010; NICHD Early Child Care Research Network, 2004; Taylor, Clayton, & Rowley, 2004). However, less work has examined whether parents' beliefs about children's early learning and parents' educational expectations may relate to young children's achievement either directly or indirectly, although some evidence suggests that parents with stronger educational beliefs may engage in more enrichment practices with their children, which in turn may promote children's learning (e.g., Davis-Kean, 2005; Sy & Schulenberg, 2005).

Despite this somewhat limited research base, modifying parents' beliefs has been a target of past parenting interventions (see Holden & Edwards, 1989, for a review), suggesting the importance of understanding how these beliefs relate to children's achievement. Although relatively few educational programs directly target parents' beliefs, many well-known programs indirectly incorporate educational beliefs, such as parent-teacher conferences in Head Start to discuss children's development and parents' goals for their learning (Benasich, Brooks-Gunn, & Clewell, 1992; Cheatham & Ostrosky, 2013). Even when beliefs are not a direct target of the intervention, these types of programs have been shown to foster parental beliefs such as self-efficacy and expectations for children's attainment (Benasich et al., 1992; Galper, Wigfield, & Seefeldt, 1997; Kim, Sherraden, Huang, & Clancy, 2015; Seefeldt, Denton, Galper, & Younoszai, 1999). However, an evidence base that clearly illustrates the role of parental beliefs in early learning is underdeveloped.

Although there is little research examining links between parental beliefs and children's early achievement, decades of research have highlighted the significant influence of SES, particularly family income and maternal education, on individual differences in children's early learning. Children raised in homes with low income or low levels of parental education are at an increased risk of struggling academically in school (e.g., Bradley & Corwyn, 2002; Davis-Kean, 2005; Duncan & Murnane, 2011; Magnuson, 2007; McLoyd, 1998). Importantly, these achievement gaps across levels of SES appear to have increased over the past several decades (Reardon, 2011, 2013). Differences in how parents' educational beliefs relate to children's achievement may help us understand these achievement gaps. In particular, there is theoretical and empirical evidence to suggest that economically disadvantaged parents may have difficulty translating their beliefs into practices. However, the question of whether the associations

between parents' educational beliefs and their enrichment practices, as well as associations between these beliefs and children's achievement, differ across SES among kindergarteners has not been directly addressed in past research.

The current study explored these issues by examining associations between educational beliefs, enrichment practices, and children's academic achievement in a nationally representative sample of families. Specifically, this study assessed whether SES moderated the association between educational beliefs and children's achievement. Further, we examined whether this association operated through parents' enrichment practices, both in the home and in the community.

1.1 PARENTS' EDUCATIONAL BELIEFS

1.1.1 Guiding Theoretical Frameworks

Given the importance of early academic skills for later school and life success (Duncan et al., 2007; Ritchie & Bates, 2013), understanding the factors that promote these early skills is vital. Models of academic socialization suggest that parents are crucial influences on children's cognitive and academic development (Taylor et al., 2004). Although past research has focused on what parents do with their children to support their learning, Taylor and colleagues' model proposes that academic socialization also occurs through parents' beliefs and expectations. According to this view, beliefs and values may directly influence children's academic development. However, indirect associations between parents' beliefs and achievement are also possible. Parents' language to their children, the types of learning environments that they

provide, and their involvement in their children's schooling can foster children's academic growth. These practices stem largely from parents' education-related experiences, cultural perceptions, and beliefs (Taylor et al., 2004).

Additionally, according to the developmental niche theory, a child's developmental context is comprised of three main subsystems: the physical and social characteristics of their setting, parenting practices, and the specific beliefs of parents (Super & Harkness, 1986). These components are each directly related to children's developmental outcomes, suggesting that beliefs may directly relate to children's early development. However, the theory also posits that children's settings and parents' practices are primarily determined by parents' belief systems (Harkness & Super, 1993), suggesting that parental beliefs may operate indirectly through parents' practices to foster early academic skills.

Both academic socialization and the developmental niche theory suggest that parents' beliefs may directly and indirectly foster children's achievement. Below, we review empirical evidence of direct associations between beliefs and academic achievement, followed by studies documenting indirect effects through enrichment practices.

1.1.2 Relations to Academic Achievement

The existing research has addressed educational beliefs in myriad ways, such as beliefs about the importance of education, children's current academic competencies, and parents' roles in the learning process (e.g., Okagaki & Sternberg, 1993; Stevenson, Chen, & Uttal, 1990; Tazouti, Malarde, & Michea, 2010). For the purposes of the present study, we focused primarily on two domains of educational beliefs that appear to be particularly relevant for early childhood: (1) short-term beliefs about school readiness and children's early education; and (2) long-term

beliefs about their children's future educational attainment (e.g. Halle, Kurtz-Costes, & Mahoney, 1997; Sy & Schulenberg, 2005). School readiness beliefs are often addressed in terms of how important parents consider specific school readiness skills to be for a child entering kindergarten. These skills include a range of cognitive and socio-emotional skills that are necessary for formal schooling, such as early literacy, attention, and emotion regulation (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Morgan & DiPerna, 2007; Sy & Schulenberg, 2005). Educational expectations, on the other hand, refer to parents' expectations for the highest educational degree that their child will attain (e.g., Eccles, 1993; Sy & Schulenberg, 2005).

Past research addressing educational beliefs has focused primarily on parents' educational expectations and much less so on their school readiness beliefs. In terms of associations between parents' expectations and children's academic success, abundant evidence from elementary school, middle school, and high school students suggests that parents' with higher expectations tend to have children who demonstrate higher levels of academic achievement (Berzin, 2010; Davis-Kean & Sexton, 2009; Davis-Kean, 2005; Halle et al., 1997; Hopson & Weldon, 2013; Rutchick, Smyth, Lopoo, & Dusek, 2009; Stevenson et al., 1990; Yamamoto & Holloway, 2010). Several meta-analyses have suggested that parents' expectations for their children are highly predictive of children's academic success and, compared to other parental factors such as parental school involvement and home literacy practices, have the largest effect sizes in predicting achievement across elementary school and secondary school (Fan & Chen, 2001; Jeynes, 2005, 2007).

Despite the robustness of these findings regarding links between parental expectations and children's achievement, several studies addressing how these processes operate across individuals have found that expectations may predict achievement differently among different

cultural or socioeconomic groups (Davis-Kean & Sexton, 2009; Davis-Kean, 2005; Sy & Schulenberg, 2005). Specifically, a recent meta-analysis of studies addressing these associations across racial/ethnic categories suggests that non-White children may not benefit from parental expectations to the same degree as their White peers (Yamamoto & Holloway, 2010). Across all studies reviewed, parental expectations were associated with children's achievement for White students, but associations were documented inconsistently for Black and Asian students and rarely for Hispanic students. Additionally, some older research suggest that parental expectations of children's grades in late elementary school were less correlated with their actual grades among families in which parents received lower levels of education (Alexander, Entwisle, Bedinger, 1994). Thus, although associations between parental expectations and children's achievement have repeatedly surfaced in past research, these associations may vary in strength for different subgroups of families (but see also Stevenson et al., 1990).

As mentioned above, research on parents' school readiness beliefs is somewhat scarce. Among a sample of White and Asian American families, Sy and Schulenberg (2005) found that parents' beliefs about the importance of academic skills for kindergarteners as well as parental expectations were related to both initial academic skills as well as growth over kindergarten and first grade. These associations appeared to function similarly across White and Asian families, although these findings have not been replicated in more representative samples.

Despite this limited research base, however, there is reason to believe that school readiness beliefs may be important for understanding children's achievement. Research suggests that the nature of kindergarten has changed drastically over the past decade. Specifically, in comparing two nationally representative samples of kindergarteners from 1998 and 2010, Bassok, Latham and Rorem (2015) found that teachers' values have become increasingly

academic, more instruction time is devoted to math and reading skills, and kindergarteners spend significantly more time working with textbooks and worksheets in the more contemporary sample of children. Given these changes in the context of kindergarten, parents' school readiness beliefs may be particularly important for ensuring that children enter school with the necessary skills to succeed. Additionally, schools often do not provide parents with information regarding their expectations for children, which may enhance the importance of parents' beliefs about school readiness in this context of limited communication (Piotrkowski, Botsko, & Matthews, 2000). More broadly, however, these changes in the nature of contemporary kindergarten practices suggest that more research is needed to determine if previously documented positive associations between educational beliefs and achievement replicate.

1.1.3 Parental Enrichment as a Mediating Mechanism

As described above, parents' beliefs about education should theoretically relate to their practices that support their children's learning (Taylor et al., 2004; Super & Harkness, 1986). Some empirical evidence supports these claims, demonstrating that parental enrichment practices mediate the link between parents' educational beliefs and children's academic achievement. Among a sample of middle to high SES parents of kindergarteners, Sy and Schulenberg (2005) found that parents' beliefs about the importance of school readiness skills and expectations for their children's academic attainment predicted their practices to support children's learning across the kindergarten year, such as reading with children and engaging in educational activities outside of the home. These practices, in turn related to children's math and reading scores, as well as growth in both of these domains, over kindergarten and first grade (Sy & Schulenberg, 2005). Among a more diverse sample of older elementary school children and their parents,

Davis-Kean (2005) also found that parents' educational expectations for their children were associated with concurrent home enrichment activities, including providing cognitive stimulation and the frequency of children's reading for enjoyment, which in turn predicted children's concomitant standardized achievement. These findings suggest that enrichment activities in the home may mediate associations between educational beliefs and achievement; however it is important to note that this study was cross-sectional and these enrichment activities did not necessarily involve the parent. Somewhat more recent work comparing these processes across racial groups has replicated these findings and shown that parenting behaviors in the home mediate links between parental expectations and children's achievement, but, interestingly, these patterns of associations varied somewhat across racial/ethnic groups (Davis-Kean & Sexton, 2009). For example, among Hispanic American parents, expectations were not significantly related to children's achievement, and among Black parents, home enrichment was not associated with children's achievement.

