



The Association Between Parents' Growth Mindset and Children's Persistence and Academic Skills

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Parents' educational beliefs are thought to guide children's early development in school. The present study explored the association between parent's growth mindset and elementary school-aged children's self-reported persistence, as well as teacher-reported reading and math skills in 102 dyads. Findings showed that children self-reported greater persistence when their parents held more growth mindset. Teachers also rated students as more capable readers when their parents endorsed a growth, rather than fixed, mindset. Additional analysis indicated that although the effect of parents' growth mindset on children's reading skills became non-significant once SES was controlled, the positive association between parents' mindset and children's persistence was unaffected by SES. Our study provides evidence about the intergenerational association of motivational tendencies at an early age, even when children may not be able to develop a coherent system of motivational beliefs of their own.

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HIGHLIGHTS

- Children tend to be more persistent when their parents have more growth mindset
- Children' reading skill is positively associated with their parents' growth mindset
- The effect of parents' growth mindset on children's academic skills could not be disentangled from SES
- The relation between parents' mindset and children's persistence did not change as a function of SES

1 INTRODUCTION

Students' implicit theories about intelligence are key to their academic motivation and achievement (Blackwell et al., 2007; Burnette et al., 2013). Individuals who hold an incremental theory about intelligence (more recently described as a growth mindset) believe that change in intelligence is possible, whereas individuals who hold an entity theory about intelligence (fixed mindset) view intelligence as a fixed trait (Dweck and Leggett, 1988; Dweck, 2006). Compared to a fixed mindset, growth mindset relates to various adaptive academic behaviors and better academic performance (Yeager and Dweck, 2012; Claro et al., 2016; Warren et al., 2019). Considering the positive association between children's growth mindset and their academic outcomes, it is imperative to investigate the origins and sources of children's beliefs as they develop during early childhood.

Early research suggested that children may attain their motivational beliefs directly through socialization with their parents or teachers (e.g., Frome and Eccles, 1998; Jodl et al., 2001). Unfortunately, only a very limited number of studies have explored how parents' mindsets may foster motivation and achievement in their children (Gunderson et al., 2013; Haimovitz and Dweck, 2016; Matthes and Stoeger, 2018). This challenge is compounded by the difficulty in measuring young children's mindsets, which may not be fully developed into a cohesive belief in the early school years (Dweck, 2002; Barger and Linnenbrink-Garcia, 2017). Therefore, in the present study we sought to parse the mindset socialization process by investigating how parents' mindsets relate to components that form children's early academic adjustment: their tendency to persist and their academic skills.

If parents socialize children's beliefs, it would be expected that parents' mindsets would be related to their children's mindsets. However, research that has explored how children's mindsets are socialized through their parent's mindsets provides conflicting evidence (Haimovitz and Dweck, 2016; Matthes and Stoeger, 2018). Specifically, a study conducted in Germany showed a positive association between parents' mindset and the mindset of their 9- to 12-year-old children when intellectual potential was made salient during a time that students were assigned into ranked academic tracks based on their academic performance (Matthes and Stoeger, 2018). In contrast, in another study conducted across two public schools in the United States where academic trajectories are not rank-based, Haimovitz and Dweck (2016) did not find an association between parents' and 10- and 11-year-old children's mindsets using a cross-sectional design.

Even less research has been done to explore such relationships among younger children, as there are several impediments to studying mindset with children younger than age 9. First, it is possible that children before age eight are too young to form a belief system as hierarchically structured as mindset to navigate through life and learning (Dweck, 2002; Kinlaw and Kurtz-Costes, 2003; Barger and Linnenbrink-Garcia, 2017). Foundational works in the field (e.g., Nicholls, 1978) also indicated that children before age 12 have not yet formed a mature conception and differentiation about intelligence, ability, and effort. Second, children may define intelligence differently than adults do. Prior works have suggested that compared to older children and adults, who uniformly linked intelligence to cognitive and intellectual traits, younger children perceived intelligence differently in that they tended to include verbal and social skills in defining intelligence (Henderlong and Lepper, 1997; Nicholls et al., 1986). Taken together, younger children may not have fully developed a mature view of intelligence. Yet, influenced by their parents' mindset, children before age 8 may have started to conceive a rudimentary or less coherent form of motivational tendencies, of which existing measures of mindset can only capture segments.

