

The Role of Parental Education, Household Income, and Race on Parents' Academic Beliefs and the Provision of Home Learning Opportunities for 4- to 8-Year-Old Children

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Abstract

Previous research has highlighted the importance of parents' education, household income, and race for children's academic achievement. In addition, these factors relate to their beliefs about their children's academic achievement and their provision of opportunities to strengthen learning. However, direct comparisons of the unique roles of parents' education, household income, and race are rare and the current study seeks to fill this gap. A heterogeneous sample of 398 parents of 4- to 8-year-old children in the US completed a survey assessing beliefs about the importance of math and reading/writing for their child, how frequently they provided learning opportunities in these skill sets at home, and demographic information. We found that parents' education was significantly related to their beliefs about the school's importance in teaching their child math, but when splitting our sample by race, this effect was only significant for White non-Hispanic parents. No significant effects were found for parents' education on their beliefs about the importance of the school or home in teaching their child reading/writing. In addition, we found that household income was significantly related to parents' beliefs about the school's but not the home's importance in teaching their child math. Finally, household income was found to be significantly related to parents' beliefs about the home's but not the school's importance in teaching their child reading/writing, but this effect was only significant for African American parents. These results suggest that parents' education and income play different roles in determining parents' beliefs about the importance of the school or the home in teaching math and reading/writing to their child and these relations were modulated by race.

Keywords: parental beliefs, home learning activities, skill set development, parental education, household income, parental race

1. Introduction

The importance of finding a suitable career is inevitable. The variety of jobs within the market opens the possibilities of venturing into different fields of studies that range from the social sciences to the natural sciences. Humans develop skills and interests in these areas based on personal beliefs and experiences throughout their schooling (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001); however, some skills and extreme interests may have their origins within preschool and experiences children make at home (DeLoache, Simcock, & Macari, 2007). In fact, children's career aspirations and expectations can be formed as early as elementary school (Auger, Blackhurst, & Wahl, 2005). One explanation for these differences is that parents have different beliefs about the importance of academic achievement and the relative value of certain skills, which transfer to their children's beliefs. While some parents value strong interpersonal skills, others may place more emphasis on academic achievements. Integration of research on children's academic socialization has resulted in two perspectives, "who parents are" and "what parents do" (Taylor, Clayton, & Rowley, 2004). In "who parents are", parental beliefs towards education are associated with their own educational experiences, spilling over to "what parents do" in the actions they take to support their beliefs in the home learning environment.

The home learning environment provides parents with the opportunity to shape their children's development. A highly enriching home learning environment significantly increases the social, cognitive, and psychological development of children (Lahaie, 2008). For example, providing children with cognitively stimulating experiences at home can prepare children for the different challenges that come with the transition to school (Lagacé - Séguin

& Case, 2010; NICHD Early Child Care Research Network, 2004; Taylor, Clayton, & Rowley, 2004). Parent-child verbal interactions at ages 10-18 months have a significant association with children's expressive vocabulary at ages 18-30 months (Camp, Cunningham, & Berman, 2010). Furthermore, the home learning environment is more strongly associated with a child's cognitive development than a child's preschool or kindergarten environment (Anders et al., 2012). However, a less stimulating home learning environment can contribute to cognitive deficits, impair language acquisition, and delay school readiness by age three years (Evans et al., 2010; Trentacosta et al., 2008; Vernon-Feagans, Garrett-Peters, Willoughby, Mills-Koonce, & Investigators, 2012). Long-term consequences include lower academic achievement, less likelihood of employment, and lower earnings (Pungello et al., 2010; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009).

Previous research has shown that parental academic beliefs are important for parental provision of home learning opportunities for their children (Sonnenschein et al., 2012) and are significant predictors of parents' aspirations for their children (Wentzel, 1998). Davis-Kean (2005) notes that parents who hold higher expectations for their children – measured by expected length of schooling – provided higher quality learning opportunities compared to parents who hold lower beliefs.

Although parental beliefs and the home learning environment play critical roles for children's development, parental beliefs do not always align with the opportunities for learning that parents provide in the home. For example, Halle, Kurtz-Costes, and Mahoney (1997) found that parental beliefs do not predict the amount of parental enrichment practices at home. According to the theory of reasoned action, multiple factors contribute to the decision-making process for an individual's intent to act (Ajzen & Fishbein, 1980; Holden & Edwards, 1989), and these behaviors are moderated by an individual's specific beliefs, community norms, and general contextual factors (Ajzen & Fishbein, 1980). These contextual factors can often lead parents to not act on their beliefs (McLoyd, 1998).

One reason for the misalignment between parental beliefs about the importance of certain skills for their child and the provision of opportunities for learning these skills at home may be variations in socioeconomic status (SES). It has been found that low-SES parents provide fewer home learning opportunities for their children (Conger & Dogan, 2007) and that the home learning environment mediates the effects of parental income and education on children's academic achievement (Kluczniok, 2017; Smith, Brooks-Gunn, & Klebanov, 1997). One possible explanation for these differences in parenting practices may be that middle-class parents tend to engage in "concerted cultivation" which is characterized by complex social and language interactions between parents and children that are thought to enhance children's development, as well as the provision of stimulating learning opportunities in children's everyday lives (Lareau, 2011). Adults subscribing to this perspective conceive of their role as parents to manage, shape, and refine children's developmental skill. Lareau believes that socioeconomically disadvantaged parents tend to focus on the provision of basic necessities (e.g., food, shelter, affection) and leave children to engage in unstructured activities throughout the day.

Another possible reason for the misalignment between parental beliefs about the importance of certain skills for their child and the provision of opportunities for learning these skills at home may be that economic adversity limits positive parenting because of poor psychological well-being and increased parental stress (Conger & Donnellan, 2007). As posited by the family stress model, families facing economic hardships tend to experience increased emotional distress within their homes. Due to these low nurturing environments, children's developmental outcomes can be inhibited.