Although most of this research has focused on parents' expectations as opposed to parents' school readiness beliefs, some work suggests that parents' beliefs about the importance of specific content areas relate to relevant practices. Parental values regarding specific academic subjects, such as math, appear to directly influence their practices to support these areas. Early math skills are consistently underemphasized by parents of young children (Cannon & Ginsburg, 2008), yet parents who value the importance of their children learning math at a young age are more likely to report engaging in math-related activities with their children in the home (Sonnenschein et al., 2012).

Despite this evidence that parents' educational beliefs predict their practices, several studies have failed to find these links (e.g., Diamond, Reagan, & Bandyk, 2000; Halle et al.,

1997). For example, among a nationally representative sample of parents of preschoolers, parents who reported more concern for their child's lack of readiness for kindergarten were not significantly more likely to read with their child or show their child educational television programs (Diamond et al., 2000). Additionally, Halle and colleagues (1997) found that among a sample of low-income third and fourth graders, parents' beliefs about their children's current abilities or future educational attainment did not predict their behaviors. The authors suggested that in this high risk sample of families, parents' practices were determined by factors other than beliefs, although the study did not directly compare these models across high and low SES families. Thus although most studies suggest that educational beliefs predict parents' enrichment practices, these inconsistent findings suggest that the way in which beliefs are translated into behaviors may differ systematically across individuals (Bradley & Corwyn, 2002).

1.2 MODERATION BY SES IN THE ASSOCIATIONS BETWEEN EDUCATIONAL BELIEFS AND ENRICHMENT

As shown in the work of Davis-Kean and others (Davis-Kean & Sexton, 2009; Halle et al., 1997), associations between parents' educational beliefs and children's achievement may not operate uniformly across all families. Although several studies have examined how these educational beliefs may operate differently across race (Davis-Kean & Sexton, 2009; Davis-Kean, 2005; Sy & Schulenberg, 2005), less work has compared how educational beliefs operate across SES. In this study we examine whether educational beliefs are differentially predictive of achievement among lower and higher SES families. Specifically, educational beliefs may be less

predictive of children's academic achievement in low SES homes, given that these educational beliefs may be less related to enrichment practices that support children's early achievement.

Theoretically, the relation between parents' educational beliefs and enrichment practices may depend on context. According to the theory of reasoned action, an individual's beliefs, along with multiple other influences, determine an individual's intention to act in a certain way (Ajzen & Fishbein, 1980; Holden & Edwards, 1989). Specifically, parents' behaviors may be influenced by their specific beliefs as well as by community norms or more general contextual factors (Ajzen & Fishbein, 1980). Thus for parents in diverse contexts, the link between beliefs and actions regarding children's education may operate in meaningfully different ways, which may in turn have implications for children's early academic skills. A parents' intention to act in accordance with their educational beliefs may not be sufficient to produce behaviors, as other contextual factors could limit the behaviors that parents can exhibit (McLoyd, 1998). This explanation is consistent with theoretical models such as the family stress model, which argues that economic adversity limits positive parenting through increased stress and poor psychological well-being (Conger & Donnellan, 2007). In other words, beliefs may operate differently in predicting parenting practices across SES groups because socioeconomic disadvantage may limit low SES parents' abilities to engage in enrichment practices with their children (Conger & Dogan, 2007). Although this pattern of associations has been suggested previously (e.g. Goodnow, 1988), previous research has not directly addressed whether associations between educational beliefs and enrichment practices are moderated by SES.

Two main bodies of empirical evidence support these theoretical claims. First, associations between beliefs and enrichment are somewhat inconsistently found in the literature, as reviewed above (e.g., Diamond et al., 2000; Halle et al., 1997). The mixed findings regarding

links between parents' beliefs and enrichment practices suggest that an unmeasured moderator could explain why some studies find associations that others do not (e.g., Bradley & Corwyn, 2002). Specifically, Halle and colleagues' (1997) findings that educational beliefs did not predict parents' enrichment practices among low-income families suggest that SES may moderate these associations.

Second, an added complexity in this work is the apparent lack of association between parental beliefs and SES. Lower SES parents are less likely to engage in cognitively stimulating activities with their children, both in the home and in the community (e.g., Bradley & Corwyn, 2002; NICHD Early Child Care Research Network, 2004). However, parents' educational beliefs appear to be relatively unrelated to SES. These differential associations with SES may suggest that among low-SES families, parents could hold strong beliefs about the importance of kindergarten skills or high expectations for children's attainment, yet these parents may nonetheless be less likely to engage in enrichment practices in the home.

Most research indicates that there is no strong relation between parents' school readiness beliefs and SES. Barbarin and his colleagues (2008) found no association between SES and parents' beliefs about the skills needed for their children to start kindergarten among a diverse sample of families with preschoolers. Likewise, among families in a high-risk community, parental education level was unrelated to parents' beliefs about school readiness (Piotrkowski et al., 2000). The authors argue that parents with lower SES may actually value school readiness skills more than high-SES parents given that their children are more likely to enter poor quality schools and so stronger early academic skills may be necessary when starting school to help compensate.

In terms of parental expectations, some studies have documented positive relations between parents' expectations and parental education or income (e.g., Bodovski & Farkas, 2007; Davis-Kean, 2005), such that high-SES parents appear to have higher expectations for their children than do low-SES parents. However, others have found that many low-SES parents consistently hold high expectations for children's educational success (e.g., Alexander, Entwisle, & Bedinger, 1994). This finding has been replicated in other samples of low-income families of elementary school children, as parents appear to have high expectations and evaluations of children's academic abilities even when children are performing below average (Halle et al., 1997). Thus although parents' expectations for children's attainment may differ across levels of SES, it seems that these beliefs may operate dissimilarly across families, suggesting that SES may moderate the association between parents' educational beliefs and their enrichment practices.

1.3 RESEARCH QUESTIONS AND HYPOTHESES

The current study examined whether parents' educational beliefs were associated with children's academic achievement and whether SES moderated these associations (Aim 1, see Figure 1). We expected that parents' school readiness beliefs and expectations would be positively associated with children's academic abilities at the end of kindergarten. Additionally, we hypothesized that these educational beliefs would be less strongly predictive of children's achievement among lower SES families as compared to higher SES families.

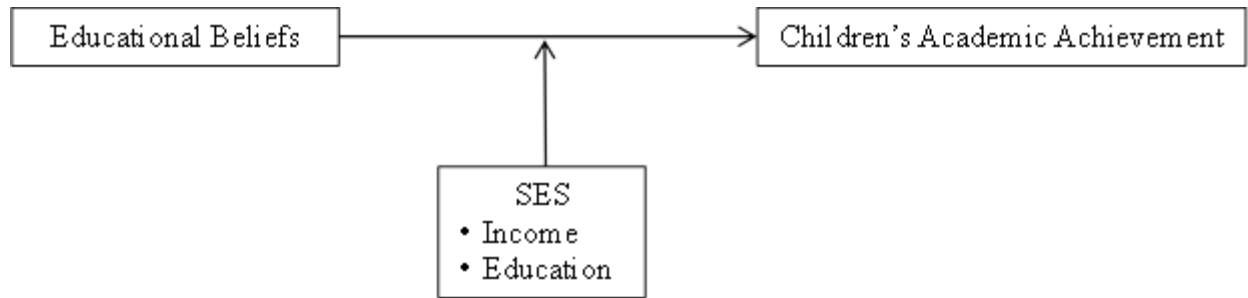


Figure 1. Moderation by SES in associations between educational beliefs and achievement

Further, this study addressed whether moderation by SES in these associations between parents' beliefs and children's academic achievement was mediated through parental enrichment practices (see Figure 2).

