

THE UNIVERSITY OF CHICAGO

**The Role of Parental Involvement in Bridging the Racial Achievement Gap:**

**A Longitudinal Study of Elementary Students**

By

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### **Abstract**

Despite widespread political and pedagogical consensus on the importance of parental involvement in children's schooling, the academic literature offers mixed findings regarding its impact on student achievement. This research seeks to address that gap through examining the associations between parental involvement and student learning in math and English over elementary school using the nationally representative Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011). Building on ecological and critical theories of involvement, this study employs composite indices of both at-home and in-school involvement to track parental engagement over time. Methodologically, this research deploys both two-level weighted growth curves which adjust for nonrandom non-response and three-level hierarchical models to account for the clustering of students in schools. In line with the literature, findings reveal a consistent small-to-moderate association between at-home and in-school parental involvement and learning in elementary school. A closer look at the models, however, reveals that parental involvement yields greatest benefits in early elementary school, with associations fading by fourth grade. Not all parental involvement is equally associated with learning; across models, parental involvement among racial minority families is a significantly stronger predictor of academic growth than for White students. While these findings suggest efforts to increase parent involvement may reduce some racial disparities in achievement, this research concludes that parental involvement alone is insufficient to overcome the structural inequities and racial biases embedded in the U.S. educational system.

### **Introduction**

Parental involvement in the context of children's schooling has long been the subject of education scholarship and political discourse (Goodall, 2021). A dominant body of work identifies family involvement in schooling as a key mediator to help close achievement gaps and maximize student potential (Gutman & Midgley, 2000; Dunn & Booth, 1996; Dearing et al., 2006). Lawmakers and scholars consider parental involvement especially important in a national context where racial inequalities in education remain large and persistent (Ladson-Billings, 2006).

The belief in the importance of the involvement of the family has become deeply embedded in the American ethos. In classrooms, elementary school teachers commonly point to parental involvement as the primary factor influencing student underachievement (Souto-Manning & Swick, 2006). In addition, parental involvement is endorsed across the aisle, receiving bipartisan support. George W. Bush signed the No Child Left Behind Act, which called for “the participation of parents in regular, two-way, and meaningful communication” (U.S. Department of Education, 2002; Hill & Tyson, 2009). A decade later, Barack Obama told Congress, “There is no program or policy that can substitute for a mother or father who will attend those parent/teacher conferences” (Obama, 2009 as cited in Robinson & Harris, 2014). Today, Illinois is one of eleven states that guarantee parents the right to time off work specifically to attend education or behavioral “conferences” (School Visitation Rights Act, 1992).

Despite political and educational consensus about the importance of families and schools working together, the literature on parental involvement remains mixed on the true effect of parental involvement, with studies yielding inconsistent results (Robinson & Harris, 2014; Okpala & Smith, 2001; Chen et al., 2013). While many scholars attribute mixed findings to differences in how parental involvement is measured or defined, the absence of consensus on when it matters most, and for which students, reveals a critical gap in the existing literature. Given that rates of parental involvement tend to peak in elementary school and decline as children transition into middle school

(Hill & Tyson, 2009), identifying which types of involvement are most effective during this period of heightened involvement represents a critical area for further research. This thesis addresses that need by employing theoretically grounded indices of both at-home and in-school parental involvement, enhancing the conceptual clarity and generalizability of the findings beyond any one set of survey items. The primary question this thesis seeks to understand is: To what extent are school-based and home-based parental involvement strategies associated with students' growth in English and mathematics test scores during elementary school, and how do these associations differ across racial groups?

### **Literature Review**

Parents can engage in their children's education in many ways, leading to a lack of consensus in the literature on what defines parental involvement in schooling (Harris & Robinson, 2016). Epstein et al. has presented one particularly influential framework of the six types of parental engagement – parenting, communicating, volunteering, learning at home, decision making, and community collaboration – that create partnership between families, schools and communities (2001). In addition, scholars often conceptualize parental involvement into two broad categories: interactions that take place in a school setting and those that occur within the context of a child's home life (Dauber & Epstein, 1989; Hill & Tyson, 2005; Fredricks, 2011). Emphasizing at-home and in-school school contexts as foundational to child development, an ecological framework conceptualizes students' academic trajectories as shaped by a range of overlapping systems and structures (Ma et al., 2016). Ecological Systems Theory (Bronfenbrenner, 1977), accordingly, organizes children's development into a set of nested structures, from their immediate microsystem in the home to the school, and then to more remote systems such as school policies and laws.

In line with Ecological Systems Theory, school-based and home-based parental involvement represent two intersecting components of children's academic experience. School-based

involvement refers to parents' direct involvement with their children's schools and teachers, including attending parent-teacher conferences and volunteering in classrooms. Because school-based involvement relies on parents and school staff communicating through a shared understanding of a child's educational context, this type of involvement requires significant resources from parents, which tends to favor families already in privileged positions while disadvantaging parents who lack English proficiency or familiarity with the educational system (Crosnoe & Ressler, 2019). Home-based involvement refers to the strategies parents may use to facilitate the continuation of learning outside of school (Schmid & Garrels, 2021; Hill & Tyson, 2005). Examples of this type of involvement include reading to a child at home, having children participate in non-school activities that promote development, and monitoring and supporting homework. Scholars suggest that rates of home-based parental involvement are less stratified by race and socioeconomic status than school-based forms of involvement, as they rely less on institutional access and knowledge (Hill & Tyson, 2009; Love et al., 2021).

Although positive associations between parental involvement and student outcomes have been repeatedly demonstrated in the qualitative and quantitative literature, there exists less consensus on when involvement is most critical, and for which students. While some studies and meta-studies have found no significant effects of in-school involvement and achievement (Thurston, 2005; Fan & Chen, 2001), the most recent meta-analyses of the field indicate that parental involvement in-school has a small but positive effect, with parental involvement in-school having a greater effect on outcomes than at home (Kim & Hill, 2015; Hill & Tyson, 2009; Erdem & Kaya, 2020). Because parental involvement encompasses a diverse set of behaviors, many scholars attribute the field's contradictory findings to inconsistent definitions of the term (Roy & Giraldo-Garci, 2018; Harris & Robinson, 2016). Without a unified theoretical framework, parental

involvement includes a wide array of behaviors, resulting in inconsistent measurement strategies and effects across studies. Therefore, points of consensus around the effect of parental involvement remain limited.