However, few studies have examined the unique contributions of parental education and family income on the home learning environment. On the one hand, controlling for income, it has been found that parent education significantly predicts occupational and educational success for children even 40 years later (Duncan, Brooks - Gunn, & Klebanov, 1994). On the other hand, controlling for education, low-income families have fewer resources (time and money) to invest in their children's academic success compared to high-income families (Duncan, Magnuson, & Votruba-Drzal, 2014) and engage in fewer home learning activities (e.g., reading to a child, playing games, counting numbers etc.). Furthermore, these parents are often unable to afford books, tutors, and technology to support the home learning environment (Orr, 2003) and engage in less cognitively stimulating experiences with their child at home (Bradley & Corwyn, 2002; NICHD Early Child Care Research Network, 2004). A study conducted by Halle et al. (1997) found that mothers with higher education had higher beliefs for their children's academic achievement and these beliefs were related to their children's achievement in reading and math. The current study fills this gap by examining the contributions of parental education and income on their academic beliefs and provision of home learning opportunities for their children in the same sample.

Another important association with parental beliefs and the provision of home learning opportunities is parents'

racial and ethnic background. Yamamoto and Holloway (2010) provide a comprehensive review of the literature on the role of race on parents' academic beliefs. In general, Asian American parents hold higher expectations than other racial groups (Glick & White, 2004; Hao & Bonstead, 1998; Okagaki & Frensch, 1998; Peng & Wright, 1994; Suizzo & Stapleton, 2007; Sy, Rowley, & Schulenberg, 2007; Vartanian, Karen, Buck, & Cadge, 2007). These higher expectations still hold when controlling for SES (Glick & White, 2004; Hao & Bonstead, 1998; Suizzo & Stapleton, 2007; Sy et al., 2007). Asian American parents' higher academic beliefs compared to other races may possibly be due to their belief that academic success is a function of hard work (Okagaki & Frensch, 1998) and the stronger emphasis on effort over genetic ability (Holloway, 1988; White, Stevenson, & Stigler, 1993).

The evidence regarding other racial groups is mixed. On the one hand, Glick and White (2004) and Hao and Bonstead (1998) found that African-American parents held higher academic beliefs compared to European-American parents, even when controlling for SES. On the other hand, Suizzo and Stapleton (2007) found no significant differences between African-American and European-American parents, when controlling for SES. One possible reason for the inconsistent findings between African-American and European-American parents may be variations between the samples (age of parent, child age, etc.) and how parental beliefs were assessed. In addition, parental race may act as a proxy for other underlying mechanisms that were not tested. For example, parental race may be associated with systematic variations in access to resources (money, careers, etc.) or cultural differences that yield different parental responses.

Very few studies have directly contrasted the roles of parental education, household income, and race on parental beliefs or on the provision of home learning opportunities. An exception is a study by Davis-Kean (2005). In this study, the author directly compared the role of parent education and income on parents' beliefs about their children's length of schooling (e.g., high school diploma or less, some college/vocational, 2-year college degree, 4-year college degree, and post-graduate degree). Controlling for child's age, gender, family size, and caregiver literacy, it was found that both parent education and income had significant direct effects on parents' beliefs about the length of schooling. However, interesting differences emerged when comparing European-American and African-American parents. For African-American parents, parental beliefs fully mediated the link between parent education and income on children's achievement. In contrast, for European-American parents, parent education was directly and indirectly linked to children's achievement. Parental income, however, played only a limited role. Unlike the study by Davis-Kean (2005), we focused on the importance of skill development in two different areas – math and reading/writing – to test whether the contributions of parental education and income are specific to certain skills or operate similarly across both academic domains.

The current study examined the unique contributions of parental education, household income, and race on parental beliefs about the importance of certain skill development for their child as well as the provision of learning opportunities for these skills at home. In addition to European-American and African-American parents, we also included Asian-American and Hispanic parents to further examine any racial differences. Furthermore, we focused on the importance of current skill development rather than long-term academic beliefs. Finally, we selectively recruited parents of 4- to 8-year-old children to examine the role of parental education and income at a young age when supporting learning in the home is most important and is not limited by parents' own educational attainment (i.e., parents can be expected to understand and support children's acquisition of counting and reading). To this end, a heterogeneous sample of parents of 4-8-year-old children in the US completed an online survey through Amazon's Mechanical Turk (MTurk).

2. Methods

2.1 Procedure

Two separate surveys were launched for non-immigrant and immigrant parents on MTurk to gather a diverse sample of parents evenly split between non-immigrants and immigrants. The content of the actual surveys was identical, but the first question of the eligibility screening differed. In the non-immigrant survey, the first question read: "Are you an individual who is native to the United States? This means that you have grown up and received your primary and secondary education (high-school) within the United States?" In the immigrant survey, the first question read: "Are you an individual who has moved to the United States after the age of 18? This means that you are originally from another country, not the United States, but moved to the US after the age of 18?" For both surveys, the answer choices that were listed were "Yes" and "No". Both surveys continued with two further screening questions: "What ethnicity do you identify with?" (Options listed were "Asian American", "African American", "White Non-Hispanic", "Hispanic", and "None of the above") and "Do you have children within the ages of 4-8?" (Options listed were "Yes" or "No"). Potential participants who answered "No" on the first or third question or "None of the above" on the second screening question were disqualified from the survey and thanked

for their time. All participants who qualified proceeded to take the actual survey (see below), which took about 15-20 minutes to complete. Before the start of the survey, parents were informed of the purpose of the survey. After completing the survey, each participant was paid \$1. The local Institutional Review Board exempted this research study from formal IRB review because no identifiable data were collected.