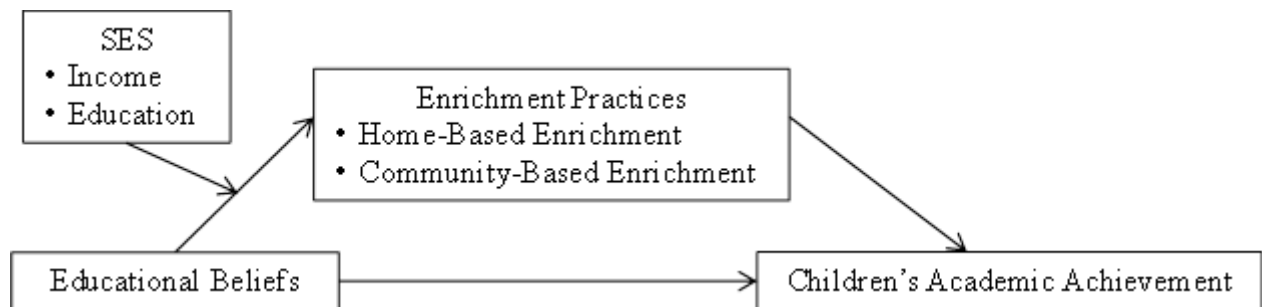


Figure 2. Mediated moderation by SES operating through enrichment practices

First, we tested whether educational beliefs were related to parental enrichment practices and whether SES moderated these associations (Aim 2). A significant SES by beliefs interaction on enrichment practices was expected, such that associations between parents' educational beliefs and their enrichment practices would be weaker among low SES parents than high SES parents. A mediated moderation model was then tested to examine whether the interaction effects

of SES and beliefs on children's academic achievement were mediated through parents' enrichment practices (Aim 3; Morgan-Lopez & MacKinnon, 2006). This model investigated whether low SES parents' beliefs were less strongly associated with children's academic achievement because these beliefs were also less strongly predictive of parents' enrichment practices, which in turn promoted children's academic achievement. Significant indirect effects operating through enrichment were expected, which would suggest that differential relations between educational beliefs and enrichment practices across SES groups observed in Aim 2 would explain the interaction between beliefs and SES in predicting children's academic achievement observed in Aim 1.

2.0 METHOD

2.1 PARTICIPANTS

Data for this study were drawn from the Early Childhood Longitudinal Study: Kindergarten Class of 2010-2011 (ECLS-K:2011), a publicly available dataset of over 18,000 children administered by the National Center for Education Statistics (NCES) through the Institute of Education Science. The ECLS-K:2011 documents children's cognitive, social, and physical growth, as well as characteristics of children's homes, classrooms, and schools through direct observations of children and interviews with parents, teachers, and school administrators. Assessments occurred in several waves of data collection across childhood, including during the fall and spring of kindergarten and first grade, fall of second grade, and spring of third grade. Data collection is scheduled to continue through 2016, when most children will be in fifth grade. Data for the proposed project were collected in the fall of 2010 (fall of kindergarten) and the spring of 2011 (spring of kindergarten).

Children were selected for participation in the ECLS-K:2011 based on a stratified sampling scheme. First, 860 schools (710 public, 150 private) agreed to participate, representing 61% of the randomly selected schools who were contacted. From these schools 18,170 families were then selected and contacted to participate. At the fall of kindergarten, 74% of families who were contacted had consented to participation and completed parent interviews. At the spring of

kindergarten, all sampled families were contacted, in addition to 2,060 newly sampled families to increase the total sample size (20,230 total). Sixty-seven percent of this combined sample consented to and completed the second round of parent interviews (see NCES, 2013, for a more detailed description of sampling techniques and response rates). Participants in this study included 13,400 children who entered kindergarten between 2010 and 2011 and their parents. In order to be included in this sample, parents must have participated in interviews in the fall of kindergarten (66% of the combined sample).

2.2 MEASURES AND PROCEDURES

All data used in the proposed study were collected through computer assisted telephone interviews with an adult in the child's household (87% and 86% mothers at fall and spring of kindergarten respectively) and direct cognitive assessments of children. For families with limited access to a telephone (6% in the fall and 7% in the spring), interviews were conducted in person. Less than 10% of interviews in both the fall and spring were conducted in a language other than English, primarily Spanish (8% and 9%, respectively). Interviews lasted between 45 minutes to one hour and addressed topics such as parenting practices and beliefs, child-care usage, demographic characteristics, and child health. Measures of children's academic skills were taken from computer based cognitive assessments that were administered individually in children's classrooms by trained researchers in both the fall and spring of kindergarten.

2.2.1 Educational beliefs

Parents' beliefs about children's education were addressed in two ways: beliefs about school readiness and educational expectations. Both measures were administered in the fall of children's kindergarten year. A preliminary principal components analysis with direct oblimin rotation was conducted on the set of educational beliefs variables and revealed that a 2-factor solution was most appropriate; thus, separate measures for school readiness beliefs and expectations were calculated for analysis.

2.2.1.1 School readiness beliefs

Parents reported how important they believed it was for children to have skills such as counting to 20, communicating needs, and taking turns in order to be prepared for kindergarten. Parents rated six items, each describing a developmentally appropriate task, on a 5-point scale (1 = *essential*; 5 = *not important*). Items were adopted from the NHES:93 School Readiness Questionnaire (Zill et al., 1993) and are shown in the Appendix. These six items were reverse coded for ease of interpretation so that higher scores represent stronger beliefs, and averages were calculated for all cases with valid responses to at least 4 of the items to form composites. Internal reliability for this measure was good ($\alpha = .82$).

2.2.1.2 Educational expectations

Parents also reported their expectations for their children's educational attainment in the fall of kindergarten. For this single item, interviewers asked parents how far in school they expected their child to go in school on a 7-point scale (1 = *to receive less than a high school diploma*; 7 = *to finish a Ph.D., MD, or other advanced degree*). For the purposes of this study, we recoded

these responses into four categories: high school or less (*receive less than a high school diploma or graduate from high school*), some college (*attend a vocational or technical school after high school or attend two or more years of college*), finish college (*finish a four- or five-year college degree*), or finish graduate degree (*earn a master's degree or equivalent or finish a Ph.D., MD, or other advanced degree*).

2.2.2 Parents' enrichment practices

Enrichment practices were addressed in terms of practices in the home, measured in the fall, and in the community, measured in the spring.

2.2.2.1 Home based enrichment

Interviews addressed the frequency with which parents or someone else in the home participated in ten different activities with their child in a typical week. These ten items, adopted from the HOME Scale (Bradley & Caldwell, 1984), addressed a variety of activities, such as playing games, singing songs, or reading books (a complete list of items is shown in the Appendix). Possible responses ranged from 1 (*not at all*) to 4 (*every day*). Although internal reliability for this scale was acceptable ($\alpha = .74$), a principal components analysis revealed that the ten items loaded onto two separate factors representing academic activities (i.e., reading books, telling stories, practicing numbers) and more play-based activities (e.g., arts and crafts, playing sports). When controlling for academic enrichment, these play-based behaviors were negatively correlated with achievement, $r = -.04$, $p < .001$. Given this finding and the lack of theoretical rationale supporting these behaviors, this factor was not utilized in the present study. We have

instead focused on the composite of the three items representing academic home enrichment activities ($\alpha = .61$), which was calculated for all families with at least two valid responses.

2.2.2.2 Community based enrichment

Community enrichment activities were measured through educational activities and extracurricular activities. Parents reported whether they had engaged in six different educational activities outside of the home or school, such as taking the child to the library or to a museum (see the Appendix for a complete list of items). For these items, parents simply stated whether or not they or someone in the family had engaged in each activity with their child in the past month (1 = *yes*; 0 = *no*). A frequency count was calculated, with higher scores indicating more educational activities (range = 0 - 6). At the same time, parents described whether their children were involved in a variety of common extracurricular activities in the community, including dance lessons or organized sports. A full list of these items is available in the Appendix. Parents were presented with 12 items each describing an activity outside of the home and asked to report whether the child had ever participated in each (1 = *yes*; 0 = *no*). For this variable, a frequency count was calculated, such that higher scores represent participation in more extracurricular activities (range = 0 - 12). These two inventory measures were combined together in a composite representing enrichment activities outside of the home by averaging the proportion of activities children engaged in for each scale ($r = .32$).

2.2.3 Children's academic achievement

Academic skills in the fall and spring of kindergarten were measured through direct assessments of children's reading and math skills developed by NCES for this study. The reading assessment

focused on basic pre-literacy knowledge, such as letter and sound recognition, whereas the math assessment targeted number sense as well as more general problem solving skills. Both tests included two stages, a routing stage with questions widely ranging in difficulty, and a more individually tailored second stage. NCES calculated IRT scores for both reading and math to establish comparable scales across children that estimated children's expected performance had all children had been given identical tests. Theta reliabilities for the reading and math scales of the full ECLS-K:11 sample in the fall were .95 and .92, respectively, and in the spring were .95 and .94, respectively (NCES, 2013). Given the high correlation between these variables ($r = .75$ and $r = .78$ in the fall and spring, respectively), math and reading IRT scores were averaged to represent overall academic skills.

2.2.4 SES

We also included two indicators of SES: household income and parental education. Although income and education are often combined as indicators of SES, both provide unique information about a family's financial and human capital, respectively (see Conger & Dogan, 2007, for a review). As such, in this study we examined each separately.

2.2.4.1 Household income

In the spring of kindergarten, parents reported their total household income retrospectively by selecting an income category to estimate their income over the past year (*What was the total income of all persons in your household over the past year, including salaries or other earnings, interest, retirement, and so on for all household members?*). Income categories increased by \$5,000 increments and ranged from less than \$5,000 to more than \$75,000. Families with

incomes above \$75,000 reported if their income was below \$100,000, between \$100,001 and \$200,000, or above \$200,000. Parents who reported income below 200% of the poverty line were asked to report their income to the nearest \$1,000. For all other families, income will be recoded as the midpoint of their reported range. For parents who did not report their income (16%), this value was imputed by NCES (NCES, 2013). Reported income was highly positively skewed and thus was natural log transformed.