Regardless of whether and when parents directly communicate growth mindset to their children, previous theory and research suggest that parents' mindsets could affect their children's motivational tendencies that are closely related to

mindset. On a within-individual level, holding a growth mindset has been associated with consistent effort in the face of adversity (Dweck, 1996; Dweck and Leggett, 1988; Dweck, 2010; Hochanadel and Finamore, 2015). When individuals with a fixed mindset face academic challenges, they might interpret it as a sign they have reached some pre-determined ceiling of potential, and therefore persist less. Individuals with a growth mindset instead interprets challenges as an opportunity to learn and improve, and therefore persists more. Intervention research supports such a causal association between holding a growth mindset and persistence among high school and college students (Bettinger et al., 2018; Rangel et al., 2020).

The association between mindset and persistence within individuals may extend to circumstances in which adults' mindsets might be used as a resource to foster persistence in their children. For example, Mueller and Dweck (1998) found that after receiving growth-oriented praise (i.e., praise for process), fifth graders were more likely to persist in challenging tasks when compared to fixed-oriented praise (i.e., praising personal attributes). Correlational studies have found that in some samples, when parents held a growth mindset, their children (ages between 7 and 8) were more persistent and less likely to display helpless patterns when taking on challenging problems (Smiley et al., 2000; Jose and Bellamy, 2012). This pattern has not been consistently documented, however. Specifically, Jose and Bellamy designed an experiment in which success on the task was made impossible, and measured children's persistence by asking whether they want to continue the task. Results showed no relation between parents' mindset and young children's persistence in their U.S. subsample, though this may be partially attributable to a limited sample size ($n = 39$). Aligned with this finding, in a longitudinal study, no transfer was observed from parents' mindset to their 7- and 8-year-old children's motivational framework, which encompasses individuals' growth versus fixed orientation, along with the attitude and behaviors associated with it (Gunderson et al., 2013).

Given this conflicting evidence, more research is needed to investigate the extent to which parents with growth mindsets may socialize persistence in their children, particularly before children form their own coherent and structured theories about intelligence and ability. To address this need, we investigated whether children younger than 8 years old are likely to be more persistent in the academic realm if their parents hold more growth mindsets.

In addition to fostering children's academic persistence, parents' growth mindset could also support children's achievement in other ways. Since harboring different mindsets is associated with varying parenting behaviors (Barger et al., under review; Haimovitz and Dweck, 2017), children's achievement could differ as a result. For this reason, mindset scholars have examined the interconnection between parents' growth mindset and their involvement in children's learning (e.g., Muenks et al., 2015). Specifically, parents who have growth mindsets tend to be more involved in students learning and provide more frequent and constructive feedback to their children's coursework.

Given the critical importance of math and reading achievement in relation to school dropout, health-related

outcomes, and future socioeconomic trajectory (Ritchie and Bates, 2013; Zuilkowski et al., 2016; Hsu et al., 2018), multiple studies have examined and found a significant association between parents' growth mindset and the frequency of their engagement in math and reading-related activities with their children (Muenks et al., 2015; Justice et al., 2020). Given that parental involvement in children's learning has been consistently shown to be associated with higher academic achievement in children (Barger et al., 2019), children may be more likely to develop academic skills if their parents hold more growth mindset.

Not only do parents holding a growth mindset spend more time with their children in learning-related activities, but the *quality* of those interactions also tends to be higher. For example, in a study conducted with children in early elementary school and their mothers, it is found that when induced with a fixed mindset, mothers were more likely to use unconstructive instruction and express negative affect in a subsequent problem-solving task with their children (Moorman and Pomerantz, 2010). On a relevant note, across multiple longitudinal studies (Barger et al., under review; Gunderson et al., 2013; Gunderson et al., 2018) using self-report and observational approaches, parents who had growth mindsets tended to use growth-oriented, process praise (e.g., "nice try!") more frequently than fixed-oriented person praise (e.g., "you are so smart!"). This difference in praise style was also reflected in children's academic performance, such that children whose parents used process praise outperform those whose parents used person praise in standardized math and reading tests. Given that growth mindset is associated with more consistent and constructive parent involvement, we hypothesized that children would develop better academic skills if their parents hold more growth rather than fixed mindset, regardless of whether parents' mindsets directly shape children's motivational tendencies. Although previous studies have focused on academic achievement as an important outcome of children's development, another approach would be to assess on students' academic skills. Academic achievement and academic skills are closely related; in one meta-analysis that involved more than 35,000 first through third grade students across three countries, academic skills in language and math were shown to be strong indicators of children's achievement in reading and mathematics (Duncan et al., 2007). Academic achievement refers to measures of children's comprehension of what they have been taught. Academic skills refer to children's proficiency in applying what they learn to different problem-solving situations. It may be that observers of young children's skills, such as teachers, might be able to capture a more dynamic dimension of children's knowledge through evaluating children's proficiency in applying what they learn to different problem-solving situations. Therefore, assessing students' academic skills should be seen as a complimentary approach to studying the potential relation between parents' mindsets on children's achievement.