2.2 Participants

All data were collected through Amazon's Mechanical Turk, an online crowdsourcing platform for tasks that require human intelligence. In general, recruiters post tasks on MTurk, which workers, i.e., any individual across the world with access to the internet who registers as a worker on MTurk, can choose to complete; if the work is satisfactory, then the recruiter can grant approval and payment to the worker. MTurk has grown as a method for psychological research over the past several years with studies demonstrating that MTurk generates reliable data and socioeconomically diverse samples (Buhrmester, Kwang, & Gosling, 2011). Although online surveys have certain limitations in that the sample is most likely not representative of the broader population, we believe MTurk's ability to transcend regional and geographic barriers by including participants outside the researcher's physical location is invaluable. A total of 1,980 participants attempted to complete the task for the current study but only 452 met eligibility criteria and completed the full task (see below). Out of 452 parents of 4-8-year-old children, 28 failed to respond correctly on the three quality control checks throughout the survey (i.e., "Please select the number 0", "Please select the number 4", and "Type in number 68"), so their data were removed from the sample. We also eliminated data from parents who preferred not to report their income ($n = 7$) or reported that their child was home-schooled ($n = 10$) or not in school ($n = 6$). Three parents did not report grade of child so their data were also removed. The final sample ($n = 398$) consisted of 51% immigrants ($n = 203$), i.e., parents who immigrated to the United States after the age of 18, and 49% non-immigrants ($n = 195$). The sample was split relatively evenly between African-Americans ($n = 86$, i.e., 21.6%), White Non-Hispanics ($n = 107$, 26.9%), Hispanics ($n = 96$, 24.1%), and Asian Americans ($n = 109$, 27.4%). Finally, 61.8% of the sample was male ($n = 246$) and 38.2% female ($n = 152$).

2.3 Measures

Parents completed a survey asking about their beliefs about the importance of different skills for their child, the frequency with which they engage in home learning activities geared toward teaching their child these skills, their own aptitude level for some of these skills, and a series of demographic questions. See Appendix A for the full set of questions.

2.3.1 Skill Set Beliefs

First, parents answered eight questions about the importance of four skill sets: math, reading/writing, art/music, and socioemotional development. They answered each question by selecting a number between 1 (not important at all) and 5 (extremely important). For each skill set, the two questions were framed to assess parents' belief in whether the home or school learning environment has greater responsibility in teaching each skill set. For the purposes of the current paper, we only examined parents' responses to the math and reading/writing skill set beliefs questions.

The following questions were asked for math: "How important is it that your child engages in activities at home that include counting, arithmetic, or measuring? (e.g., playing games that involve counting, adding and subtracting money, or measuring ingredients for a recipe)" and "How important is it that your child engages in activities at school that include counting, arithmetic, or measuring? (e.g., playing games that involve counting, adding and subtracting money, or measuring the length of different objects)". The following questions were asked for reading/writing: "How important is it that your child engages in reading and writing activities at home? (e.g., reading bedtime stories together, writing letters or stories)" and "How important is it that your child engages in reading and writing activities at school? (e.g., reading books, writing stories)".

2.3.2 Home Learning Activities

Parents answered eight questions regarding the frequency with which certain home learning activities occurred in the past month. Options were "0" (activity did not occur at all), "1" (occurred less than once a week), "2" (occurred about once a week), "3" (occurred a few times a week), "4" (occurred almost daily), or "N/A" (not applicable). For each skill set, two separate questions were asked. For the purposes of the current paper, we only examined parents' responses to the math and reading/writing activities questions.

The following questions were asked for math home activities: "How often do you play board/card games that require counting and arithmetic?" and "How often do you ask your child to help measure ingredients for a recipe or explain the concept of measurement tools to them? (i.e.: we need $\frac{3}{4}$ cup of flour, there are 3 feet in a yard stick)."

The following questions were asked for reading/writing home activities: “How often do you engage in reading activities with your child at home? (e.g., reading the newspaper together or a bedtime story)” and “How often do you engage in writing activities with your child at home? (e.g., writing letters, poems, or short stories)”.

2.3.3 Self-Aptitude

Parents completed three self-aptitude questions comparing their own abilities to other people their age by selecting a number between 0 (worst) – 100 (best). The questions pertained to parents’ math ability, reading/writing ability, and physical fitness. However, because parents’ self-aptitude was not a focus of the present paper, these scores were not considered in our analyses.

2.3.4 Demographic Questions

Finally, parents answered a series of questions about their age, child’s age, child’s grade (1 = pre-school, 2 = kindergarten, 3 = first grade, 4 = second grade, 5 = third grade, 6 = home-school, 7 = not in school, 8 = prefer not to answer), own educational background (1 = no high-school, 2 = high-school/GED, 3 = some college, 4 = college degree, 5 = post-graduation degree, 6 = non-traditional), household income (1 = less than \$12,500, 2 = between \$12,501 and \$49,999, 3 = between \$50,000 and \$74,999, 4 = between \$75,000 and \$99,999, 5 = above \$100,000, 6 = prefer not to answer), gender (1 = male, 2 = female), primary language spoken at home, preference for their child to enter a career in Science, Technology, Engineering, or Math (STEM), preference for their child to enter a career in helping people (e.g., health care, social work, education), and ages of any other children living within their home. For the purposes of the current paper, we were mainly interested in parents’ education and income, but considered these factors within the context of parents’ immigrant status, race/ethnicity, and gender as well as child’s grade.

3. Results

3.1 Descriptive Statistics

Parents came from a wide range of educational backgrounds: .3% did not complete high-school ($n = 1$), 5.3% only completed high-school or obtained a GED ($n = 21$), 20.6% completed some college ($n = 82$), 55% obtained a college degree ($n = 219$), and 18.8% obtained a post-graduate degree ($n = 75$). Total household income ranged from 8.3% making less than \$12,500 a year ($n = 33$), 36.2% making between \$12,500-\$49,999 ($n = 144$), 30.4% making between \$50,000-\$74,999 ($n = 121$), 16.8% making between \$75,000-\$99,999 ($n = 67$), and 8.3% making above \$100,000 ($n = 33$). In comparison with the 2016 U.S. national household income data (“Household income distribution in the United States in 2016,” 2017) and the 2012 U.S. national parents’ education obtained from the National Center for Education Statistics (“The Condition of Education,” 2015), the household income and parents’ education in our sample are higher than those of the national population.