In considering the age at which involvement is most crucial, some scholars suggest parental involvement is most productive in younger years as early elementary education represents a particularly malleable developmental stage (Avnet et al., 2019; Barnett et al., 2020). Still, others argue that as classroom sizes grow, parents' involvement is essential to provide individualized attention to students (Juvonen et al., 2004).

Similar to findings on age, both theoretical and empirical research offers mixed conclusions regarding the role of parental involvement in moderating the racial achievement gap (Harris & Robinson, 2016). While some studies find no significant differences in the effects of parental involvement based on a child's race (Nzinga-Johnson, Baker, & Aupperlee, 2009; Jeynes, 2016), other scholars remain divided on how parental involvement moderates racial differences in schooling.

Both Cultural Reproduction Scholarship and Critical Race Theory contend that parental involvement disproportionately benefits students from more advantaged backgrounds, as these parents are more equipped to deploy and transmit the cultural capital desired in schooling. This dynamic is particularly evident in the marginalization of non-white, non-middle-class parents in school (Yosso, 2006). Even when parents from disadvantaged backgrounds are actively involved, they often report feeling marginalized within the educational system (Assari et al., 2021; Love et al., 2021; McCarthy, 2022). For example, Black parents report frequently racial aggressions in their children's schooling, including assumptions that their involvement practices are inadequate or perceptions of them as threatening or overly aggressive in their efforts to advocate for their children

(Love et al., 2016; McCarthy 2022). In contrast, families from advantaged backgrounds are better equipped to deploy their cultural capital within educational contexts, as they typically have greater access to resources, social networks, and knowledge that facilitate their navigation of the educational system. This sense of understanding and entitlement to the school system enables advantaged parents to engage with and advocate for their children's education in ways that are often inaccessible to parents from less privileged backgrounds, reproducing inequality in schooling (Lareau, 2011). Some quantitative examinations of this cultural and racialized reproduction have found advantaged children benefit more from the cultural capital of their parents (Marcucci, 2019; Xu and Hampden-Thompson 2012).

In contrast, other scholars contend that the presence of structural inequalities and interpersonal racism within schools makes in-school parental involvement even more effective for disadvantaged students compared to their peers (Li & Fischer, 2017; Domina, 2005; Benner, Boyle, & Sadler, 2016). Cultural mobility theorists argue that, while schools predominantly prioritize the cultural capital of white, middle-class families, marginalized families can leverage their involvement with normative school culture to gain access to and leverage the resources of the space (DiMaggio, 1982). Examples of this might be Black families' participation in their children's schooling as a means of contesting dominant ideologies and exclusionary practices such as students placement into lower academic track classes or disciplinary procedures (Yosso, 2006). In addition, Cooper (2009) describes the legacy of Black parents' educational involvement in advocating on behalf of their children, and their communities, through engaging with student spaces and teachers to improve educational resources. Lareau (2011), similarly, argues that the effective deployment of parental capital in schooling can improve outcomes particularly for disadvantaged students.

## **Method**

*i. Data Source:*

This study utilized the public-use data file of the Early Childhood Longitudinal Study from the Kindergarten Class of 2010-11 (ECLS-K:2011). The ECLS-K:2011 was conducted by the National Center for Education Statistics (NCES) within the Institute of Education Sciences (IES) of the U.S. Department of Education. The ECLS-K:2011 followed a nationally representative cohort of children from their entrance into kindergarten in 2010-2011 through the 2015-2016 school year, when most of the sample participants were in fifth grade. The study itself is a multisource, multimethod study with a clustered, multistage probability design. For kindergarten, first grade, and second grade, data was collected from the sample near the beginning (fall) and end (spring) of each respective academic year. Starting in third grade, data collection occurred once during the end of each academic year.

*ii. Participants:*

In the 2010–11 school year, the ECLS-K:2011 collected data from a nationally representative sample of 18,174 children enrolled in 968 schools. Participants were selected through a three-stage clustered sampling design that involved selecting 90 geographic sampling units, sampling public and private schools with probabilities proportionate to student body size and then selecting a fixed number of students per school.

After applying survey weights to account for sampling bias, the estimated racial composition of the population, based on the weighted sample, is as follows: 51.85% White, 4.43% Asian, 13.24% Black, 24.78% Hispanic, 4.11% Multiracial, 0.004% Pacific Islander or Native Hawaiian, and 0.01% Native American. Additionally, 51.58% of children in the weighted population are male.

The modal educational attainment for a child’s primary caregiver is some college, while the modal educational attainment for a child’s secondary caregiver is a high school degree. 12.07% of

students in the sample have a primary caregiver who has not completed a high school degree, while 28.33% of the sample have a primary caregiver with at least a college degree.

*iii. Test Scores*

Student achievement was measured using IRT-based theta scores for mathematics and English. Theta scores are advantageous in longitudinal research because they maintain a consistent measurement scale across different assessments and time points, enabling direct comparisons of student achievement growth over time. Student tests were conducted during the spring of kindergarten, second grade, and fourth grade.

*iv. Additional Controls:*

*i. Student Behavior:*

To begin to address the potential endogeneity arising from student behavior influencing parental involvement, thereby reversing the presumed direction of effects, this study incorporates four measures of student behavior in the classrooms and a measure of disability status into models.

Student in-class attentional focus and inhibitory control were assessed using the Children's Behavior Questionnaire (CBQ) (Putnam & Rothbart, 2006) for kindergarten and the Temperament in Middle Childhood Questionnaire (TMCQ) (Simonds & Rothbart, 2004) for grades 2–5. These scales report high internal consistency across grades and were mean centered. Teacher-student relationships were assessed using the Student-Teacher Relationship Scale (STRS) (Pianta, 2001), with teacher-reported student conflict and closeness averaged across Likert-type scales.

While teacher evaluations of student behavior may be biased by racial stereotyping (Starck et al., 2020; Owens, 2023), these measures remain valuable in accounting for variation in parental involvement, as schools may request increased parental involvement for students perceived as misbehaving.

All student-behavior controls were collected during each round of data collection and grand mean centered. Student disability status is a binary variable that indicates if a student's parent reports their child has a disability.

*ii. Household Income:*

The variable household income was collected over each period of data collection and grand mean centered. Missing data from any round of data collection was identified by the NCES team through longitudinal imputation.