Although parents' mindset may impact their children's academic skills by either affecting children's motivational tendencies or supporting more adaptive parenting behaviors, these processes do not happen in a vacuum. Children's

motivation development is highly situated in sociocultural contexts they find themselves in (Eccles and Wigfield, 2020), and it is therefore crucial for researchers to consider structural factors when examining children's motivation and learning outcomes. One such structural factor of importance is socioeconomic status (SES), which can be reflected by household income, parents' educational attainment, and parents' occupation. Previous research has established SES as a robust predictor of students' academic achievement (Reardon et al., 2011; Berkowitz et al., 2017). Even though early empirical works focusing on mindset omitted the role of SES in relation to mindset and students' achievement, several more recent studies have examined whether the relation between mindset and achievement are separable from the effects of SES and whether mindset interacts with SES to predict achievement in older students (Claro et al., 2016; Yeager et al., 2016; Destin et al., 2019; King and Trinidad, 2021). Although correlational studies found SES was a more powerful predictor of student achievement than mindset, three studies (Claro et al., 2016; Destin et al., 2019; Hwang et al., 2019) also found that growth mindset was associated with higher achievement above and beyond the effects of SES. The moderating role of mindset on the relation between SES and achievement, however, is much less clear. Two studies found no interaction between the two (Destin et al., 2019; Hwang et al., 2019), two found that growth mindset ameliorated the negative effects of low SES on achievement (Yeager et al., 2016; Claro et al., 2019), and another study found the opposite, that growth mindset was associated with higher achievement only among wealthy students (King and Trinidad, 2021). The complex way in which students' mindsets interact with their SES in predicting achievement remains unclear.

Given that the interaction between older students' mindsets and SES remains unclear, it is even less apparent whether parental beliefs interact with SES on academic aptitude for young children. If children's motivation or academic skills are enhanced by parents' growth mindsets, its effect needs to first be disentangled from the effect of SES. Furthermore, parents' mindsets could interact with SES to predict children's persistence and academic skills. It may be that parents' growth mindset reduces the impact of low SES on academic skills (mirroring student mindset findings in Claro et al., 2016; Yeager et al., 2016), or enhances academic skills only for high SES students (King and Trinidad, 2021), or that parents' mindset and SES each play a distinct role but do not interact to shape children's motivation and academic skills (Destin et al., 2019). Therefore, it is important to first control for SES when investigating the relation between parents' mindsets and children's motivation and academic skills, and then test for whether parents' growth mindset moderates the relation between SES and children's academic skills.

The current study aimed to answer several questions regarding the interrelation among parents' growth mindset, children's motivational tendency, academic skills, and their SES backgrounds. We relied on multiple reporters (parents, children, and teachers) to assess the variables of interest to avoid mono-method bias. We had four research questions. Our first research question was whether parents who hold more growth mindset about their children's

intellectual potential would have children who are more persistent. We expected to find a positive relationship between parents' growth mindset and children's persistence. Our second research question was whether children whose parents hold more growth mindset would develop better academic skills than children whose parents have more fixed mindset. We hypothesized that children whose parents have more growth mindset would develop better academic skills compared to children whose parents have more fixed mindsets. Our third research question was whether parents' growth mindset can explain additional variance in children's persistence and academic skills above and beyond the effect of socioeconomic status. Finally, our fourth research question was whether parents' mindsets moderate the relation between SES and children's persistence and academic skills. Given that prior works have provided supporting evidence to both sides of the argument, we did not make a directional hypothesis about the interaction effect of parent's mindset and SES.