With respect to race, our sample showed an uneven relationship between parental race and education with Asian-American parents having higher education compared to Hispanics, White non-Hispanics, and African American parents. The latter three groups however had similar educational backgrounds (Table 1). In contrast, income levels with our sample were equally distributed between all four races (Table 2)

3.2 Preliminary Analyses

We conducted separate one factor chi-square analyses to examine whether parents’ immigrant status, race/ethnicity, or child’s grade related to parents’ beliefs for home or school math and reading/writing development or reported frequency of related home learning activities. These results are shown in Table 3. In sum, parents’ immigrant status, race/ethnicity, or child’s grade did not relate to parents’ beliefs for home or school math or reading/writing development or reported frequency of related home learning activities.

3.3 The Role of Parental Education and Income on Beliefs and the Home Learning Environment

We conducted separate one factor chi-square analyses to examine whether parents’ education and total income related to parents’ beliefs for home or school math or reading/writing or reported frequency of related home learning activities. Parents’ education level related to their belief about the importance of the *school* in teaching math to their child ($\chi^2(12, N = 421) = 26.56, p < 0.01$) (Figure 1) but not the importance of the *home* in teaching math to their child ($\chi^2(12, N = 414) = 14.02, p = 0.30$). As seen in Figure 1, there was a trend that higher educated parents believed more strongly that the school is important for teaching their child math than parents with lower levels of education. However, a crosstab column proportion analysis revealed no significant differences between individual education levels and ratings for school math beliefs. Parents’ education level was not related to the home or school reading/writing beliefs (home reading/writing: $\chi^2(12, N = 422) = 13.32, p = 0.35$; school reading/writing: $\chi^2(12, N = 423) = 17.22, p = 0.14$). Furthermore, parents’ education level did not relate to their reported frequency of related home learning activities (measuring: $\chi^2(12, N = 417) = 13.73, p = 0.32$; board games: $\chi^2(12, N = 421) =$

17.22, $p = 0.14$; reading: $\chi^2 (12, N = 419) = 13.08, p = 0.36$; writing: $\chi^2 (12, N = 419) = 12.85, p = 0.38$).

In contrast, parental income related to their beliefs about the importance of the home in teaching reading/writing to their child ($\chi^2 (16, N = 416) = 33.73, p < 0.01$) (Figure 2), but not the importance of the school in teaching reading/writing ($\chi^2 (16, N = 417) = 18.96, p = 0.27$). As can be seen in Figure 9, parents with higher household income tended to believe more strongly that the home is important for teaching their child reading/writing than parents with lesser household income. However, a crosstab column proportion analysis revealed no significant differences between individual income levels and ratings for home reading/writing beliefs. Parental income was only marginally related to their belief about the importance of the home in teaching math ($\chi^2 (16, N = 408) = 26.01, p = 0.05$) but was related to their belief about the importance of the school in teaching math ($\chi^2 (16, N = 415) = 28.79, p < 0.05$) (Figure 3). As can be seen in Figure 12, parents with higher household income tended to believe more strongly that the school is important for teaching their child math than parents with lesser household income. However, a crosstab column proportion analysis yielded no significant differences between individual income levels and ratings for school math beliefs. Furthermore, parental income did not relate to their reported frequency of related home learning activities (measuring: $\chi^2 (16, N = 411) = 15.06, p = 0.52$; board games: $\chi^2 (16, N = 415) = 13.87, p = 0.61$; reading: $\chi^2 (16, N = 414) = 12.31, p = 0.72$; writing: $\chi^2 (16, N = 413) = 17.41, p = 0.36$).

In sum, parental education and income were related to parents' beliefs about the importance of the school and not the home in teaching math to their child. In contrast, only parental income was significantly related to the importance of the home in teaching reading and writing to their child.

3.4 Parents' Education, Family Income, and Race: Two Factor Chi-Square Analyses

Education level, household income, and race are often confounded with each other; within our sample, a chi-square analysis showed parental race being significantly associated with parents' education ($\chi^2 (12, N = 398) = 41.36, p < 0.00$) but not household income ($\chi^2 (12, N = 398) = 10.73, p = 0.55$). A crosstab column proportion analysis revealed that there were significantly fewer Asian-American parents with only a high school degree compared to White and Hispanic parents. There were also significantly fewer Asian-American parents with some college only compared to White and African-American parents. Finally, there were significantly more Asian-American parents with post-graduate education compared to White parents. There were no other significant differences between any of the races at any of the education levels. Thus, we were interested in analyzing whether parents' racial or ethnic background was linked to the observed significant relations in the previous section.

White parents were the only group for which the relation between parents' education and their beliefs in the importance of the school teaching their child math was significant ($\chi^2 (12, N = 113) = 22.43, p < 0.05$). None of the other races showed this effect (African-Americans: $\chi^2 (12, N = 89) = 8.37, p = 0.76$; Asian-Americans: $\chi^2 (6, N = 111) = 10.16, p = 0.11$; Hispanics: $\chi^2 (12, N = 108) = 11.14, p = 0.12$). None of the races by themselves showed any significant relations between parents' income and their beliefs in the importance of the school teaching their child math (White: $\chi^2 (16, N = 112) = 21.24, p = 0.17$; African-Americans: $\chi^2 (16, N = 89) = 18.11, p = 0.32$; Asian-Americans: $\chi^2 (12, N = 110) = 14.39, p = 0.28$; Hispanics: $\chi^2 (16, N = 104) = 10.40, p = 0.85$).

In contrast, African-American parents were the only group for which the relation between parents' income and their belief in the importance of the home in teaching their child reading/writing was significant ($\chi^2 (12, N = 89) = 21.43, p < 0.05$). None of the other races showed this effect (White non-Hispanics: $\chi^2 (16, N = 111) = 15.39, p = 0.50$; Asian-Americans: $\chi^2 (12, N = 112) = 10.44, p = 0.58$; Hispanics: $\chi^2 (16, N = 104) = 13.36, p = 0.65$).