*iii. Number of Siblings:*

To account for potential limitations in parental involvement due to constrained human capital, parents reported the number of siblings a child had during each round of data collection. i Given the extensive literature showing that larger family sizes are negatively associated with student test scores, controlling for household size is essential when modeling student outcomes (Steelman et al., 2022; Öberg 2017). Additionally, because research suggests that parent's ability to transmit human capital to each child diminishes as family size increases, family size also likely to be negatively associated with student involvement both at school and at home (Vellymalay, 2013).

*iv. Student Race/Ethnicity:*

Parent reports of student race and ethnicity was constructed into a baseline child race composite variables following the final round of data collection. These composites categorized children into mutually exclusive racial/ethnic groups including: White, Black, Hispanic (with or without specified race), Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native, and multiracial (non-Hispanic). If students had no recorded race or ethnicity following the final round of data collection, the most recent race/ethnicity composite from a previous round of data collection was used to fill in missing values.

*i. Sex:*

Parents reports of their child's sex were used as a baseline child covariate.

*ii. Primary Caregiver Health:*

The primary caregiver of each child surveyed reported their health status during each round of data collection in kindergarten, third grade, and fifth grade on a scale of "1: Excellent" to "5: Poor."

This health indicator was grand mean centered at each round of data collection.

*iii. Primary and Secondary Caregiver Baseline Level of Education:*

The primary parent and secondary parent's highest level of education was attained in the kindergarten round of data collection and grand mean centered as a student-level covariate.

*iv. Primary Language in Child's Home:*

At the end of data collection, a composite variable was created to assess a student's primary language at home. If, in fifth grade, a parent reported a language other than English was spoken at home either primarily or exclusively, the student was coded as having a non-English primary language. If data was missing in fifth grade, the most recent available primary language composite from prior waves was used to impute the missing value. This variable was included as a baseline child-level covariate to control for non-English speaking home environments.

*v. % Nonwhite Students in School:*

School administrators reported the percentage of students at the school who were not white at each round of data collection. These percentage values were then converted into percentile ranks. This covariate was collected at each point of data collection and grand mean centered.

*vi. % Free or Reduced Lunch Eligible:*

School administrators reported the percentage of students at the school eligible for free or reduced- price lunch over each round of data collection. If no information was received from school administrators, the NCES team employed longitudinal imputation. Free or reduced lunch eligible percentages were grand mean centered and included as a school-level covariate.

*i. % District poverty*

School administrators reported the percentage of students in the district in poverty over each round of data collection. If no information was received from school administrators, the NCES team employed longitudinal imputation. District-level poverty percentages were grand mean centered and included as a school-level covariate.

*v. Imputing Missing Data*

The NCES imputed some missing measures within the ECLS-K:2011 prior to the publication of the analytical data. In this dataset, household income, race, parental education, and district poverty were longitudinally imputed by the NCES team before publication, with flag dummy variables identifying imputed values.

Additional imputations of missing data for student behavioral controls and the creation of at-home and in-school parental involvement indexes have been conducted. For continuous variables, missing values were replaced with the mean, while categorical variables were imputed using the mode. Additionally, dummy variable columns were created for each variable with imputed values to indicate which values had been imputed for further inclusion in analysis. Imputation flags from the NCES team were added to imputation flags from the second round of analysis. All regressions were run with each independent variable imputation flags so that the potential bias introduced by missing data could be accounted for through model specification.

*vi. Meeting the Assumptions of OLS Regression*

Initial diagnostic regressions were performed following Jackknife 2 Weighting to assess whether the additional assumptions of Ordinary Least Squares (OLS) regression were satisfied. Prior to formal modeling, exploratory scatterplots with fitted linear trend lines indicated the

relationship between time and in-school and at-home involvement were approximately linear, supporting the use of linear growth models.

Diagnostic regressions including all relevant independent and dependent variables indicated the presence of heteroskedasticity, with larger residuals observed at extreme values of student test scores. To reduce the risk of increased Type I errors, student test scores were restricted to fall within the 5<sup>th</sup> to 95<sup>th</sup> percentile through Winsorizing. After this transformation, the Breusch-Pagan test indicated no significant evidence of heteroskedasticity in either the literacy or math models, confirming the appropriateness of the OLS assumptions.

Following the initial model estimation, all primary models presented below were estimated using Winsorized test scores to mitigate the influence of extreme values. The results from the models that included non-Winsorized scores demonstrated similar patterns of association between parental involvement and student learning outcomes as Winsorized scores; while the coefficients for the non-Winsorized models were slightly larger for the primary variables of interest, the overall pattern of associations remained consistent. Specifically, parental involvement in-school and at-home continued to show a positive and statistically significant relationship with both math and reading achievement ( $p < .001$ ). While non-Winsorized scores will not be reported in the main models, similar results confirm the stability of the model.

*vii. Constructing Composite Scores of In-School and At-Home Parental Involvement*

To construct indicators of parental involvement with their children outside of schooling, variables that indicated parent's and family's involvement on a frequency scale were summed across scores of items, with a total ranging from 0-21. Following the methodology of Kling et al., in analyzing variables on a frequency scale (2007), involvement indicators are reported in z-scores, scaling by the standard deviation of each indicator at the given time.

In addition to the parental involvement z-scores, additional standardized z-scores which summed imputation flags were assigned to each child at each point to account for varying levels of missingness in involvement indexes across respondents. All frequency variables included are direct measures of the frequency with which parents or family members directly interact with their child over the average week. These measures include (1) playing a sport or exercising with child, (2) having child help parent around house, (3) taking child in nature or to do science experiments, (4) practicing reading and writing numbers with child, (5) reading books with child, (6) telling stories with child. Questions that were not asked across years were dropped to ensure consistent measurement.

To construct a composite measure of parental involvement in schooling, five key indicators of parental involvement were combined using standardized Z-scores to assess parents' involvement in classrooms during the past academic year (parental questionnaires were administered in the spring). The parental involvement in schooling variables include (1) attending parent-teacher association meetings, (2) participating in parent-teacher conferences, (3) attending Back-to-School night, (4) volunteering at their child's school, and (5) maintaining social networks within the school community. While four of these variables were already binary indicators, the final variable in the composite measure was transformed into a binary variable.