2 METHOD

2.1 Study Procedures and Participants

We obtained data for this project from a sample of 102 elementary school children attending rural and urban schools in the Midwest. Children were participating in a larger study (NIH Grant #R21HD091681) investigating the potential mechanisms by which education and health are linked. Participants were recruited from first, second, and third grade classrooms in two school districts. Recruitment of teachers and children began at the start of the fall semester. All children of consenting teachers were invited to participate in the full protocol. Data collection for this study occurred at the end of the fall semester and thus all data were collected concurrently. The full protocol was approved by the third author's institutional review board (IRB protocol: STUDY00006507).

A total of 39 first-grade, 50 second-grade, and 13 third-grade children ($M_{\text{age}} = 7.14$ years; $SD = 0.80$ years) across 12 classrooms (3–14 students participated per class) were included in the current analyses. Approximately 49% of the sample was female and approximately 83% was white, 5% was African American, 5% was multiple races, and 7% identified as another race; just under 10% of the sample was Latino. Just under 6% of the children were identified as having a developmental delay (e.g., speech, social, emotional, cognitive) and approximately 2% have been held back once. Based on parents' report, 95% of the responding parents were mothers, and 67.7% of the participating parents were married or partnered. Thirty-seven percent of the participating parents had a bachelor or an advanced degree (e.g., MA, PhD, MD). Annual income for participating parents ranged from \$5,000 to 300,000, with a median of \$85,000. Participating teachers had an average of 11.4 ($SD = 4.9$) years of teaching experience. Eleven of the 12 teachers included in the study were female and all were white.

2.2 Measures

2.2.1 Parents' Mindset

Parents' mindset was measured using a modified version of the 3-item Growth Mindset Scale (Dweck, 1999; Dweck, 2006). More specifically, using a 6-point Likert-type scale (1 = Strongly

disagree to 6 = Strongly agree) parents were asked to indicate their level of agreement with three statements about their child's reading intelligence and three statements about their child's mathematics intelligence. Sample items include "Your child's reading intelligence is something about him/her that he/she can't change very much" and "Your child has a certain amount of math intelligence and he/she really can't do much about it." Items were summed to create a total mindset score, with higher values indicating a more fixed mindset. Internal consistency for this measure in the current sample was excellent ($\alpha = 0.96$).

2.2.2 Children's Persistence

Children's persistence was assessed using a set of investigator-developed questions adapted from existing measures (e.g., Duckworth et al., 2007) about how children handle challenges when they are learning. More specifically, trained research assistants asked students to indicate whether each of the 12 persistence statements was always true, sometimes true, or never true. Sample items include "I keep working on a problem even when it is hard" and "If I do something wrong or get the wrong answer, I learn from my mistakes." We conducted exploratory factor analyses to determine which items could be used to reliably assess persistence with this sample of participants (see below).

2.2.3 Academic Skills

The *Academic Rating Scale* (or ARS, U.S. Department of Education, 2002) was used to assess children's language, general knowledge, and mathematics skills. Using a 5-point Likert-type scale, teachers indicated whether the child demonstrated the skill (1 = Not yet or n/a = skill has not been introduced in the classroom) and if so, at what level (2 = Beginning, 3 = In progress, 4 = Intermediate, 5 = Proficient). Based on scoring guidelines from the ARS authors, items within scales were averaged to create a total score for each subscale (language and literacy = 11 items and mathematics = 7 items). Internal consistency in the current sample was high ($\alpha = 0.91$ for language and $\alpha = 0.93$ for mathematics).

2.2.4 Family Income (Socioeconomic Status)

Parents were asked to report on their total annual family income. More specifically, parents indicated their approximate income range using a 25-point scale (e.g., 1 = < \$5,000 to 25 = > \$300,000). Ranges increased in increments of \$5,000 up to \$100,000; between \$100,000 and \$300,000 it increased in increments of \$50,000.

3 RESULTS

3.1 Preliminary analyses

Due to the nested structure of our data (children nested within classrooms), we tested to see whether there were between-class differences in the variables that could impact our analyses. There were no substantial between-class differences in children's persistence ($ICC < 0.05$). However, teachers' ratings of

TABLE 1 | Factor loading for Children's persistence.