Table 1. Parents' Education of the Current Sample Split by Race

	African American	White non-Hispanic	Hispanic	Asian-American
Did not complete high-school	1.16%	0%	0%	0%
High-school or GED	3.49%	6.54%	11.46%	0%
Some college	23.58%	29.91%	19.79%	8.26%
College degree	54.65%	51.40%	50%	63.30%
Post-graduate degree	15.12%	12.15%	18.75%	28.44%
TOTAL	n = 86	n = 107	n = 96	n = 109

Table 2. Parental Race and Household Income

	African American	White non-Hispanic	Hispanic	Asian-American
Below \$12,500	5.81%	5.61%	9.38%	11.93%
\$12,500-\$49,999	40.70%	36.45%	41.67%	22.52%
\$50,000-\$74,999	29.07%	32.71%	26.04%	33.03%
\$75,000-\$99,999	17.44%	18.69%	12.5%	18.35%
Above \$100,000	6.98%	6.54%	10.42%	9.17%
	<i>n</i> = 86	<i>n</i> = 107	<i>n</i> = 96	<i>n</i> = 109

Table 3. Preliminary Chi-Square Analyses Examining the Relationships between Immigrant Status, Parents' Race/Ethnicity, and Child's Grade Level and Parents' Beliefs and Home Learning Activities

Immigrant status and home math belief	χ^2 (4, N = 397) = 6.58, p = 0.58
Immigrant status and school math belief	χ^2 (4, N = 396) = 4.20, p = 0.38
Immigrant status and home reading/writing	χ^2 (4, N = 397) = 1.16, p = 0.89
Immigrant status and school reading/writing	χ^2 (4, N = 398) = 0.87, p = 0.93
Immigrant status and measuring activity	χ^2 (4, N = 392) = 0.24, p = 0.99
Immigrant status and board games	χ^2 (4, N = 396) = 4.80, p = 0.31
Immigrant status and reading activity	χ^2 (4, N = 395) = 6.31, p = 0.18
Immigrant status and writing activity	χ^2 (4, N = 395) = 2.11, p = 0.72
Parents' race/ethnicity and home math belief	χ^2 (12, N = 397) = 16.22, p = 0.88
Parents' race/ethnicity and school math belief	χ^2 (12, N = 396) = 5.05, p = 0.96
Parents' race/ethnicity and home reading/writing	χ^2 (12, N = 397) = 20.60, p = 0.06
Parents' race/ethnicity and school reading/writing	χ^2 (12, N = 398) = 11.61, p = 0.48
Parents' race/ethnicity and measuring activity	χ^2 (12, N = 392) = 8.98, p = 0.71
Parents' race/ethnicity and board games	χ^2 (12, N = 396) = 19.59, p = 0.08
Parents' race/ethnicity reading activity	χ^2 (12, N = 395) = 16.73, p = 0.16
Parents' race/ethnicity and writing activity	χ^2 (12, N = 395) = 8.86, p = 0.72
Child's grade level and home math belief	χ^2 (16, N = 397) = 31.66, p = 0.48
Child's grade level and school math belief	χ^2 (16, N = 396) = 16.52, p = 0.42
Child's grade level and home reading/writing	χ^2 (16, N = 397) = 22.63, p = 0.12
Child's grade level and school reading/writing	χ^2 (16, N = 398) = 9.45, p = 0.89
Child's grade level and measuring activity	χ^2 (16, N = 392) = 20.79, p = 0.19
Child's grade level and board games	χ^2 (16, N = 396) = 13.23, p = 0.66
Child's grade level and reading activity	χ^2 (16, N = 395) = 22.36, p = 0.13
Child's grade level and writing activity	χ^2 (16, N = 395) = 16.97, p = 0.39

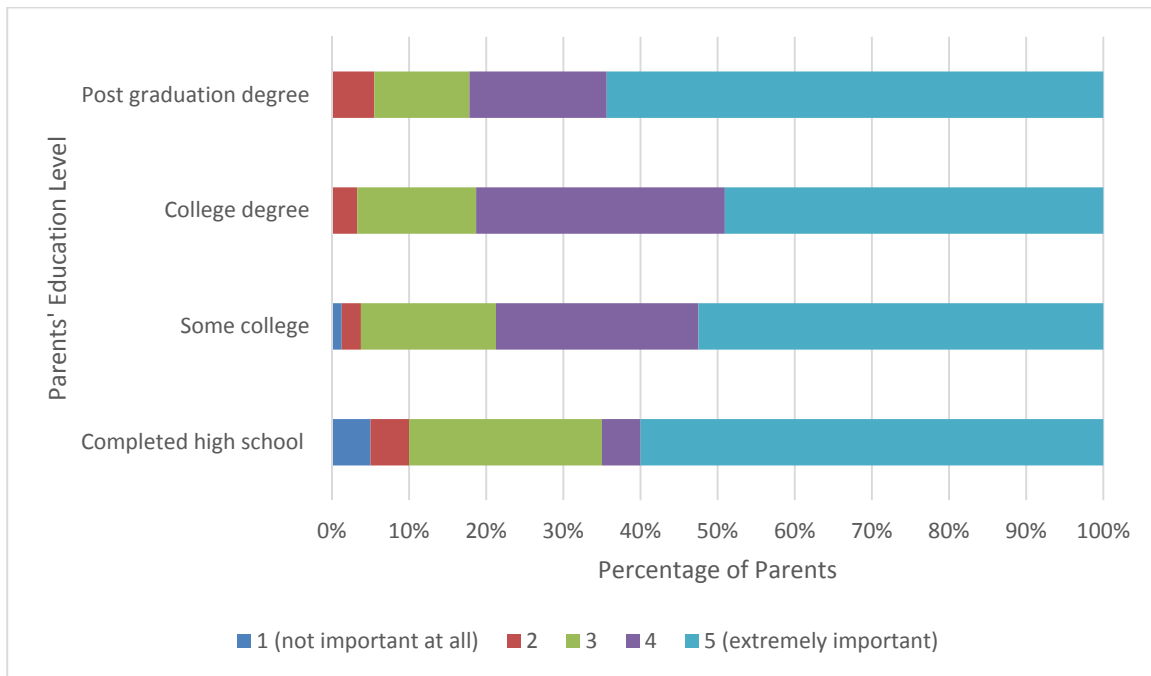


Figure 1. Educational Association on Parents' Beliefs about the Importance of Math at School