Specifically, for assessing parent's social networks, parents that indicated they talk to at or above the median number of parents talked to in each time period were categorized as a 1 while parents below the median were categorized as a 0. Following the transformation of all variables into binary indicators, they were summed into a composite scale ranging from 0 to 5, reflecting the total number of involvement behaviors exhibited by each parent. Finally, this scale was standardized using Z-scores at each point in time to create a continuous, normalized measure of parental involvement in schooling. In addition to the parental involvement z-scores, additional z-scores

which summed imputation flags were assigned to each child at each point to account for varying levels of missingness across respondents.

**Table 1.** *Descriptive Statistics of Parental At-Home Involvement Across Grades*

	Exercise with Child	Child Helps Parent	Parent takes Child in Nature	Practice Math Skills	Read Books	Tell Stories to Child
Kindergarten	2.67 (sd = .55)	2.23 (sd = .49)	2.04 (sd = .53)	2.93 (sd = .25)	1.99 (sd = .09)	2.76 (sd = 0.47)
Second	2.69 (sd = .54)	2.06 (sd = .48)	2.00 (sd = .49)	2.87 (sd = 0.37)	1.90 (sd = .28)	2.17 (sd = .47)
Fourth	2.14 (sd = .49)	1.90 (sd = .46)	1.94 (sd = 0.45)	2.71 (sd = .55)	1.97 (sd = .14)	2.06 (sd = .45)

*Note:* Values represent ordinal indicators of parental involvement frequency on a 4-point ordinal scale: (1) Never, (2) Once or Twice a Week, (3) 3 to 6 Times a Week, and (4) Every Day. Means indicate average involvement frequency.

**Table 2.** *Descriptive Statistics of Parental In-School Involvement Across Grades*

	PTO/PTA Attendance	Parent-Teacher Conference	Back-to-School Night	Volunteering at School	Talking to other parents
Kindergarten	31% (sd = .46)	93% (sd = .26)	84% (sd = .37)	67% (sd = .47)	72% (sd = 0.45)
Second	37% (sd = .48)	94% (sd = .24)	86% (sd = .33)	61% (sd = 0.48)	66% (sd = .49)
Fourth	36% (sd = .48)	93% (sd = .26)	87% (sd = .33)	41% (sd = .49)	75% (sd = .43)

viii. *Modeling Parental Involvement and Student Learning*

This paper applies two primary approaches to the nested data from the ECLS-K:2011: growth curve models as the main model and three-level hierarchical nested models as a supplementary analysis, each offering distinct advantages and limitations.

First, models which capture individual students' growth over time are a common method for analyzing longitudinal datasets. For example, McKoy (2023) and Li & Lihong (2015) both employed two-level growth-curves on this data set, nesting time points within individual students. The strength of this approach lies in the ECLS-K dataset's robust set of main sampling weights along with 80 replicate weights which facilitate accurate variance estimations and support causal inference. These weights are especially important because they adjust for differential patterns of nonresponse that could bias estimates, given that parents from lower-income backgrounds and parents from racial minority groups had higher nonresponse rates (National Center for Education Statistics 2016).

At the same time, because this model assumes observational independence across students, it overlooks the fact that students within the same school may have more similar outcomes than those in different schools (Raudenbush, 2001). To address this, a secondary approach, the three-level HLM, incorporates school-level effects, providing a more accurate representation of how parents engage with their children's education given the context of the child's school. However, methodological challenges persist given the dataset's lack of appropriate weights for modeling a longitudinal three-level structure. Therefore, this thesis will present a primary model using growth curves to capture individual students' learning trajectories over time, leveraging the strength of this methodology to incorporate weights for non-response and oversampling. A secondary three-level hierarchical linear model will then be used to nest children in their schools, ensuring that the

conclusions from the findings remain consistent when considering children's non-random clustering.

The main model deployed in this analysis was conducted through growth-curve modeling. Because the design contains at least two levels of data, with repeated time-varying child testing scores, parent interviews, and teacher evaluations (Level 1) nested within individual student participants (Level 2), I estimated survey-weighted growth curve models using R version 4.2.3 (R Core Team, 2023) and the *survey* package (Lumley, 2023), modeling between-student changes in achievement over time in math and English. Casewise deletion was used for participants missing outcome variables. An interaction term of time-by-parental involvement was included in each model to assess whether the association between parental involvement and student learning changes over time. In addition, this model included weighting on the student unit for non-response and non-random survey selection.

To facilitate comparisons of the associations between parental involvement (in-home vs. in-school) on learning (math vs. English), four models were specified, each controlling for a consistent set of robust set of covariates including: socioeconomic indicators (free meal eligibility, parental income, education, and health), teacher-reported behavioral traits (inhibitory control, attentional focus, closeness, and conflict), key demographic characteristics (race, disability status, and sex; and all imputation flags of covariates. Although this model cannot establish causality, using the same set of covariates and centering practices across all models is advantageous as it allows for the direct comparisons of coefficients across the different types of involvement (in-school vs at-home) and academic skills (math vs English). By holding controls constant, we reduce the chance that differences in model estimates between involvement and student learning are due to differences in model specification

To further support clarity of findings, coefficient values were translated into the equivalent number of school days gained over the four-year period for a one standard deviation increase in parental engagement, assuming a 180-day school year. This was calculated by dividing each involvement coefficient by the corresponding time coefficient and multiplying the result by 180, the estimated number of instructional days per time unit. These rough estimations assume no interaction between time and parental involvement, which is often a false assumption.

Following the primary growth-curve analyses, additional analyses was conducted to examine the negative interaction between time and parental involvement, as well as potential variation in these associations across racial subgroups. These analyses were conducted across at-home and in-school involvement models.

To investigate the negative time-by-involvement interaction, I conducted additional analyses estimating the marginal effect of parental involvement using the primary survey-weighted models. These marginal effects quantify the rate of change in the association between parental involvement and learning outcomes over time, holding all other covariates constant. Additionally, to examine whether the association between parental involvement and academic outcomes differed by race, survey-weighted growth curve models were estimated separately for each racial subgroup. Stratified modeling allowed for heterogeneous effects of parental involvement across groups by estimating subgroup-specific associations. Each model used the same covariates as the full-sample analysis, ensuring that the effects of parental involvement could be compared consistently across racial groups. One limitation of this analysis is that Native American and Pacific Islander students were excluded from this subgroup analysis due to insufficient sample size, which hindered model convergence.