Items	Loading on final model
If I do something wrong or get the wrong answer, I learn from my mistakes	0.608
I like to work on tough problems so I always try to do them	0.536
I keep working on a problem even when it is hard	0.339
When someone tells me I did something wrong and tries to help me, I don't always listen to them. (reverse coded)	0.470
I believe that hard work and effort can help me succeed	0.562

children's academic skills in math (ICC = 0.31) and reading (ICC = 0.12) did seem to vary based on the teacher. Because we had a small number of classrooms that would make multilevel modeling difficult and we were not interested in the causes of class-level differences in teachers' ratings of their students (e.g., they could be caused by idiosyncrasies of the individual teacher as a rater or by differences in school curriculum), we recentered children's math and reading scores based on the average scores in each class. Specifically, within each class (teacher), we calculated the mean for reading and math scores, and then subtracted each students' individual score from the mean to get a new mean-centered value for all subsequent analysis.

We conducted exploratory factor analysis (EFA) in SPSS Version 26 with all 12 items from the children's persistence scale. Using principal axis factoring with oblique rotation, our scree plot initially suggested a four-factor model. However, two items were removed because they cross-loaded on all four factors without contributing substantially to any one of them. We ran another EFA using the remaining items and SPSS returned a three-factor solution, with another two items cross loading on all factors. After removing the cross-loading items, we moved on to a bi-factor model for the purpose of parsimony. One item showed cross loading and was removed. Items in our final bi-factor model showed small to moderate loadings on their respective factors. Internal consistency (Cronbach's alpha) for each of the factors was examined. Factor 1 (see **Table 1**) included five items, which all seemed to fit with our conceptualization of persistence as continuing to work in spite of challenges, and was therefore retained as our final measure of children's persistence, $\alpha = 0.602$. The reliability of this scale is commensurate to prior studies that examined similar constructs in elementary school age children (e.g., Gunderson et al., 2013; Gunderson et al., 2018). The second factor, which seemed to capture children's tendency to give up, had only two items and low reliability, $\alpha = 0.42$, and was therefore not used for subsequent analyses.

3.2 Descriptive Statistics and Correlations

Descriptive statistics and correlations for the variables of interest are presented in **Tables 2, 3**, respectively. Parents' growth mindset was associated with their children's persistence and their children's reading skills, though not their math skills. We also found a medium positive correlation between SES and parent's growth mindset and a small positive correlation between SES and reading

TABLE 2 | Descriptive statistics for study variables.

	N	M	SD	α
Parents' Growth Mindset	86	30.93	5.43	0.96
Children's Persistence	101	8.31	1.84	0.60
Children's Math Skills (mean centered)	102	25.87	5.58	0.93
Children's Reading Skills (mean centered)	102	39.88	5.22	0.91
SES	83	14.69	6.96	—

The average SES, on the 25-point scale corresponds with a household income of 73,450.

TABLE 3 | Bivariate Pearson correlation results between study variables.

	1	2	3	4
1. Parents' Growth Mindset	—	—	—	—
2. Children's Persistence	0.248*	—	—	—
3. Children's Math Skills	0.155	0.033	—	—
4. Children's Reading Skills	0.220*	0.019	0.715**	—
5. SES	0.372**	0.013	0.181	0.245*

*Indicates $p < .05$ (2-tailed). **Indicates $p < .01$ (2-tailed).

skills, but the correlations between SES and children's persistence and math skills were not significant.

3.3 Primary Analysis

There was no missing data from the teacher-report. For parents' report, in addition to three parents who reported on growth mindset but not annual income, there were 16 parents who did not report either annual income or growth mindset. There was one student who did not report on persistence, resulting in a total of 20 participants missing some data, or 19.6% of the sample. We estimated missing data in our model specification stage, using full information maximum likelihood estimation in Mplus version 8.

3.3.1 RQ1: Whether Parents Who Hold More Growth Mindset About Their Children's Intellectual Potential Would Have Children Who Are More Persistent?

We conducted linear regression to examine whether parents' growth mindset is associated with the persistence of their children (**Table 4**). The model suggested that parents' growth mindset significantly predicted their children's persistence ($\beta = 0.24$, $p = 0.015$, $R^2 = 0.057$). This implies that children whose parents had more growth mindsets about the intellectual potential of their children tended to describe themselves as being more persistent than children whose parents held more fixed mindsets. The result

TABLE 4 | Results from regression models (research question 1 and 2).