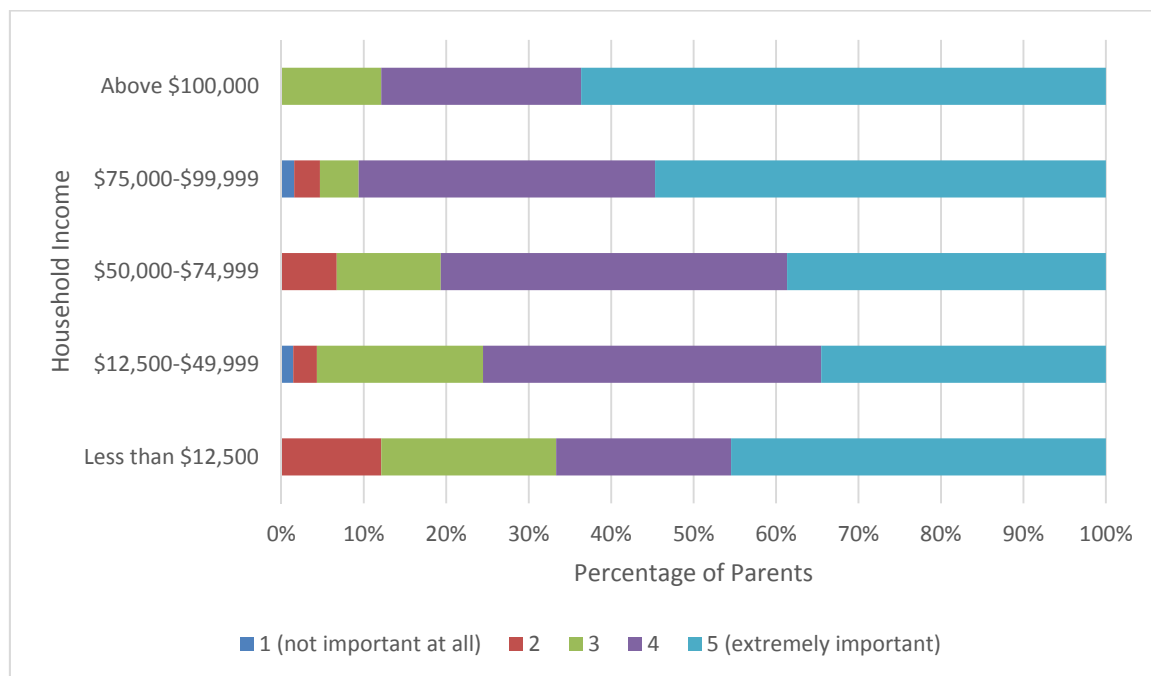


Figure 2. Income Association on Parents' Beliefs about the Importance of Reading/Writing at Home

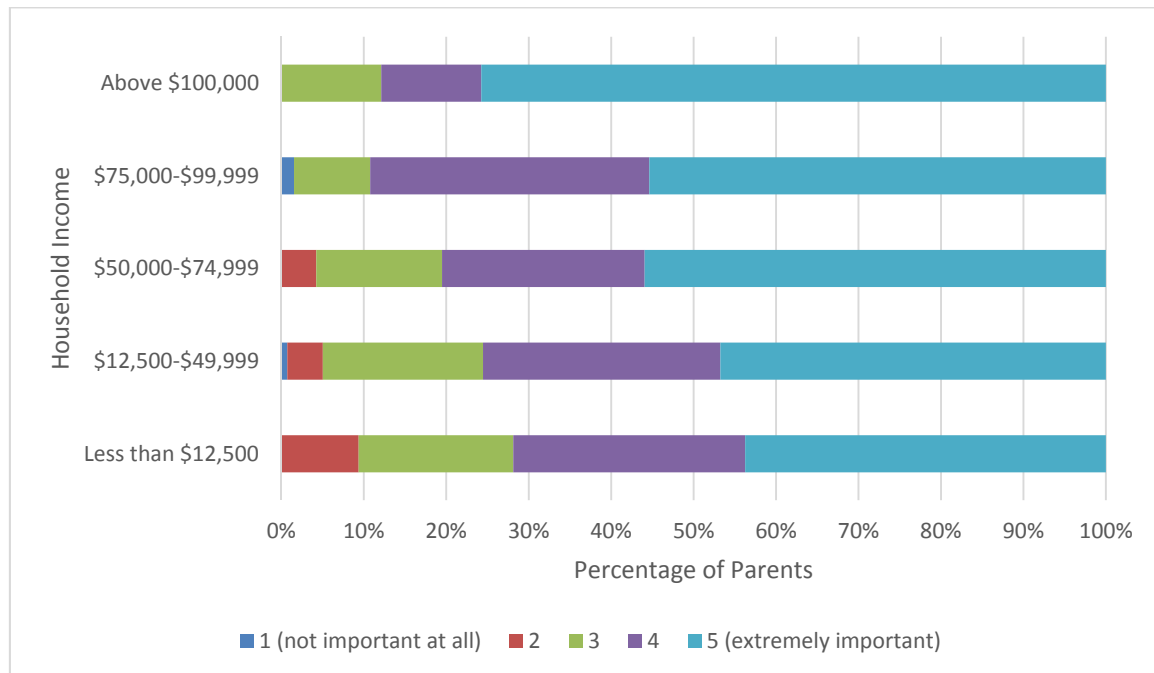


Figure 3. Income Association on Parents' Beliefs about the Importance of Math at School

4. Discussion

The current study highlights that parents' education and income play different roles in determining parents' beliefs about the importance of the school or the home in teaching math and reading/writing to their child. Importantly, these relationships were also modulated by parents' racial or ethnic background. We found that parents' education was significantly related to their beliefs about the school's importance in teaching their child math but not the home's importance in teaching their child math. However, when splitting the data by race, the relation between education and parents' beliefs was only significant for White non-Hispanic parents and non-significant for Asian-American, African-American, and Hispanic parents. No significant effects were found between parents' education and beliefs about the importance of the school or home in teaching their child reading/writing.