Complementary three-level HLMs were conducted to account for clustering of students within schools, thereby enhancing the robustness of preliminary findings. A three-level HLM was

estimated using the *lme4* package in R (version 4.4.2; Bates et al., 2015). This modeling approach reflects the nested data structure, where repeated observations (Level 1) are nested within children (Level 2), who are themselves nested within schools (Level 3). To facilitate comparisons across models, four models were specified to examine in-home and in-school involvement in both math and literacy outcomes, controlling for the same set of covariates and centering as used in the two-level growth curve models. To assess the impact of accounting for school-level variation in the model, a Likelihood Ratio Test (LRT) was performed to compare a model with only random effects for children to a full model that includes random effects for both children and schools. The results of the LRT indicated that the full model with random intercepts for schools significantly improves the model fit. For example, for the model assessing in-school involvement in English, the Chi-squared value was 135.26 ( $p < 0.001$ ).

Despite the addition of school-level random effects, the fixed effects from the three-level HLMs were consistent with the findings from the primary two-level models in both the direction of the Beta coefficients and their statistical significance, supporting the robustness of the initial analyses. As such, detailed results from the three-level models are presented in the appendix for reference.

## Results

Table 3 presents regression estimates from two regression models which assess the relationship between race and levels of in-school involvement; the first model predicts parental involvement in-school involvement based on race with the second model adding additional parental education controls. Before controlling for parent's education, differences in parental involvement in school based on race are highly significant; the parents of all non-white students, on average, engage less in their children's classrooms than white classmates' parents do ( $p < .001$ ). After controlling for education, the differences in parental involvement by race shrink substantially.

However, parents of Black, Hispanic, Asian, and Native Hawaiian students still show significantly lower levels of involvement compared to white parents. Differences for Multi-Racial and Native American parents become statistically insignificant. Overall, in-school parental involvement increases slightly over time regardless of the model, as indicated by the positive and statistically significant coefficients for time in both regressions.

**Table 3.** *Predicting In-School Parental Involvement by Student Race and Parental Education*

In-School Parental Involvement	Without Education Controls				With Education Controls			
	$\beta$	SE	<i>t</i>	<i>p</i>	$\beta$	SE	<i>t</i>	<i>p</i>
Intercept	0.202	0.012	16.505	<.001 ***	0.111	0.013	8.341	<.001 ***
Time	0.017	0.002	6.712	<.001 ***	0.027	0.002	9.868	<.001 ***
Race								
Black	-0.514	0.021	-23.431	<.001 ***	-0.294	0.031	-9.555	<.001 ***
Hispanic	-0.428	0.015	-28.629	<.001 ***	-0.106	0.018	-5.848	<.001 ***
Asian	-0.162	0.024	-6.769	<.001 ***	-0.202	0.024	-8.135	<.001 ***
Native Hawaiian	-0.284	0.091	-3.127	0.001 **	-0.273	0.105	-2.604	0.009 **
Multi-Racial	-0.104	0.033	-3.142	0.001 **	-0.046	0.035	-1.320	0.186
Native American	-0.247	0.067	-3.656	<.001 ***	-0.093	0.077	-1.218	0.223
Education								
Primary Caregiver					0.095	0.005	8.698	<.001 ***
Secondary Caregiver					0.087	0.004	19.280	<.001 ***

*Note.* Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

Table 4 presents regression estimates from two models assessing the relationship between student race and levels of out-of-school parental involvement from kindergarten through fourth grade. The first model predicts at-home involvement based on race alone, while the second adds controls for parental education. In both models, large and statistically significant differences in at-home involvement persist between racial groups, with negative coefficients for Black, Hispanic, and Asian students ( $p < .001$ ), indicating lower expected involvement compared to white students. Over time, mean estimated out-of-school parental involvement slightly declines from kindergarten to fourth grade ( $\beta = -0.008$ ,  $p = .004$ ).

**Table 4.** *Predicting Out-of-School Parental Involvement by Student Race and Parental Education*

Out-School Parental Involvement	Without Education Controls				With Education Controls			
	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	0.102	0.012	8.124	<.001 ***	0.088	0.014	6.176	<.001 ***
Time	-0.002	0.002	-1.074	0.283	-0.008	0.003	-2.812	0.004 **
Race								
Black	-0.202	0.022	-8.923	<.001 ***	-0.120	0.033	-3.614	<.001 ***
Hispanic	-0.271	0.015	-17.603	<.001 ***	-0.182	0.020	-9.327	<.001 ***
Asian	-0.340	0.024	-13.723	<.001 ***	-0.370	0.027	-13.794	<.001 ***
Native Hawaiian	0.094	0.094	1.002	0.316	0.087	0.113	0.768	0.442
Multi-Racial	-0.104	0.033	-3.142	0.001 **	-0.078	0.038	-2.058	0.039 *
Native American	-0.077	0.069	-1.116	0.264	-0.062	0.083	-0.748	0.454
Education								
Primary Caregiver					0.044	0.005	8.698	<.001 ***
Secondary Caregiver					0.005	0.004	1.196	0.232

*Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .*

Tables 5 present results from two growth curves which estimate the relationship between parent's in-school involvement and their child's academic learning in both math and English scores.

The primary predictor of interest, in-school involvement, is positively and significantly associated with English achievement ( $\beta = 0.028$ ,  $p < .001$ ), corresponding to an estimated gain of approximately 20 additional days of learning over the study period. A significant negative interaction between involvement and time ( $\beta = -0.005$ ,  $p < .001$ ) indicates that the effect of parental involvement on reading achievement diminishes across elementary school.

A similar pattern is observed in the math and in-school involvement model, where in-school involvement is also positively associated with achievement ( $\beta = 0.023$ ,  $p < .001$ ), translating to roughly 13 additional days of math learning between kindergarten and fourth grade. The interaction term ( $\beta = -0.004$ ,  $p = .013$ ) again suggests a declining marginal benefit over time. Together, these findings indicate that while in-school involvement has a positive influence on early academic growth, its effect weakens as students advance through elementary school.