	Persistence					Reading					Math				
	Step 1		Step 2		ΔR^2	Step 1		Step 2		ΔR^2	Step 1		Step 2		ΔR^2
	β	SE	β	SE		B	SE	β	SE		B	SE	β	SE	
Parent mindset	0.239*	0.098	0.274**	0.102	0.057	0.214*	0.100	0.220*	0.105	0.046	0.123	0.101	0.143	0.105	0.022
Age	—	—	-0.087	0.102	0.006	—	—	-0.120	0.103	0.015	—	—	-0.395	0.104	0.005
Gender	—	—	-0.097	0.099	0.007	—	—	0.063	0.099	0.00	—	—	-0.828	0.100	0.004
Total R^2	—	—	—	—	0.070	—	—	—	—	0.061	—	—	—	—	0.031

* $p < .05$, ** $p < .01$.

TABLE 5 | Results from regression models (research question 3 and 4 regarding Children's persistence).

	Persistence							ΔR^2
	Step 1		Step 2		Step 3			
	B	SE	β	SE	B	SE		
SES	0.013	0.105	-0.099	0.110	-0.117	0.114	0.00	
Parent mindset	—	—	0.278**	0.106	0.321*	0.128	0.066	
Parent mindset \times SES	—	—	—	—	0.072	0.123	0.006	
Total R^2	—	—	—	—	—	—	0.072	

* $p < .05$, ** $p < .01$.

for this finding remained robust even when controlling for children's age and gender. Therefore, our first hypothesis was supported.

3.3.2 RQ2: Do Children Whose Parents Hold More Growth Mindset Develop Better Academic Skills Than Children Whose Parents Have More Fixed Mindset?

We then regressed children's math and reading scores on their parents' mindset (Table 4). Our models suggested that parents' growth mindset significantly predicts children's reading score ($\beta = 0.21, p = 0.032, R^2 = 0.046$, but not math score ($\beta = 0.15, p = 0.141, R^2 = 0.022$). Our results indicated that children's reading skills were positively associated with their parents' growth mindset about their children's intellectual potential; the more growth-oriented their parents were, the higher children's reading skills. However, the same pattern was not observed for math skills. Thus, our second hypothesis was partially supported. The results for reading skills were robust when including gender and age as control variables in the model.

3.3.3 RQ3: Does Parents' Growth Mindset Explain Variance in Children's Persistence and Academic Skills Above and Beyond SES?

To examine whether parents' mindsets are associated with children's persistence above and beyond SES, we conducted a two-step hierarchical regression with children's persistence as the dependent variable (Table 5). SES was entered as a control variable in the first step. Parents' mindset was entered at Step 2. Results indicated that the association between parents' mindset and their children's persistence remained significant with SES included in the model ($\beta = 0.28, p = 0.009, R^2 = 0.066$).

To examine the effect of parents' mindset on children's reading skills, controlling for SES, we followed the same

procedure as above, but used children's reading skills as the dependent variable (Table 6). Regression models showed that the effects of both SES ($\beta = 0.18, p = 0.086$) and parents' growth mindsets ($\beta = 0.15, p = 0.175$) on their children's reading skills were nonsignificant, suggesting that for children's reading skills, the effect of parents' mindset can not be disentangled from that of SES.

3.3.4 RQ4: Does the Parents' Mindset Moderate the Relation Between SES and Children's Persistence and Academic Skills?

To examine whether the relationship between SES and children's outcome variables depends on parents' growth mindset, we added an interaction term for parents' mindset and SES to each of the models we fit to answer the third research question (Tables 5–7, Step 3). We did not find a significant interaction effect between SES and parents' mindset on children's persistence ($\beta = 0.072, p = 0.559$), children's reading ($\beta = -0.033, p = 0.784$), and math skills ($\beta = 0.109, p = 0.356$). These results did not support the theory that the impacts of SES on children's skill development become more or less powerful depending on parents' growth mindsets about their children's intellectual potential. We conducted power analyses for these interaction effects. Results indicated that our sample was substantially underpowered to observe these effects (power = 0.06 to 0.15). Therefore, results about the moderating role of parents' growth mindset on the relation between SES and children's academic skills should be interpreted with caution.

4 DISCUSSION

The present study identified connections between parents' mindset, children's persistence and academic skills.

TABLE 6 | Results from regression models (research question 3 and 4 regarding reading skills).

	Reading						ΔR^2
	Step 1		Step 2		Step 3		
	β	SE	β	SE	B	SE	
SES	0.235*	0.099	0.184	0.107	0.191	0.110	0.055
Parent mindset	—	—	0.146	0.108	0.128	0.127	0.020
Parent mindset \times SES	—	—	—	—	-0.033	0.119	0.001
Total R^2	—	—	—	—	—	—	0.076

* $p < .05$, ** $p < .01$.**TABLE 7** | Results from regression models (research question 3 and 4 regarding math skills).