We also found that household income was significantly related to parents' beliefs about the school's importance in teaching their child math, but not the home's importance in teaching their child math. Interestingly, when splitting the data by race this effect was not significant for any of the races by themselves.

Finally, household income was also found to be significantly related to parents' beliefs about the home's importance in teaching their child reading/writing but not the school's importance in teaching their child reading/writing. The home belief was only significant for African-American parents and non-significant for Asian-American, White non-Hispanics, and Hispanic parents. These findings highlight the importance of examining parents' education, household income, and race separately as well as comparing their roles for math and reading/writing in isolation.

On the one hand, our findings that household income is related to parents' school math belief and home reading/writing belief contradict previous findings that reported parents' beliefs were significantly associated with parents' education (Halle et al., 1997). However, our findings that parents' education is associated with their belief in the school's importance in teaching their child math does support the results by Davis-Kean (2005) and Halle et al. (1997). One possible explanation for the divergent findings is that parental beliefs were assessed differently. Davis-Keane (2005) and Halle et al. (1997) assessed parental beliefs about the number of years of schooling their children would complete. These long-term beliefs may be biased by parents' own education level because they might hope their children will also obtain the same amount of schooling or more. In contrast, we asked parents about their beliefs about the importance of math and reading/writing for their child's development. Given that these were parents of 4- to 8-year-old children, our questions may have tapped into very different beliefs about academic achievement since children are just starting formal schooling. Another possible explanation for the differences between our study and the ones by Davis-Kean and by Halle and colleagues is the difference in heterogeneity of the samples. Davis-Kean (2005) focused on African-American and European Caucasian parents,

and Halle et al. (1997) only focused on African-American parents. In our study, we had roughly equal numbers of African-American, White Non-Hispanic, Hispanic, and Asian-American parents. Importantly, race and income were not confounded and only Asian-American parents differed in education from all other races. In addition, half of our sample consisted of immigrant parents. While we did not find any differences between immigrant and non-immigrant parents in our sample, it is possible that our internet-based sample had other unmeasured characteristics than the samples that Davis-Kean and Halle et al. used.

Our finding that only African-American parents showed a significant relation between family income and their belief about the importance of the home in teaching their child reading/writing is consistent with prior literature on African-American parents having higher academic beliefs compared to other racial groups (Glick & White, 2004; Hao & Bonstead, 1998), but inconsistent with findings that show no differences between White non-Hispanic and African-American parents (Suizzo & Stapleton, 2007). One possible reason for these inconsistencies are the differences in assessing parents' academic beliefs. For example, Glick and White (2004), Hao and Bonstead (1998), and Suizzo and Stapleton (2007) all assessed parents' expected length of schooling for their child. Furthermore, variations in the children's and parents' ages, and parents' own education level may have contributed to these inconsistent findings.

In addition, we found that parents' education, race, and family income were not associated with parents' provision of math and reading/writing-related home learning opportunities. These results differ from past research, which found that socioeconomic status is indirectly related to home learning opportunities (Davis-Kean, 2005). One possible explanation for these divergent findings is that our questions were too limited to capture the variety of activities that parents engage in at home. For example, by incorporating more than two math-related home learning activities, we could have captured more math-related activities, both informal such as measuring ingredients and playing board games as well as formal ones such as counting and teaching telling time.

Our findings highlight the important role of parents' education, household income, and race for shaping parents' beliefs about the importance of math and reading/writing skills which in turn are important for the provision of related home learning activities which are ultimately linked to academic achievement (DeFlorio & Beliakoff, 2015; Kluczniok, 2017; LeFevre et al., 2009; Saxe et al., 1987; Smith et al., 1997). Knowing that family income and parents' education contribute to potential risk factors for educational inequality between children, future policy may need to increase investment in after-school enrichment programs and parent education to decrease achievement disparities.

4.1 Limitations and Future Direction

While our study provided an important direct comparison of parents' education and household income, we only focused on two components of SES. Many researchers include multiple variables into SES, a form of recognizable social hierarchy and stratification (Smith, Borgerhoff Mulder, Bowles, & Hill, 2011). For example, other relevant measures of SES can include context of the neighborhood (low versus high crime; Chong, Lee, & Victorino, 2015), family size (Davis-Kean, 2005), relative residential property value (Coffee et al., 2013), and current occupation (Winkleby, Jatulis, Frank, & Fortmann, 1992). We acknowledge that parents' education and household income are only two methods of measuring SES and that there are several other measures that may provide additional relevant insight into SES-differences related to parents' beliefs about the importance of early skills and their provision of related home learning opportunities.

Another limitation of our study relates to the small number of questions asked for each domain of interest (two questions about the importance of math and reading/writing each, two questions about math and reading/writing-related activities each). For example, by asking parents about the importance of "playing games that involve counting, adding and subtracting money, or measuring the length of different objects" we may have excluded other important aspects of math that are related to parents' beliefs about the importance of this skill. Similarly, by asking parents about the frequency with which they "play board/card games that require counting and arithmetic" and "ask [the] child to help measure ingredients for a recipe or explain the concept of measurement tools", we only tapped into a very restricted set of possible math-related home learning activities. Parents most likely engage in a much richer and more variable set of home learning activities with their children. Future studies should include a wider array of questions targeting parents' beliefs and covering a broader set of possible home learning activities.

The fact that we found differential patterns in our associations between education/income and parents' beliefs by race needs to be interpreted with caution. We believe that parental race may act as a proxy for other underlying mechanisms that were beyond the scope of the current study. For example, parental race may be associated with differences in access to resources (money, careers, etc.) or cultural differences that yield different parental

responses. Future studies should examine the underlying mechanisms that transcend the racial differences found here.

Furthermore, the majority of our sample was highly educated as they reported having obtained a college degree or higher. Future studies should include a larger number of participants with less education to see whether our results can be replicated and whether additional associations between parental education and parents' beliefs and home learning activities may emerge.