**Table 5.** Survey-Weighted Growth Curve Models Predicting English and Math Achievement from In-School Parental Involvement, Controlling for Student Behavior, Demographics, and Family Background

	English				Math			
	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	-0.185	0.037	-4.957	<.001***	-0.311	0.042	-7.341	<.001***
Time	0.241	0.002	82.714	<.001***	0.321	0.002	131.253	<.001***
In-School Involvement	0.028	0.007	3.729	<.001***	0.023	0.008	2.917	0.005**
Student Conflict	0.139	0.019	7.05	<.001***	0.186	0.023	7.818	<.001***
Student Attention	0.208	0.0163	12.727	<.001***	0.321	0.024	13.232	<.001***
Parent Health	0.011	0.007	1.567	0.123	0.015	0.010	1.422	0.161
Race								
Native American	-0.139	0.033	-4.256	<.001***	-0.143	0.025	-5.641	<.001***
Hawaiian	-0.037	0.080	-0.464	0.644	-0.107	0.065	-1.635	0.107
Asian	0.056	0.018	2.994	0.004**	0.055	0.026	2.068	0.31
Black	-0.036	0.022	-1.606	0.114	-0.241	0.027	-8.784	<.001***
Hispanic	-0.029	0.015	-1.900	0.063	-0.109	0.02	-11.66	<.001***
Multiracial	0.003	0.028	0.120	0.905	-0.011	0.034	-0.337	0.737
Food Stamp	-0.015	0.015	-0.950	0.346	0.004	0.017	0.267	0.790
Sex								
Female	-0.027	0.010	-2.691	0.009**	-0.165	0.011	-13.850	<.001***
English Learner	-0.047	0.014	-3.223	0.002**	-0.045	0.016	-2.698	0.009**
Primary Ed	0.028	0.003	7.814	<.001***	0.032	0.004	6.591	<.001***
Secondary Ed	0.021	0.003	6.551	<.001***	0.024	0.004	6.034	<.001***
Free-Reduced Lunch in School	-0.049	0.016	-2.909	.005**	-0.054	0.021	-2.507	0.015*
Time-by-Parental Involvement	-0.005	0.001	-4.533	<.001***	-0.004	0.001	-2.564	0.013*

Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

Similar to the significant positive association between in-school parental involvement, at-home involvement is positively and significantly associated with academic achievement in English and Math (Table 6). For English, a one-standard deviation increase in at-home involvement is

associated with an average test score gain of 0.028 points ( $p < .001$ ), equivalent to approximately 21 additional days of English learning over the testing period. A similar effect is observed for math ( $\beta = 0.019$ ,  $p = .019$ ), corresponding to around 11 additional days of math learning across the elementary period. However, in both models, a statistically significant negative interaction between at-home involvement and time (English:  $\beta = -0.005$ ,  $p < .001$ ; Math:  $\beta = -0.003$ ,  $p = .006$ ) suggests that the academic benefits of at-home involvement diminish over time. This pattern indicates that at-home involvement is most influential in early years of elementary education.

**Table 6.** *Survey-Weighted Growth Curve Models Predicting English and Math Achievement from At-Home Parental Involvement, Controlling for Student Behavior, Demographics, and Family Backgrounds*

	English				Math			
	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	-0.191	0.038	-4.991	<.001***	-0.315	0.042	-7.370	<.001***
Time	0.243	0.001	142.629	<.001***	0.325	0.002	148.936	<.001***
At-Home Involvement	0.028	0.006	4.523	<.001***	0.019	0.008	2.410	0.019 *
Student Conflict	0.138	0.018	7.530	<.001***	0.184	0.022	8.218	<.001***
Student Attention	0.200	0.015	12.884	<.001***	0.310	0.023	13.033	<.001***
Parent Health	0.010	0.007	1.403	0.166	0.012	0.010	1.227	0.225
Race								
Native American	-0.140	0.032	-4.312	<.001***	-0.146	0.024	-6.039	<.001***
Hawaiian	-0.027	0.069	-0.389	0.698	-0.091	0.055	-1.642	0.106
Asian	0.051	0.019	2.715	0.008	0.046	0.027	1.700	0.095
Black	-0.037	0.023	-1.593	0.117	-0.242	0.027	-8.675	<.001***
Hispanic	-0.112	0.026	-4.265	<.001***	-0.112	0.026	-4.265	<.001***
Multiracial	-0.010	0.035	-0.292	0.771	-0.010	0.035	-0.292	0.771
Household Income	0.000	0.000	0.884	0.381	0.000	0.000	0.884	0.381
Sex								
Female	-0.027	0.010	-2.685	0.009**	-0.165	0.011	13.04	<.001***
English Learner	-0.046	0.014	-3.116	0.002*	-0.044	0.016	-2.654	0.010

Primary Ed	0.029	0.003	7.747	<.001 ***	0.033	0.004	6.742	<.001 ***
Secondary Ed	0.021	0.003	6.693	<.001 ***	0.025	0.004	6.215	<.001 ***
Free-Reduced Lunch in School	-0.048	0.0163	-2.958	0.004 **	-0.052	0.021	-2.474	0.016 *
Time-by-Parental Involvement	-0.005	0.001	-4.949	<.001 ***	-0.003	0.001	-2.823	0.006 **

Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$ .

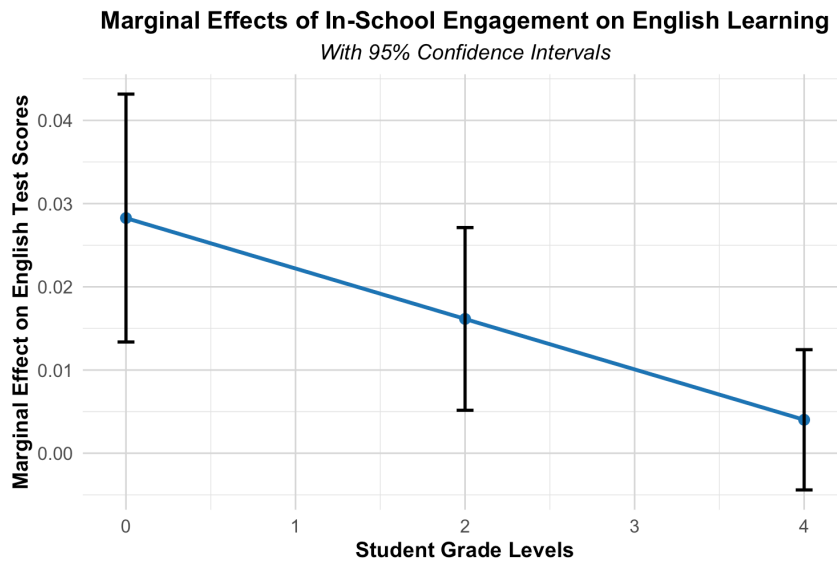
Figure 1 and 2 provide graphical representations of the marginal effects of in-school parental involvement and at-home parental involvement on academic achievement in English and math during spring kindergarten, spring second grade, and spring fourth grade, based on estimates from the survey-weighted growth curve models. While both main models indicate positive effects of in-school parental involvement, the interaction with time reveals a statistically significant attenuation of this benefit by the time children enter second grade.