2.2.4.2 Parental Education

At the fall of kindergarten, survey respondents reported their education and their partner's education on a scale of 1 to 23 as either the highest grade of school completed (1 = *first grade*; 12 = *twelfth grade but no diploma*) or highest degree earned (13 = *high school equivalent/GED*; 23 = *professional degree after bachelor's degree*). Educational attainment was then recoded into four categories: high school or less (*1st grade through 11th grade, 12th grade but no diploma, high school equivalent/GED, or high school diploma*), some college (*voc/tech program after high school but no voc/tech diploma; voc/tech program after high school, diploma; some college but no degree, or Associate's degree*), Bachelor's degree (*Bachelor's degree or graduate or professional school but no degree*), and graduate degree (*Master's, Doctorate degree, or Professional degree after Bachelor's degree*). From these categories, we coded parental education as the highest educational level of either parent.

2.2.5 Covariates

In addition to these main variables of interest, we included a host of covariates in these models that may be related to parents' educational beliefs, their practices, and children's achievement.

All covariates were obtained in the fall of kindergarten, with the exception of immigrant status, which was collected in the spring. In particular, we controlled for children's gender (1 = *male*), age in the spring, and language spoken at home (1 = *non-English*). Additional controls included the respondent's marital (1 = *married*), employment (1 = *employed at least 35 hours a week*), and immigrant status (1 = *immigrant*), as well as race (dummy codes for Black, Hispanic, Asian and Pacific Islander, and other, with White as the reference group), and relation to the child (1 = *non-maternal caregiver*). Racial/ethnic groups were broken down by immigrant status in order to obtain a more detailed picture of how these processes operate across a variety of families. Models predicting spring achievement also included a lagged dependent variable measured in the fall, as well as an indicator of how many months passed between the fall and spring assessments. Finally, all models included several school-level controls, such as whether the school was private or public (1 = *private*), whether the child was in full-day or part-day kindergarten (1 = *part-day*), and school urbanicity (dummy codes for suburban, town, or rural, with urban as the reference group).

2.3 ANALYSIS PLAN

In this study we tested a model of mediated moderation (see Morgan-Lopez & MacKinnon, 2006, and Muller, Judd, & Yzerbyt, 2005, for detailed descriptions). Mediated moderation occurs when the effect of variable A on outcome C is moderated by variable Z and this moderation operates through a mediator, B. In other words, the effect of A on B depends on Z, and B in turn predicts C. In order to test for mediated moderation, first the moderating effect on Z on the A and C path is established. Next moderation in the A and B path by Z is established, and the B and C

path is tested. For the proposed project we were interested in whether the association between parents' educational beliefs (A) and children's academic achievement (C) was moderated by SES (Z), and whether this moderation operated through enrichment practices (B). In addition to basic assumptions of multiple regression models, tests of mediated moderation assume there is no covariance between A and Z; if there is a nonzero covariance, A and Z must not be causally related to one another (Morgan-Lopez & MacKinnon, 2006). Further, the model assumes that C cannot cause A, B, or Z and that B cannot cause A or Z (Morgan-Lopez & MacKinnon, 2006).

2.3.1 Aim 1

We first addressed whether beliefs were related to children's academic achievement (A to C path) and whether this effect was moderated by SES (Z). Specifically, children's spring achievement scores were regressed on parents' school readiness beliefs and expectations, controlling for SES indicators, fall achievement scores, and covariates (child gender, age, language, and baseline achievement, parent marital status, employment status, race/ethnicity, immigrant status, and relation to child, months between assessments, school type, full-day/part-day kindergarten, and urbanicity). Model specifications are shown below:

$$\text{Model 1: } \text{Achievements}_{\text{Spring}} = B_1\text{SchoolReadinessBeliefs}_{\text{Fall}} + B_2\text{Expectations}_{\text{Fall}} + B_3\text{Income}_{\text{Spring}} + B_4\text{Education}_{\text{Fall}} + B_5\text{Achievement}_{\text{Fall}} + B_6\text{SES} \times \text{Beliefs} + B_7\text{COV} + B_0$$

To address whether this association was moderated by SES, we tested each of the four sets of interaction terms separately (i.e., school readiness beliefs X income, expectations X income, school readiness beliefs X education, and expectations X education). Any significant interactions were then combined in a single model to test for unique effects of the interactions.

2.3.2 Aim 2

Next, we tested whether the association between parents' educational beliefs on their enrichment practices depended on SES (Aim 2) to establish whether the A by Z interaction term predicted B. We regressed both home based enrichment and community based enrichment on the set of predictors shown in Model 1. Model specifications are shown below:

$$\begin{aligned} \text{Model 2: HomeBasedEnrichment}_{\text{Fall}} = & B_1\text{SchoolReadinessBeliefs}_{\text{Fall}} + B_2\text{Expectations}_{\text{Fall}} \\ & + B_3\text{Income}_{\text{Spring}} + B_4\text{Education}_{\text{Fall}} + \\ & B_5\text{SESxBeliefs} + B_6\text{COV} + B_0 \end{aligned}$$

$$\begin{aligned} \text{Model 3: CommunityBasedEnrichments}_{\text{Spring}} = & B_1\text{SchoolReadinessBeliefs}_{\text{Fall}} + \\ & B_2\text{Expectations}_{\text{Fall}} + B_3\text{Income}_{\text{Spring}} + \\ & B_4\text{Education}_{\text{Fall}} + B_5\text{SESxBeliefs} + B_6\text{COV} \\ & + B_0 \end{aligned}$$

Much like in Aim 1, we first tested individual interactions, and then included all significant interactions in one model to detect unique effects of each interaction.

2.3.3 Aim 3

Finally, we tested whether enrichment was related to achievement (the B to C path) and calculated indirect effects of the interaction between beliefs and SES (A by Z) on achievement (C) through enrichment (B). Specifically, we regressed children's academic achievement on parents' educational beliefs, SES, any significant beliefs by SES interaction terms from previous models predicting children's achievement, and enrichment practices. Specifications are shown below:

$$\begin{aligned} \text{Model 4: } \text{Achievements}_{\text{Spring}} = & B_1 \text{SchoolReadinessBeliefs}_{\text{Fall}} + B_2 \text{Expectations}_{\text{Fall}} + \\ & B_3 \text{Income}_{\text{Spring}} + B_4 \text{Education}_{\text{Fall}} + \\ & B_5 \text{HomeBasedEnrichment}_{\text{Fall}} + \\ & B_6 \text{CommunityBasedEnrichment}_{\text{Spring}} + B_7 \text{Achievement}_{\text{Fall}} + \\ & B_8 \text{SESxBeliefs} + B_9 \text{COV} + B_0 \end{aligned}$$

Indirect effects of the interaction terms (i.e. indirect moderation effects operating through enrichment practices) were calculated from the coefficients on the interaction terms in Models 2 and 3 and the coefficients on the enrichment terms in Model 4. Estimates of indirect effects and their significance levels were calculated using techniques described by Sobel (1982).

All models in these analyses were estimated in Stata 13 (StataCorp, 2013). All significant interactions were tested and plotted according to the procedures outlined by Aiken and West (1991). Given that children in this sample were nested within schools, and that children within the same school may score more similarly on the achievement measures than children in different schools, we also included a random effect for school to account for this data dependence in all models. Finally, we utilized fall of kindergarten population weights calculated by NCES (W1P0), which adjusted for attrition and non-response on the part of both families and schools.

3.0 RESULTS

In data preparation, NCES imputed missing data using hot deck imputation methods for several commonly used items, such as income, which were included in the current analyses when available (NCES, 2013). Missing data analyses were conducted to determine the extent and nature of missing data on the remaining independent and dependent variables (Jeličić, Phelps, & Lerner, 2009). All fall independent variables and both fall and spring child assessments had less than 5% missing for the analysis sample. In contrast, about 20% of participants were missing parent reports for income, immigration status, and community based enrichment. Parents missing any spring data ($n = 2,660$) were more likely to be unmarried (45.8% compared to 28.1%), $\chi^2(1) = 307.43, p < .001$, and be employed more than 35 hours a week (44.3% compared to 41.7%), $\chi^2(1) = 5.56, p = .02$ than parents with complete data on these three variables ($n = 10,740$). These parents were also more likely to be Black (19.3% compared to 11.4%), Hispanic (25.8% compared to 19.1%), Asian (8.3% compared to 7.9%), or other (3.1% compared to 2.3%), $\chi^2(4) = 245.65, p < .001$, and more likely to have a high school education (39.0% compared to 25.4%) or some college (37.1% compared to 30.7%) and less likely to have finished college (15.5% compared 24.7%) or attended graduate school (8.4% compared to 19.2%), $\chi^2(4) = 368.02, p < .001$. Multiple imputations were performed in Stata 13 using the `mi impute chained` command in order to create 40 complete data sets (Rubin, 2008; Widaman, 2006). Descriptive statistics for the imputed sample are included in Table 1.