In addition, our study only elucidates the relationship between parents' education and household income for parents' beliefs and home learning activities at a young age. Future studies may examine these relationships both cross-sectionally as well as longitudinally to determine whether the associations of parents' education and income with beliefs and home learning activities change as children get older.

Another important limitation of the current study is the lack of information about the children. We do not have any information about the children's interests towards math and reading/writing. It is likely that parents alter their beliefs and provision of home learning opportunities in response to their children's interests. Future studies should collect information about the children's academic achievements and interests towards math and reading/writing to examine parents' beliefs and activities while accounting for variability in children's achievement and interests.

Most importantly, our findings are correlational and cannot address the mechanisms that relate parents' education and household income to parents' beliefs and provision of home learning opportunities. Future research needs to identify *how* parents' education and household income relate to their beliefs and activities. For example, it would be important to assess whether the underlying mechanisms may be related to financial strain (e.g., difficulty paying bills), parental stress (e.g., beliefs about the difficulty of being a good parent), social support in the community (e.g., reliance on neighbors or other community members for emergencies), educational values (e.g., importance of developing math and reading/writing skills before kindergarten and at what age teaching math and reading/writing should start), and/or depressive symptoms (e.g., thoughts of suicide and daily anxiety level).

In sum, the current study highlights the unique importance of parents' education, race, and income for parental beliefs about the importance of math and reading/writing for their children and for the provision of related home learning opportunities. Parents' education was significantly related to their beliefs about the school's importance in teaching their child math but not the home's importance in teaching their child math. This relation was only significant for White non-Hispanic parents and non-significant for Asian-American, African-American, and Hispanic parents. Household income was significantly related to parents' beliefs about the school's importance in teaching their child math, but not the home's importance in teaching their child math. Finally, household income was significantly related to parents' beliefs about the home's importance in teaching their child reading/writing but not the school's importance in teaching their child reading/writing. This relation was only significant for African-American parents and non-significant for Asian American, White non-Hispanics, and Hispanic parents. Future studies should investigate the unique contributions of other aspects of SES and incorporate a greater subset of questions for academic beliefs and home learning activities to capture a broader set of possible beliefs and activities.

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Competing Interests Statement

The authors declare that they have no competing or potential conflicts of interest.

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Appendix

- Q1 - How important is it that your child engages in activities at home that include counting, arithmetic, or measuring? (e.g., playing games that involve counting, adding and subtracting money, or measuring ingredients for a recipe)
- Q2 - How important is it that your child engages in activities at school that include counting, arithmetic, or measuring? (e.g., playing games that involve counting, adding and subtracting money, or measuring the length of different objects)
- Q3 - How important is it that your child engages in reading and writing activities at home? (e.g., reading bedtime stories together, writing letters or stories)
- Q4 - How important is it that your child engages in reading and writing activities at school? (e.g., reading books, writing stories)
- Q5 - How important is it that your child engages in music and art activities at home? (e.g., playing a musical instrument, painting, coloring, watching a musical production on TV, or playing dress up)
- Q6 - Please select number 4
- Q7 - How important is it that your child engages in music and art activities at school? (ie: playing a musical instrument, joining chorus, learning how to paint, or watching/participating in musical or play productions)
- Q8 - How important is it that your child engages in activities enhancing socio-emotional development at home? (ie: playing sports, playing outside, or having friends over for a sleep-over)
- Q9 - How important is it that your child engages in activities enhancing socio-emotional development at school? (e.g., playing sports, playing outside, or spending time with friends)
- Q10 - Please rank the following domains (reading/writing, arithmetic, socio-emotional development, and arts/music) on a scale of "most important" to "least important", in which you believe the school has the most responsibility in teaching your child.
- Q11 - Please rank the following domains (reading/writing, arithmetic, socio-emotional development, and arts/music) on a scale of "most important" to "least important", in which you believe the home has the most responsibility in teaching your child.
- Q12 - How often do you play board/card games that require counting and arithmetic?
- Q13 - How often do you ask your child to help measure ingredients for a recipe or explain the concept of

measurement tools to them? (ie: we need $\frac{3}{4}$ cup of flour, there are 3 feet in a yard stick)

Q14 - How often do you take your child out of the house and engage in outdoor activities, i.e. kickball, tag, riding a bike, or going for a hike?

Q15 - Please select the number 0

Q16 - How often do you engage in activities that ask your child to consider the needs and emotions of others around them, e.g., comforting an individual if they appear sad or distressed, volunteering at a local soup kitchen, or donating to charity?

Q17 - How often do you make music at home with your child? (e.g., singing, playing an instrument, drumming on pots and pans)

Q18 - How often do you engage in art activities at home with your child? (e.g., drawing and coloring, knitting, decorating the house for various holidays)

Q19 - How often do you engage in reading activities with your child at home? (e.g., reading the newspaper together or a bedtime story)

Q20 - How often do you engage in writing activities with your child at home? (e.g., writing letters, poems, or short stories)

Q21 - What is the highest educational degree you received?

Q22 - How old are you?

Q23 - Type in the number 68

Q24 - What is your gender?

Q25 - What ethnicity do you identify with?

Q26 - What is the total income of your household?

Q27 - What grade is your child currently attending?

Q28 - What is the primary language spoken at home?

Q29 - How old is the child for which you completed the survey?

Q30 - Please list the age(s) of any other children you have (exclude the one you thought of for this study)

Q31 - On a scale of 1(not involved) to 10 (extremely involved), how involved are you with your child's academic development (e.g., helping them with homework, projects, and providing learning opportunities)?

Q32 - Compared to all other people my age, I am (0 = worst at math, 50 = average, 100 = best at math)

Q33 - Compared to all other people my age, I am (0 = worst writer, 50 = average, 100 = best writer)

Q34 - Compared to all other people my age, I am (0 = physically weakest, 50 = average, 100 = physically strongest)

Q35 - I would prefer my child to go into a career related to science, technology, engineering and math.

Q36 - I would prefer my child to go into a career in which my child will help people (e.g., health care, social work, education).

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