	Math						ΔR^2
	Step 1		Step 2		Step 3		
	B	SE	β	SE	β	SE	
SES	0.171	0.101	0.135	0.109	0.112	0.111	0.029
Parent mindset	—	—	0.099	0.109	0.160	0.127	0.009
Parent mindset \times SES	—	—	—	—	0.109	0.118	0.009
Total R^2	—	—	—	—	—	—	0.047

* $p < .05$, ** $p < .01$.

Specifically, there were clear associations between parents' belief that their children's ability can change, their children's persistence, and children's academic skills. Parents' growth mindsets about their children's intellectual potential were linked to children's persistence, even when controlling for socioeconomic status, age, and gender. Parents' growth mindsets were also related to reading skills, but the effect of parents' mindsets on children's reading skills was indistinguishable from that of SES. Interestingly, we did not find a direct association between children's own persistence and their academic skills. One possible explanation is that persistence in the face of challenge is less critical to succeeding in contexts that have low rates of failure (e.g., early elementary school). Also, unexpectedly, the association between parents' growth mindset and children's academic skill was significant only for reading but not math. One possibility is that parents know more about how to foster reading skills in children than math skills (Cannon and Ginsburg, 2008). It is also likely that parents place more value in reading than in math, especially at this age (Barbarin et al., 2008), influencing their parenting practices in home-learning environments. The association between parents' growth mindset and their children's persistence supported the theory that parents foster motivational tendencies in their children that align with their own mindsets, even if those tendencies do not have immediate payoffs in terms of children's achievement.

The linkage between parent's growth mindset about their children's ability and children's persistence suggested that children as young as 6 years old are able to acquire motivational beliefs from their parents. Prior research has provided conflicting findings about the direct association between parents' and children's growth mindset (Gunderson

et al., 2013; Haimovitz and Dweck, 2016; Matthes and Stoeger, 2018). However, one possible explanation for this disconnection is that young children are not yet cognitively capable of forming a structured set of beliefs around something as abstract as intelligence (Barger and Linnenbrink-Garcia, 2017; Kinlaw and Kurtz-Costes, 2003). The theory of growth mindset is not only a theory of intelligence, but also a belief in what sets of actions should be taken due to those theories, such as being persistent in face of challenges (Dweck and Leggett, 1988). Our findings offered the possibility that even if parents' mindsets about intelligence do not directly get passed to children, who still have fairly loose understanding of intelligence, children may be receptive to parents' mindsets in the form of simpler motivational scripts (e.g., "When I fail, I should keep trying"). Children's tendency to persist could therefore be an antecedent of growth mindset, which would explain why some researchers have found a connection between parents' and children's mindsets in older children (Matthes and Stoeger, 2018) but not younger children (Gunderson et al., 2013). In this view, parents with a growth mindset may foster young children's developing motivational tendencies like persistence (which are not captured in traditional mindset measures), which in turn solidify into cohesive mindsets later in childhood, gaining impact as children move into more challenging contexts (like middle school). Given the ongoing challenge of measuring growth mindset in young children, it may be more developmentally appropriate for researchers to measure the motivational tendencies related to growth mindset, instead of directly assessing formal mindset in young children. Unfortunately, this current research was not able to empirically investigate the longitudinal development of children's persistence and mindsets, nor was it possible to

identify the direction of the associations between parents' mindset and children's outcomes observed here. We cannot rule out the possibility that when parents see their children persist more through challenge that it fosters the belief in parents that their children's ability can change. Future research should further explore the psychological and behavioral mechanisms through which mindset might transfer from parents to children, perhaps through experimental designs that manipulate parents' mindsets and examine the impacts of parenting practices and subsequent persistence in children.

We replicated Matthes and Stoeger's (2018) finding that children had better academic performance (in the current study, reading comprehension) when their parents held more growth mindset. However, this association disappeared when we included SES as a control variable in a regression model, meaning that SES still accounted for a large portion of variance in children's academic skills in the current study. In this sense, our findings demonstrated that parents' growth mindsets covaried with their SES, as having high SES may have provided people with fewer barriers to achievement throughout their lives, making more salient the belief that one's intellectual ability can improve. This connection between mindset and SES made it impossible to distinguish between the potential contribution of parents' mindsets and SES to children's academic skills in this current study. Given the strong empirical evidence that SES contributes to academic achievement (Berkowitz et al., 2017), the shared variance in achievement between parent mindset and SES would most cautiously be interpreted as being due to SES and not parents' mindset.