Table 1. Imputed, weighted descriptive statistics for all study variables (N = 13,400)

Variable	<i>M (SD) / %</i>
<i>Parents' Educational Beliefs</i>	
School readiness beliefs	4.18 (0.50)
Expectations	
Attend college	14
Graduate college	46
Graduate with Master's degree or more	35
<i>SES</i>	
Parental education	
Some college	32
Bachelor's degree	22
Graduate or professional degree	16
Income (natural log transformed)	10.65 (1.01)
<i>Parents' Enrichment Practices</i>	
Home based enrichment	3.32 (0.58)
Community based enrichment	0.32 (0.17)
<i>Child Achievement</i>	
Academic achievement in fall	31.93 (10.65)
Academic achievement in spring	45.51 (10.74)
<i>Control Variables</i>	
Child male	52
Home language of child is not English	15
Respondent married/civil union	67
Respondent employed 35+ hours/week	42
Parent Race / Immigrant Status	
Black – Non-Immigrant	12
Hispanic – Non-Immigrant	9
Asian – Non-Immigrant	1

Table 1 (continued)

Other – Non-Immigrant	2
White -Immigrant	2
Black –Immigrant	1
Hispanic –Immigrant	13
Asian –Immigrant	4
Other – Immigrant	0.2
Respondent non-maternal caregiver of study child	12
Child age in months (at spring assessment)	74.46 (4.56)
Private school	11
Part-day kindergarten	23
Urbanicity	
Suburban	33
Town	11
Rural	23
Time Between Assessments	6.02 (0.84)

Note. Values shown for categorical variables are percentages, whereas values for continuous variables are means, with standard deviations shown in parentheses.

3.1 AIM 1

In order to test whether parents' educational beliefs were related to academic achievement, children's achievement was regressed on parents' school readiness beliefs, parents' expectations, income, parental education level, and the set of covariates described above (Model 1). As shown in the first column of Table 2, both expectations, $F(3, 11,100) = 3.11, p = .03$, and school readiness beliefs were significantly and positively related to children's academic achievement. Specifically, children of parents who expected their children to go to some college, receive a bachelor's, or attend graduate school scored 0.06, 0.07, and 0.07 standard deviations (*SDs*) higher, respectively, than children of parents who expected their children to complete only high school in the math and reading assessments. Additionally, a standard deviation increase in school readiness beliefs was associated with a small but significant 0.01 *SD* increase in achievement. SES indicators were also related to children's academic achievement. Parents' own educational level was significantly related to achievement, $F(3, 23930) = 2.77, p = .04$, such that children of parents with some college, a Bachelor's degree, or a graduate degree scored 0.03, 0.05, and 0.05 *SDs* higher, respectively, than children of parents with only a high school education. In addition, log transformed income was related to children's achievement at trend level, such that a *SD* increase in income was associated with a 0.01 *SD* increase in achievement.

Table 2. Predicting achievement from educational beliefs, SES interactions, and enrichment

Variable	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>
<i>Parents' Educational Beliefs</i>			
School readiness beliefs	0.27** (0.10)	0.30** (0.10)	0.28** (0.10)
Expectations			
Attend college	0.60** (0.29)	0.58* (0.29)	0.56† (0.29)
Graduate college	0.79** (0.27)	0.77** (0.27)	0.72** (0.27)
Graduate with Master's degree or more	0.76** (0.28)	0.73** (0.28)	0.66* (0.28)
<i>SES</i>			
Parental education			
Some college	0.30† (0.11)	0.29† (0.15)	0.24 (0.15)
Bachelor's degree	0.52** (0.19)	0.51** (0.19)	0.44* (0.19)
Graduate or professional degree	0.56* (0.22)	0.56* (0.22)	0.46* (0.23)
Income (natural log transformed)	0.14† (0.08)	0.13† (0.08)	0.13 (0.08)
<i>Parents' Enrichment Practices</i>			
Home based enrichment			0.13 (0.10)
Community based enrichment			0.79* (0.35)
<i>Child Achievement</i>			
Academic achievement in fall	0.86*** (0.01)	0.86*** (0.01)	0.86*** (0.01)
<i>Interactions</i>			
Income X School Readiness Beliefs		-0.20† (0.11)	-0.20† (0.11)
<i>Control Variables</i>			
Child male	-0.45*** (0.10)	-0.45*** (0.10)	-0.42*** (0.10)
Home language of child is not English	-0.15 (0.24)	-0.15 (0.24)	-0.08 (0.24)
Respondent married/civil union	0.39** (0.13)	0.40** (0.13)	0.39** (0.13)
Respondent employed 35+ hours/week	0.23* (0.11)	0.23* (0.11)	0.24* (0.11)
Parent Race / Immigrant Status			
Black – Non-Immigrant	-1.30*** (0.22)	-1.29*** (0.22)	-1.28*** (0.22)
Hispanic – Non-Immigrant	-0.05 (0.21)	-0.05 (0.21)	-0.03 (0.21)

Table 2 (continued)

Asian – Non-Immigrant	0.28 (0.56)	0.29 (0.56)	0.28 (0.56)
Other – Non-Immigrant	-0.23 (0.38)	-0.23 (0.38)	-0.24 (0.38)
White – Immigrant	0.42 (0.36)	0.41 (0.36)	0.41 (0.36)
Black –Immigrant	0.48 (0.57)	0.51 (0.57)	0.52 (0.57)
Hispanic –Immigrant	-0.67 (0.43)	-0.66 (0.43)	-0.65 (0.43)
Asian –Immigrant	-0.58 (0.70)	-0.58 (0.70)	-0.56 (0.70)
Other – Immigrant	-0.18 (1.10)	-0.18 (1.10)	-0.16 (1.10)
Respondent non-maternal caregiver	0.08 (0.16)	0.08 (0.16)	0.09 (0.16)
Child age in months (at spring assessment)	-0.06*** (0.01)	-0.06*** (0.01)	-0.06*** (0.01)
Private school	-1.04*** (0.26)	-1.04*** (0.26)	-1.06*** (0.26)
Part-day kindergarten	-0.16 (0.12)	-0.16 (0.12)	-0.16 (0.12)
Urbanicity			
Suburban	-0.34 (0.23)	-0.34 (0.23)	-0.34 (0.23)
Town	0.20 (0.34)	0.20 (0.34)	0.21 (0.34)
Rural	0.29 (0.25)	0.29 (0.25)	0.31 (0.24)
Time Between Assessments	2.17*** (0.10)	2.17*** (0.10)	2.17*** (0.10)
Constant	8.89*** (1.11)	8.90*** (1.12)	8.30*** (1.17)

Note. Unstandardized regression coefficients and standard errors in parentheses are presented.

The omitted reference category includes White non-immigrant mothers with high school education or less, who expect high school education or less.

† $p < .10$, * $p < .05$, ** $p < .01$. *** $p < .001$

We first tested whether associations between school readiness beliefs and achievement were moderated by SES by including interaction terms for income and parental education, separately. As shown in column 2 of Table 2, a marginally significant interaction between school readiness beliefs and income emerged, such that school readiness beliefs were less predictive of achievement at higher income levels (see Figure 3).

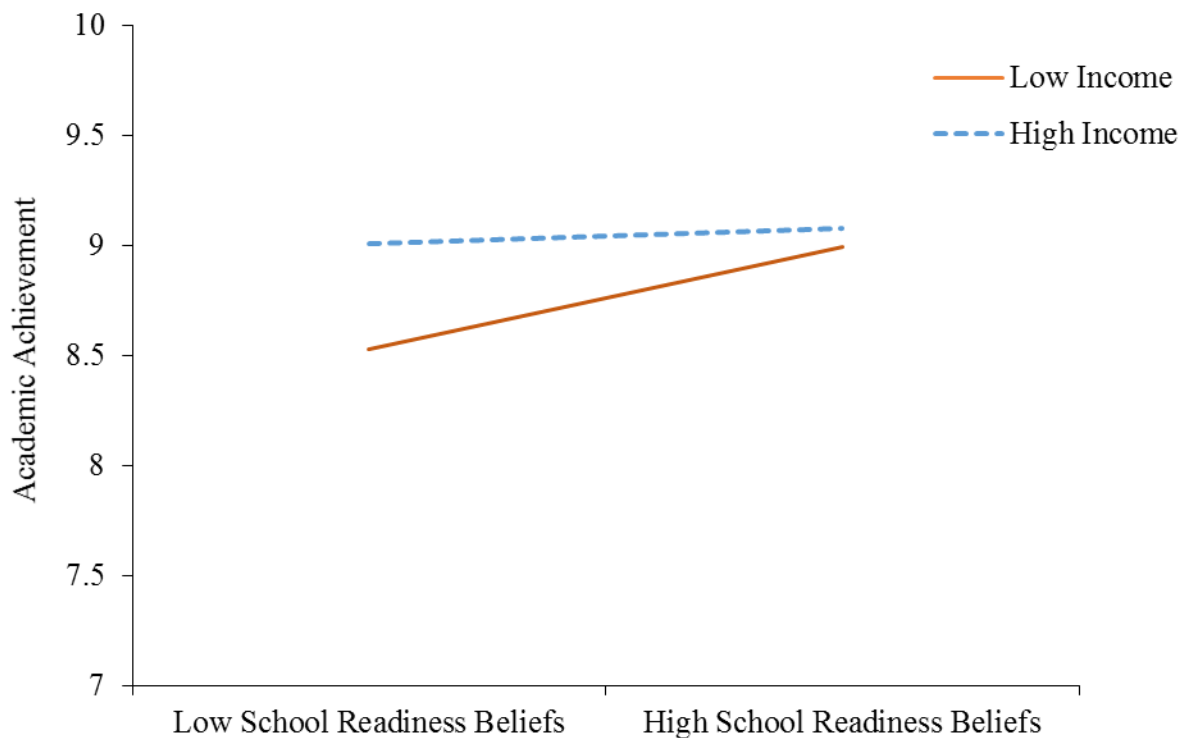


Figure 3. Income by school readiness beliefs interaction predicting achievement

We then examined whether parents' school readiness beliefs interacted with parental education to predict children's achievement. To do so, three terms representing the interaction of school readiness beliefs with parental education (i.e., some college, Bachelor's Degree, or graduate school, with high school or below as the reference group) were added to the main effects model.