In kindergarten, in-school parental involvement is positively and significantly associated with both English learning ( $\beta = 0.028$ ,  $p = <.001$ ) and Math achievement ( $\beta = 0.023$ ,  $p = <.001$ ). By second grade, the marginal effects of parental-involvement in-school begins to diminish for math outcomes ( $\beta = 0.015$ ,  $p = 0.012$ ) and English outcomes ( $\beta = 0.016$ ,  $p = 0.001$ ) but remains positive and statistically significant for both. By the spring of fourth grade, both associations with in-school involvement are positive but lose statistical significance, suggesting insufficient evidence to conclude that parental involvement continues to support increased learning in the later elementary years.

For at-home involvement, a similar pattern of diminishing association with student achievement over time emerges. In kindergarten, in-school involvement is positively and significantly associated with both English learning ( $\beta = 0.023$ ,  $p < .001$ ) and Math achievement ( $\beta = 0.012$ ,  $p = 0.042$ ). In second grade, the marginal effect of at-home involvement remains small yet positive for English ( $\beta = 0.008$ ,  $p = 0.003$ ), while the marginal effect of at-home involvement on

math learning is nonsignificant ( $\beta = 0.004, p = 0.422$ ). By fourth grade, in-school involvement is nonsignificant for Math and English.

*Figure 1. Model-Based Marginal Effects of In-School Parental Involvement on English Achievement*



*Figure 2. Model-Based Marginal Effects of At-Home Parental Involvement on English Achievement*

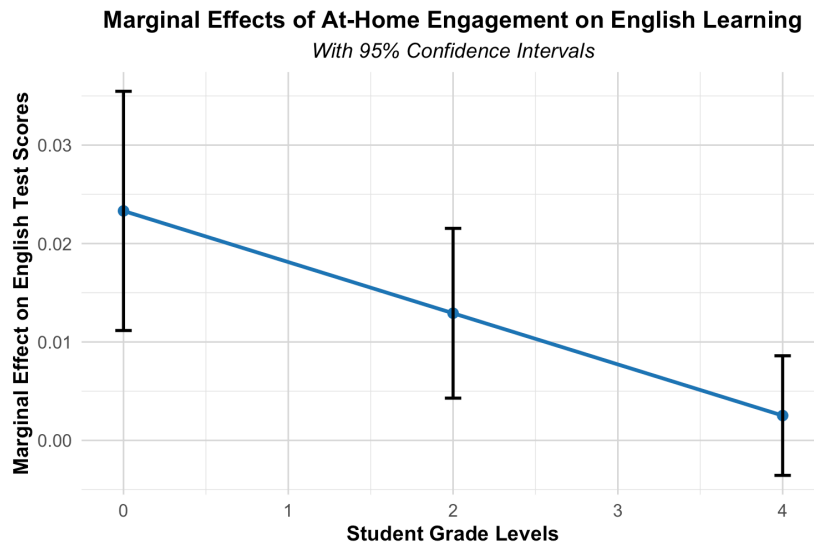


Table 8 and 9 present separate models for Black, Multiracial, Latino, Asian, and White students, allowing the relationship between parental involvement in-school and learning outcomes to vary based on students’ race and time.

Black, Multiracial, and Asian students all showed a positive and statistically significant association between in-school parental involvement and English achievement at the  $\alpha = 0.05$  level (Table 8). For these groups, a one standard deviation increase in parental involvement corresponds to estimated academic gains equivalent to approximately 56, 64, and 72 additional instructional days, respectively, over the four-year study period. In addition, while not statistically significant, Latino students also show suggestive positive trends, potentially indicating similar benefits from involvement that may not reach significance due to the reduced power of sub-group specific analysis. In contrast, White students did not show evidence to suggest a positive association between in-school involvement and English learning.

Similar trends emerged for math outcomes (Table 9): models examining Multiracial, Latino, and Asian students each revealed a positive association between in-school parental involvement and math learning. Neither Black nor white students showed evidence to suggest a positive association between in-school involvement and English learning. In math, while the associations are generally weaker, Multiracial and Asian students again show the largest gains, with estimated learning benefits equivalent to 42 and 48 additional instructional days for a one standard deviation increase in in-school involvement.

**Table 8.** Survey-Weighted Growth Curve Models Predicting English Achievement from In-School Parental Involvement, by Race

	Black	Multiracial	Latino	Asian	White
Intercept	-0.034	0.070	-0.198 ***	-0.173	-0.189 ***
	(se = 0.146)	(se = 0.146)	(se = 0.047)	(se = 0.128)	(se = 0.047)

Time	0.228 *** (se = 0.008)	0.237*** (se = 0.008)	0.253*** (se = 0.002)	0.231*** (se = 0.007)	0.238 *** (se = 0.002)
In-School Involvement	0.071 ** (se = 0.026)	0.085 * (se = 0.036)	0.021 (se = 0.011)	0.092 ** (se = 0.030)	0.012 (se = 0.010)
Instructional Days Equivalent (1 SD ↑)	56	64		72	
In-School Involvement -by- Time	-0.012 * (se = 0.005)	-0.016 * (se = 0.006)	-0.002 (se = 0.002)	-0.017 ** (se = 0.005)	-0.003 * (se = 0.001)

Note: Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$

Note: Estimated instructional days gained for a one standard deviation increase in involvement were calculated by dividing the parental involvement coefficient by the coefficient for time in each model, then multiplying the result by 180, the approximate number of instructional days represented by a one-unit increase in the time variable.