However, our results should not be interpreted as devaluing the role of parents' mindset, or mindset in general, in supporting children's academic outcomes. For one thing, parents' mindsets did uniquely relate to children's persistence, which could be beneficial beyond looking at early math and reading skills. Furthermore, previous research has presaged a few behavioral and psychological mechanisms through which parents' growth mindset can affect children's achievement, particularly among older students. Specifically, parents holding more growth mindset not only spend more time on helping children with their coursework, but also provide guidance of higher quality (Moorman and Pomerantz, 2010; Muenks et al., 2015). When children succeed on a task, parents with growth mindset are more likely to use process praise rather than person praise (Barger et al., *under review*). When children experience failures, parents who hold more growth mindsets are also more likely to view failures as enhancing rather than debilitating (Haimovitz and Dweck, 2016). These more adaptive parenting behaviors and beliefs would potentially facilitate children's achievement in the long term.

The interconnectedness between SES and growth mindset requires future research to take a holistic approach and investigate when and why growth mindset and SES start to converge, and whether growth mindset could be particularly beneficial when people have the resources to put those beliefs into action (e.g., King and Trinidad, 2021). It may be that people from wealthier backgrounds have more exposure to positive life experiences such as having a successful career or receiving

promotions at their workplace. Such sanguine experiences can lead them to believe that their ability can be improved over time. Future research may also investigate the interplay between socioeconomic status, mindset, and achievement by assessing these variables longitudinally, so that researchers can determine whether mindset interacts with prior achievement (e.g., doing poorly in math previously) and not contextual variables like SES that are linked with prior achievement (e.g., Hwang et al., 2019). In the same vein, our results emphasized the importance of accounting for SES in evaluating parents' mindset and parenting behaviors in relation to children's academic achievement. Doing so will help researchers to disentangle the effect of parental belief and behaviors from that of SES on children's academic outcomes.

5 LIMITATIONS

There are several limitations to our findings. First, in an effort to obtain multiple reporters, the total sample size may have been underpowered to detect all effects of interest (i.e., interaction effects). Future research should consider replicating these findings on a greater scale. Second, parent's income was the sole indicator of SES in our study, even though SES consists of multiple indicators (e.g., parents' education and occupation). Future research may benefit from a more comprehensive assessment of family SES. Third, our measure of children's academic achievement, the ARS, was not a direct measure of children's achievement on math and reading, but rather an estimate of academic skills based on teacher-report. Measuring children's academic skills has its own merits, and academic skills are strongly associated with children's academic achievement (Stevenson and Newman, 1986; La Paro and Pianta, 2000; Duncan et al., 2007). Nonetheless, future research may benefit from using more standardized achievement assessments, to ease the process of comparing results across studies for future researchers. Finally, given that corresponding parents were mostly mothers in our sample, future research should consider recruiting more father participants and examining whether the intergenerational association found in this present study holds for parents of both genders.

6 CONCLUSION

Our study provided promising evidence that parents' growth mindset plays a role in fostering children's persistence in academic settings. Although the benefits of parents' growth mindset do not seem to extend to their children's academic skills while controlling for SES at this early stage of education, the tendency to persist could become a useful resource when coursework becomes more challenging later in school. Limited by the nature of cross-sectional data, we were unable to unveil the timeline and process through which motivational beliefs were transferred from parents to their children. Both longitudinal and experimental research are required to further explore these topics. Although parents' mindsets may have a role to play in fostering children's motivation

and learning, this study also reminded researchers of the importance of studying socialization processes in context, given the potentially extensive effects of SES on parents' motivational beliefs, parenting behaviors, and children's academic outcomes.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board, University of Georgia. Written informed consent to participate in this

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study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

The authors confirm contribution to the paper as follows: study conception and design: YS, MB, and KB; data collection: KB; analysis and interpretation of results: YS, MB, and KB; draft manuscript preparation: YS, MB, and KB. All authors reviewed the results and approved the final version of the manuscript.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2021.791652/full#supplementary-material>

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