This set of interactions was non-significant, $F(3, 10140) = 1.85, p = .14$, suggesting that parent education did not moderate associations between school readiness beliefs and academic achievement.

We then repeated these analyses with expectations as opposed to school readiness beliefs in order to determine whether the associations between expectations and achievement depended on SES. Three interaction terms representing three levels of expected educational attainment (i.e., some college, Bachelor's Degree, or graduate school, with high school or below as the reference group) crossed with income were included in Model 1. This set of interaction terms was not significant, $F(3, 6570) = 1.07, p = .36$, suggesting the associations between educational expectations and academic achievement did not vary significantly across income levels. Finally, we tested whether the relation between expectations and achievement depended on parental education by including nine interaction terms representing each level of attainment expectations (i.e., some college, Bachelor's Degree, or graduate school, with high school or below as the reference group) crossed with each level of parental education (some college, Bachelor's Degree, or graduate school, with high school or below as the reference group). However, this set of interaction terms was also not significant, $F(9, 17490) = 0.65, p = .75$.

3.2 AIM 2

To assess whether the association between educational beliefs and parents' enrichment practices varied by SES, the analyses from Aim 1 were repeated with both home based enrichment (column 1 of Table 3) and community based enrichment (column 2 of Table 3) as outcomes

instead of academic achievement. Additionally, we removed the indicator of time between achievement assessments from the models.

Parents' home based enrichment was positively related to school readiness beliefs and expectations (see column 1 of Table 3). Specifically, a standard deviation increase in school readiness beliefs was associated with a 0.08 *SD* increase in home enrichment. Additionally, the omnibus test for expectations was significant, $F(3, 1,000,000) = 34.89, p < .001$. Parents who expected their children to go to some college did not differ significantly in their home based enrichment from those who expected their children to complete high school. However, parents who expected children to receive a Bachelor's degree or attend graduate school reported 0.18 and 0.32 *SDs*, respectively, more home based enrichment practices than parents who expected their children to complete only high school. SES indicators were also significant predictors of home enrichment. Parental education was significantly related to home enrichment practices, $F(3, 108440) = 24.32, p < .001$, such that parents with some college, a Bachelor's degree, or a graduate degree reported 0.17, 0.17, and 0.26 *SDs* more home enrichment than parents with only a high school education. Unexpectedly, income was negatively and significantly associated with home enrichment (effect size = -0.03 *SD*). Although this finding is inconsistent with past work suggesting that there is a positive association between income and enrichment (e.g. Bradley & Corwyn, 2002), this is a very small effect that, though negative, is very close to zero.

Table 3. Regression models predicting enrichment practices from educational beliefs

Variable	Home Based	Community Based
	Enrichment	Enrichment
	<i>B (SE)</i>	<i>B (SE)</i>
<i>Parents' Educational Beliefs</i>		
School readiness beliefs	0.09*** (0.01)	0.003 (0.003)
Expectations		
Attend college	0.01 (0.03)	0.02* (0.01)
Graduate college	0.11*** (0.03)	0.04*** (0.01)
Graduate with Master's degree or more	0.19*** (0.03)	0.06*** (0.01)
<i>SES</i>		
Parental education		
Some college	0.10*** (0.01)	0.04*** (0.01)
Bachelor's degree	0.10*** (0.02)	0.08*** (0.01)
Graduate or professional degree	0.15*** (0.02)	0.10*** (0.01)
Income (natural log transformed)	-0.02* (0.01)	0.01*** (0.002)
<i>Child Achievement</i>		
Academic achievement in fall	0.004*** (0.001)	0.001*** (0.0002)
<i>Control Variables</i>		
Child male	-0.06*** (0.01)	-0.03*** (0.003)
Home language of child is not English	-0.25*** (0.03)	-0.04*** (0.01)
Respondent married/civil union	0.04** (0.01)	0.01 (0.004)
Respondent employed 35+ hours/week	-0.07*** (0.01)	-0.01** (0.003)
<i>Parent Race / Immigrant Status</i>		
Black – Non-Immigrant	-0.11*** (0.02)	0.01† (0.01)
Hispanic – Non-Immigrant	-0.13*** (0.02)	0.01 (0.01)
Asian – Non-Immigrant	-0.002 (0.05)	0.01 (0.02)
Other – Non-Immigrant	-0.02 (0.04)	0.02† (0.1)
White – Immigrant	0.001 (0.04)	0.01 (0.01)

Table 3 (continued)

Black –Immigrant	-0.01 (0.07)	-0.02 (0.02)
Hispanic –Immigrant	-0.01 (0.05)	-0.02 (0.01)
Asian –Immigrant	-0.07 (0.06)	-0.02 (0.02)
Other – Immigrant	0.10 (0.13)	-0.04 (0.05)
Respondent non-maternal caregiver	-0.12*** (0.02)	-0.003 (0.01)
Child age in months (at spring assessment)	-0.01*** (0.001)	0.0004 (0.0004)
Private school	-0.06** (0.02)	0.02*** (0.01)
Part-day kindergarten	-0.01 (0.01)	0.01 (0.004)
Urbanicity		
Suburban	0.01 (0.02)	-0.004 (0.005)
Town	0.02 (0.03)	-0.02* (0.01)
Rural	-0.002 (0.02)	-0.02** (0.01)
Constant	3.51*** (0.10)	0.21*** (0.03)

Note. Unstandardized regression coefficients and standard errors in parentheses are presented.

The omitted reference category includes White non-immigrant mothers with high school education or less, who expect high school education or less.

† $p < .10$, * $p < .05$, ** $p < .01$. *** $p < .001$

Each of the four of interactions between beliefs and SES was then tested in turn for home enrichment, but none of the interactions were significant predictors of home based enrichment practices. First, we included an interaction between parents' reported income and school readiness beliefs. This interaction was not significant, $B = -0.01$, $p = .56$. We then tested a set of variables representing the interaction of expectations and income, which was also not significant, $F(3, 9,020) = 1.66$, $p = .17$. Parental education also did not moderate the effect of parents' school readiness beliefs, $F(3, 464,670) = 0.46$, $p = .71$, or expectations, $F(9, 442,510) = 1.17$, $p = .31$.

These analyses were then repeated with community based enrichment. Parents' community based enrichment was also significantly related to expectations but not to school readiness beliefs (see column 2 of Table 3). Specifically, parents who expected their children to go to some college, receive a bachelor's degree, or attend graduate school reported 0.12, 0.21, and 0.35 *SDs*, respectively, more community based enrichment practices than parents who expected their children to complete only high school, $F(3, 2,090) = 27.56$, $p < 0.001$. Both income and parental education, $F(3, 3,080) = 81.14$, $p < 0.001$, were also significant predictors of community based enrichment. Parents with some college, a Bachelor's degree, or a graduate degree reported 0.24, 0.47, and 0.59 *SDs* more community enrichment than parents with only a high school education. Additionally, a *SD* increase in income was associated with a 0.06 *SD* increase in reported community enrichment activities. Similarly to home based enrichment, each of the four sets of interactions were tested but none were statistically significant. Income did not moderate the association between parents' school readiness beliefs and community enrichment, $B = -0.0002$, $p = .94$, or between expectations and community enrichment, $F(3, 3,270) = 0.55$, $p = .65$. Additionally parental education did not moderate the effect of parents' school readiness

beliefs, $F(3, 5,090) = 0.27, p = .85$, or expectations, $F(9, 9700) = 1.33, p = .22$. Thus there were no significant interactions in the A to B pathway, in terms of either school readiness beliefs or expectations predicting home or community enrichment.

3.3 AIM 3

To assess whether the income by school readiness beliefs interaction on academic achievement from Aim 1 was mediated through either home or community based enrichment practices, we included both enrichment mediators in the Aim 1 regression model that included the significant income by school readiness beliefs interaction. Results of this model examining whether enrichment predicts children's achievement are shown in column 3 of Table 2. Importantly, home based enrichment practices were not significantly related to children's achievement over and above the set of covariates included in these models. However, community based enrichment practices were significantly associated with achievement, such that a standard deviation increase in community based enrichment was associated with a 0.01 *SD* increase in achievement.

The final step of these analyses was to determine whether interactions between educational beliefs and SES in predicting achievement were mediated through enrichment practices by calculating indirect effects. Specifically, we were interested in mediating the marginal interaction between income and school readiness beliefs on children's academic achievement, as well as detecting any fully indirect effects for the three non-significant interactions predicting achievement. However, given that none of the interaction terms in the A to B pathway were significant, none of these indirect effects were calculated.

3.4 ALTERNATIVE MODEL SPECIFICATIONS

Achievement was highly correlated across the two time points ($r = .85, p < .001$), raising potential multi-collinearity concerns in models that included a lagged dependent variable. Results from the more conservative model that includes baseline achievement as a covariate were presented above to provide a more rigorous estimate of the association between parents' educational beliefs and children's achievement. Given the high correlation between academic achievement in the fall and spring of kindergarten, however, the same series of analyses were also completed with the exclusion of fall achievement as a covariate.

Final model results are shown in Table 4. In Aim 1, the pattern of main effect findings was fairly similar to models including the lagged dependent variable. Specifically, income became a significant predictor of academic achievement when baseline achievement was removed from the model; otherwise, the pattern of significance among main effects of educational beliefs and SES predicting spring achievement was identical regardless of whether or not a control for fall academic achievement were included. However, the pattern of interaction effects on achievement varied when baseline achievement was removed from the model. In particular, the interaction between income and school readiness beliefs was no longer significant when the lagged dependent variable was taken out of the model, suggesting this effect was particularly predictive of change in achievement over the school year. However, income interactions with expectations were significant in these models when academic achievement at fall was removed. Expectations appeared to be more predictive of children's achievement at higher income levels, $F(3, 8,580) = 3.60, p = .01$. Additionally, a marginally significant education by expectations interaction emerged as well, such that expectations were also more

significant at higher levels of parental education, $F(3, 30,180) = 1.67, p = .09$. When both interactions were included together in the same model, neither remained significant.

Table 4. Predicting achievement without baseline achievement

Variable	<i>B (SE)</i>
<i>Parents' Educational Beliefs</i>	
School readiness beliefs	2.17*** (0.18)
Expectations	
Attend college	2.67** (0.86)
Graduate college	3.59*** (0.77)
Graduate with Master's degree or more	3.41*** (0.79)
<i>SES</i>	
Parental education	
Some college	2.77** (1.01)
Bachelor's degree	4.19* (1.82)
Graduate or professional degree	7.56** (2.82)
Income (natural log transformed)	0.45 (0.51)
<i>Parents' Enrichment Practices</i>	
Home based enrichment	0.87*** (0.17)
Community based enrichment	2.21*** (0.63)
<i>Interactions</i>	
Income X Expectations	
Expect Some College	0.35 (0.57)
Expect Bachelor's	0.44 (0.52)
Expect Graduate Degree	0.75 (0.54)
Education X Expectations	
Some College X Some College	-1.12 (1.12)
Some College X Bachelor's	-0.59 (2.04)
Some College X Graduate Degree	-3.59 (3.18)
Bachelor's X Some College	-0.55 (1.08)
Bachelor's X Bachelor's	0.36 (1.85)
Bachelor's X Graduate Degree	-1.30 (2.90)

Table 4 (continued)

Graduate Degree X Some College	-0.29 (1.07)
Graduate Degree X Bachelor's	1.43 (1.87)
Graduate Degree X Graduate Degree	-0.56 (2.88)
<i>Control Variables</i>	
Child male	-0.84*** (0.18)
Home language of child is not English	-1.79*** (0.43)
Respondent married/civil union	1.33*** (0.22)
Respondent employed 35+ hours/week	0.54** (0.19)
Parent Race / Immigrant Status	
Black – Non-Immigrant	-2.93*** (0.34)
Hispanic – Non-Immigrant	-1.38*** (0.34)
Asian – Non-Immigrant	1.63 [†] (0.90)
Other – Non-Immigrant	-1.67* (0.67)
White – Immigrant	0.06 (0.61)
Black –Immigrant	2.27* (1.14)
Hispanic –Immigrant	-0.73 (0.74)
Asian –Immigrant	1.44 (1.12)
Other – Immigrant	2.74 (2.30)
Respondent non-maternal caregiver	-0.90** (0.27)
Child age in months (at spring assessment)	0.38*** (0.02)
Private school	-0.38 (0.44)
Part-day kindergarten	-0.19 (0.20)
Urbanicity	
Suburban	-0.32 (0.35)
Town	0.16 (0.51)
Rural	0.48 (0.39)
Constant	8.16*** (1.99)

Note. Unstandardized regression coefficients and standard errors in parentheses are presented. The omitted reference category includes White non-immigrant mothers with high school education or less, who expect high school education or less.

† $p < .10$, * $p < .05$, ** $p < .01$. *** $p < .001$

For Aim 2, patterns of predictors for models predicting home based and community based enrichment did not differ in models with and without the control for fall academic achievement, and no SES by educational beliefs interactions were significant in predicting either home based or community based enrichment practices. Finally, in Aim 3, enrichment activities did not mediate interactions between SES indicators and educational beliefs on achievement, replicating the findings described above with fall achievement included in the model. Specifically, home and community enrichment were included in the model predicting academic achievement with the significant attainment belief interactions included as well. Both forms of enrichment practices were significantly associated with children's achievement. However, since none of the interactions predicting enrichment were significant, indirect effects also were not calculated for these models.

4.0 DISCUSSION

The present study sought to understand how parents' educational beliefs were related to parents' enrichment practices and children's achievement and, specifically, whether these associations differed by SES. We first tested whether associations between educational beliefs and children's academic achievement were moderated by SES and found some evidence that parents' beliefs about how important different skills are for kindergarteners was more strongly related to achievement among low-income families compared to high-income families. However, the associations between educational beliefs and children's academic achievement appeared to be primarily additive. We then assessed whether SES moderated associations between educational beliefs and parental enrichment practices and found no evidence of interactions in these processes. Thus our hypotheses that parents' educational beliefs would be more strongly related to children's achievement among high SES families, given that educational beliefs and enrichment practices would be more highly associated among these parents, was unsupported.

4.1 PARENTS' EDUCATIONAL BELIEFS, CHILDREN'S ACADEMIC ACHIEVEMENT, AND SES

In assessing relations between parents' educational beliefs and children's achievement, both beliefs about school readiness and educational expectations were positively related to children's

achievement at the end of kindergarten. These results are consistent with past research suggesting that parents' educational beliefs may foster children's achievement (e.g., Berzin, 2010; Davis-Kean & Sexton, 2009; Davis-Kean, 2005; Halle et al., 1997; Sy & Schulenberg, 2005). Although these effects were quite small, these estimates control for numerous family and school characteristics as well as children's achievement at school entry, suggesting that beliefs about the importance of school readiness skills and expectations for children's attainment are uniquely related to children's growth in academic achievement over the course of kindergarten.

Only one out of the four tested interactions between SES and parents' educational beliefs emerged as a marginally significant predictor of children's academic achievement. Specifically, income attenuated the association between parents' school readiness beliefs and children's achievement, such that beliefs were more weakly associated with achievement at higher levels of income. This finding was counter to our hypotheses that beliefs would be more predictive of achievement among high-SES families. As can be seen in the plot of the interaction (Figure 3), children of higher income parents were performing well even when parents did not value early academic skills. Among these more advantaged families, children may have had access to more resources and experiences, and thus these children may already been at an advantage regardless of parents' educational beliefs (e.g., Bradley & Corwyn, 2002; Dilworth-Bart, 2012; Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005; Votruba-Drzal, 2003; Zadeh, Farnia, & Ungerleider, 2010). Although this interpretation is speculative, it is nonetheless consistent with the abundant research suggesting that high SES parents provide their children with more cognitively stimulating materials and experiences both in the home and in the community (see Bradley & Corwyn, 2002, for a review).

In sum, these findings show that parents' educational beliefs are significant predictors of children's early achievement. Although effect sizes for educational beliefs were small, these associations with children's achievement remained significant under stringent statistical controls. Despite the correlational nature of this study, these results suggest that educational beliefs, among other factors, may foster early academic skills, but more research utilizing experimental designs is needed to establish causality in these processes. Future research should also aim to rule out alternative explanations and directions of effects, as parents' beliefs could be based in part on their own children's abilities (e.g., Englund, Luckner, Whaley, & Egeland, 2004; Goldenberg, Gallimore, Reese, & Garnier, 2001).

4.2 ENRICHMENT AS A MEDIATING MECHANISM OF INTERACTIONS ON ACHIEVEMENT

Significant main effects of parents' educational beliefs were evident for parental enrichment practices in both the home and community. In particular, both forms of educational beliefs were related to parents' reported activities in the home. Parents who believed school readiness skills were important were more likely to engage in activities in the home that could foster these skills, such as reading and working with numbers. Similarly, parents' with higher expectations for their children tended to engage in these academic activities at home that could help support children's attainment. These findings are consistent with models of academic socialization and the developmental niche theory as well as with past research (e.g., Davis-Kean, 2005; Sy & Schulenberg, 2005). Due to the correlational nature of this study it is unclear whether this

association indicates a causal relation. However, these findings nonetheless suggest that parents' values and actions appear to be relatively consistent in the context of the home environment.

In terms of enrichment practices outside of the home, parental expectations predicted community enrichment practices, suggesting that parents with higher expectations provide their children with more learning opportunities outside of the home as well as inside the home. However, parents' school readiness beliefs were unrelated to their community enrichment practices. It is possible that this lack of an association was attributable to when community enrichment activities were measured. School readiness beliefs focused primarily on what skills parents viewed as necessary for children who were just entering kindergarten, whereas community enrichment activities were reported at the end of kindergarten. These beliefs may have been less relevant for understanding parents' behaviors after the transition to formal schooling. Alternatively, school readiness beliefs may simply be less related to enrichment in the community. Some research with older elementary school children suggests that parents' values appear to predict their children's participation in activities in the community, such that parents choose activities for their children based on their goals for children's development more broadly (Dunn, Kinney, & Hofferth, 2003). However, it is unclear how this concordance between beliefs and enrichment practices would apply to educational values among parents of younger children.

Counter to our hypotheses, neither income nor parental education moderated these associations between educational beliefs and enrichment practices in the home or in the community. In other words, low SES parents were not significantly less likely to translate their beliefs into practices. These results, together with the main effects findings, suggest that the processes through which educational beliefs relate to enrichment practices are primarily additive.

Future research should examine these processes further among low SES families to understand how parents' provide enrichment opportunities in the context of limited time and resources.

In addition to examining whether SES by educational belief interactions predicted parents' enrichment practices, associations between enrichment and achievement were assessed to determine whether enrichment could mediate the observed association between the interaction of income and school readiness beliefs and children's achievement. Community enrichment practices but not home enrichment practices were related to change in achievement over the course of kindergarten. This finding is particularly surprising, given the wealth of past research suggesting that home enrichment practices are a robust predictor of children's learning. Literacy activities such as shared book reading appear to foster children's early language and cognitive development (e.g., Melhuish et al., 2008; Mol & Bus, 2011; Neuman & Roskos, 1993; Neuman, 1996; Taylor et al., 2004; Whitehurst & Lonigan, 1998), and broader aspects of the home environment, such as language exposure and the availability of cognitively stimulating materials, have also been linked to children's early cognitive and academic skills (e.g., Hart & Risley, 1995; Rodriguez & Tamis-LeMonda, 2011). Although most research has focused on early literacy skills, parents' math-related activities in the home also appear to predict children's participation in math activities and math abilities (e.g., Anders et al., 2012; Kleemans, Peeters, Segers, & Verhoeven, 2012; Simpkins, Davis-Kean, & Eccles, 2005). The lack of an association between home enrichment and achievement could be attributable to the highly conservative model, given that home enrichment became a significant predictor of achievement when fall achievement was removed as a control. However, the fact that community enrichment practices were related to children's achievement is consistent with past research (e.g., Lagacé-Séguin &

Case, 2010; NICHD Early Child Care Research Network, 2004) and suggests that more research should address these experiences outside the home as predictors of children's early learning.

Taken together, two key findings were the lack of SES by educational beliefs interactions in predicting enrichment and the lack of mediation for the interaction effect of school readiness beliefs and income on children's achievement by enrichment practices in the home and community. In other words, although school readiness beliefs were less strongly related to achievement for high-income parents as opposed to low-income parents, this result was not detected because these beliefs were less strongly related to enrichment practices. Thus the question of how these processes are operating remains.

One potential mediator not addressed in this study that could explain why school readiness beliefs are less predictive of achievement in high-income homes is the quality of enrichment activities at home as opposed to quantity, as was measured in this study. Although research distinguishing between the quality and quantity of enrichment practices is somewhat limited, there is some evidence that these two aspects of enrichment may operate quite differently. Among a sample of Dutch preschoolers, for example, Leseman and van den Boom (1999) found that the quality of parent child interactions around literacy and problem solving was more predictive of children's cognitive development than the quantity of time spent in these interactions. Parents with higher incomes appear to provide higher quality interactions with their children; these children receive more language input during play, for example, and parents tend to be more warm during interactions (Baharudin & Luster, 1998; Davis-Kean, 2005; Hart & Risley, 1995; Sy & Schulenberg, 2005). Although income did not moderate associations between school readiness beliefs and the quantity of enrichment, school readiness beliefs could be stronger predictors of the quality of activities among low-income parents as compared to high-

income parents. If this is the case, parental enrichment quality could explain why school readiness beliefs are also more strongly related to achievement in low-income families. Thus future research should address enrichment quality as a potential mediator of the school readiness beliefs by income interaction in predicting children's achievement.

Alternatively, the school readiness beliefs by income interaction may operate through parental involvement in their child's school. In other words, school readiness beliefs may be particularly important in predicting parental school involvement for low-income parents, which could explain why parents' school readiness beliefs are more important for achievement among these families as well. Some evidence suggests that parents with stronger educational beliefs may be more involved with children's schools and, importantly, that the strength of these associations may vary across subgroups of families. Parents' beliefs about their roles in their children's education and their abilities appear to foster school involvement (Hoover-Dempsey & Sandler, 1997; Hornby & Lafaele, 2011). Davis-Kean and Sexton (2009) also found that parents' expectations predicted their involvement with school for White parents but interestingly not for racial/ethnic minority parents. In turn, parental school involvement appears to foster children's early academic achievement (Fan & Chen, 2001; Hill & Taylor, 2004; Jeynes, 2003), although some research suggests that involvement is particularly relevant for children's social skills as opposed to achievement (El Nokali, Bachman, & Votruba-Drzal, 2011). Contextual factors in parents' lives could theoretically limit parents' abilities to be involved with children's schools, and so high-income parents may simply be more involved given that they may have more time and resources available (see Hornby & Lafaele, 2011, for a review), which in turn could explain why achievement is less related to parents' school readiness beliefs among high-income families.

4.3 LIMITATIONS AND CONCLUSIONS

Several limitations of this study warrant discussion. First, all data addressing parents' educational beliefs and enrichment practices were based on parent reports; thus, this project is vulnerable to self-report and mono-method biases (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003 for a review). Additionally, enrichment practices were measured through parent report, and so future work should attempt to replicate these findings with observer reports of enrichment in order to ensure that links between parents' educational beliefs and enrichment practices are not simply an artifact of the shared methodology between these two measures. This study is also correlational, limiting possible causal interpretations; however, the longitudinal, autoregressive models help to address this issue (Johnson, 2005). We were also unable to address how these educational beliefs were related to achievement beyond kindergarten, and so more work is needed to examine the long-term implications of these beliefs for children's learning across elementary school. Although the predictive ability of school readiness beliefs for children's achievement could theoretically persist over time, no research has directly assessed whether these beliefs about skills at school entry predict individual differences in school success long after the transition to kindergarten. Additionally, given that parents' appear to adjust their expectations based on characteristics of their children (Mägi, Lerkkanen, Poikkeus, Rasku-Puttonen, & Nurmi, 2011; Rutchick et al., 2009), associations between parents' expectations and children's achievement are likely to be complex and dynamic, and thus understanding these processes over time is crucial. Finally, the observed interaction between school readiness beliefs and income in predicting achievement was only marginally significant, and so more work is needed to replicate this finding.

Despite these limitations, this study provides compelling evidence that parents' educational beliefs are positively related to both enrichment practices as well as children's academic achievement among a large, nationally representative, socioeconomically and ethnically diverse sample of contemporary U.S. families. Although these associations between educational beliefs and achievement were primarily additive for low and high SES children and parents, some evidence of potential moderation by family income emerged. More work is needed to understand how this interaction relates to achievement, as enrichment practices did not appear to mediate these associations. Overall, these results suggest that educational beliefs may be a worthy target of future research and intervention efforts, given that they are uniquely predictive of enrichment and achievement, even among disadvantaged children at risk of starting school behind their peers (Bradley & Corwyn, 2002; McLoyd, 1998; Reardon, 2011, 2013).

APPENDIX

PARENT EDUCATIONAL BELIEF ITEMS

School Readiness Belief Items: How important do you think it is that a child ...

Can count to 20 or more?

Takes turns and shares?

Is able to use pencils and paint brushes?

Sits still and pays attention?

Knows most of the letters of the alphabet?

Communicates needs, wants, and thoughts verbally in {his/her} primary language?

Home Enrichment Items: In a typical week, how often do you or any other family members do the following things with {CHILD}?:

Tell stories to {CHILD}?

Sing songs with {CHILD}?

Help {CHILD} do arts and crafts?

Involve {CHILD} in household chores, like cooking, cleaning, setting the table, or caring for pets?

Play games or do puzzles with {CHILD}?

Talk about nature or do science projects with {CHILD}?

Build something or play with construction toys with {CHILD}?

Play a sport or exercise together?

Practice reading, writing, or working with numbers?

Read books to {CHILD}?

Educational Activities Items: In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}?

Visited a library?

Visited a bookstore?

Gone to a play, concert, or other live show?

Visited an art museum, gallery, or historical site?

Visited a zoo, aquarium, or petting farm?

Attended an athletic event in which {CHILD} was not a player?

Extracurricular Activities: Outside of school hours, has {CHILD} ever participated in:
Academic activities, like tutoring, or math lab?

Dance lessons?

Organized athletic activities, like basketball, soccer, baseball, or gymnastics?

Organized clubs or recreational programs, like scouts?

Music lessons, for example, piano, instrumental music or singing lessons?

Drama classes?

Art classes or lessons, for example, painting, drawing, or sculpture?

Organized performing arts programs, such as children's choirs, dance programs, or theater performances?

Crafts classes or lessons?

Non-English language instruction?

Religious activities or instruction?

Volunteer work or community service?

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