**Table 9.** Survey-Weighted Growth Curve Models Predicting Math Achievement from In-School Parental Involvement, by Race

	Black	Multiracial	Latino	Asian	White
Intercept	-0.370 * (se = 0.141)	-0.222 (se = 0.154)	-0.451 *** (se = 0.057)	-0.498 *** (se = 0.135)	-0.370 *** (se = 0.141)
Time	0.304 *** (se = 0.006)	0.323 *** (se = 0.007)	0.329 *** (se = 0.003)	0.328 *** (se = 0.007)	0.304 *** (se = 0.006)
In-School Involvement	0.019 (se = 0.038)	0.075 ** (se = 0.027)	0.027 * (se = 0.010)	0.087 ** (se = 0.029)	0.019 (se = 0.026)
Instructional Days Equivalent (1 SD ↑)		42	15	48	
In-School Involvement -by- Time	-0.002 (se = 0.005)	-0.016 * (se = 0.006)	-0.002 (se = 0.002)	-0.013 * (se = 0.005)	-0.003 (se = 0.005)

Note: Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$

Table 10 reveals that at-home parental involvement is similarly associated with meaningful gains in English achievement for Black, Latino, and Asian students, with one standard deviation increases in involvement corresponding to approximately 61, 12 and 61 additional instructional

days, respectively while white students get a 15 additional instructional days boost for a one standard deviation increase in engagement. In contrast, multiracial students did not show evidence that suggested a positive association between in-school involvement and English learning.

In math achievement models (Table 11), the association between at-home involvement and academic growth was more limited. Only Black students showed a statistically significant positive relationship ( $p < .01$ ), a one standard deviation increase of 26 instructional days. While the relationship was not significant for Multiracial, Latino, Asian, or White students. These findings suggest that parental involvement outside of school may have a more pronounced impact on English achievement across racial groups than it does on math.

**Table 10.** Survey-Weighted Growth Curve Models Predicting English Achievement from At-Home Parental Involvement, by Race

	Black	Multiracial	Latino	Asian	White
Intercept	-0.089 (se = 0.157)	0.075 (se = 0.140)	-0.206 *** (se = 0.046)	-0.209 (se = 0.107)	-0.184 *** (se = 0.049)
Time	0.232 *** (se = 0.006)	0.239 *** (se = 0.006)	0.254 *** (se = 0.002)	0.226 *** (se = 0.005)	0.242 *** (se = 0.002)
Out-School Involvement	0.078 ** (se = 0.032)	-0.024 (se = 0.036)	0.017 * (se = 0.009)	0.077 ** (se = 0.024)	0.020 * (se = 0.010)
Instructional Days	61		12	61	15
Equivalent (1 SD ↑)					
Out-School Involvement - by- Time	-0.010 (se = 0.006)	0.001 (se = 0.008)	-0.004 (se = 0.002)	-0.019 ** (se = 0.005)	-0.003 (se = 0.002)

Note: Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$

**Table 11.** Survey-Weighted Growth Curve Models Predicting Math Achievement from At-Home Parental Involvement, by Race

	Black	Multiracial	Latino	Asian	White
Intercept	-0.406 **	-0.222	-0.456 ***	-0.533 ***	-0.308 ***

	(se = 0.157)	(se = 0.145)	(se = 0.056)	(se = 0.110)	(se = 0.058)
Time	0.305 ***	0.324 ***	0.334 ***	0.329 ***	0.322 ***
	(se = 0.005)	(se = 0.006)	(se = 0.003)	(se = 0.005)	(se = 0.003)
Out-School Involvement	0.044 **	-0.012	0.013	0.051	0.0133
	(se = 0.028)	(se = 0.047)	(se = 0.011)	(se = 0.024)	(se = 0.011)
Instructional	26				
Days Equivalent (1 SD ↑)					
Out-School Involvement -	-0.004	0.001	-0.002	-0.014 *	-0.002
by- Time	(se = 0.006)	(se = 0.008)	(se = 0.002)	(se = 0.006)	(se = 0.002)

Note: Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$

### Discussion

The goal of the present study is to assess if parent's involvement in their child's learning, both in-school and at-home, is associated with greater English and mathematics growth across elementary school. Secondary research questions explore how the marginal effect of parental involvement evolves over time and whether these effects vary by racial group. Results from multilevel multiple regression analyses suggest that the influence of parental involvement in-school and at-home is strongest when children enter kindergarten, with continued positive effects through second grade.

While in-school parental involvement shows a small but significant positive association with learning outcomes through the spring of second grade, the effect of at-home involvement is no longer significant by that point. By spring of fourth grade, neither form of involvement remains statistically significant, providing strong evidence that parental involvement both in-school and at-home is most impactful during early years of elementary school. Moreover, although white parents reported the highest average levels of involvement across the study, the strongest positive

associations between involvement and learning were observed among Black, Multiracial, Latino, and Asian children.

While these patterns suggest that parental involvement may offer particularly high marginal returns for students from racial minority backgrounds, caution is warranted in the interpretation of these findings. Although in-school parental involvement is positively associated with minority student learning in the early years of schooling, the results do not suggest that increased involvement can counteract the forces driving persistent disparities in academic achievement across racial and socioeconomic groups.

*At-Home Involvement:*

Overall, both the growth-curve and three-level HLM models for at-home involvement suggest that parental involvement has a small but statistically significant effect on English and mathematics learning in the early years of elementary school. While many experimental randomized control trials have identified parental involvement in early childhood as predicting sustained growth in English literacy (Nix et al., 2018; Sheridan et al., 2011; Sylva et al., 2007; Kalil et al., 2025), this study contributes to a body of growing literature which identifies at-home involvement as a positive predictor of learning through a longitudinal study (Greenfader & Miller, 2024; Singh et al., 2025).

In line with literature on the topic, highly educated parents were more likely to report higher levels of at-home involvement (Suizzo & Stapleton, 2007; Dauber & Epstein 1989; Khalil et al., 2012). However, substantial and statistically significant differences in expected levels of at-home involvement persisted across racial groups, even after controlling for parental education.

Considering that the literature largely finds no racial differences in rates of parental involvement at home, large disparities for Black, Hispanic, and Asian children that persist after controlling for education suggests that this measure is not sensitive to culturally specific at-home parental

involvement practices (Love et al., 2016; Robinson & Harris, 2014). Critical Race Theorists argue that parental involvement is shaped not only by socioeconomic status but also by families' cultural histories and relationships with school institutions. For example, Black parents may emphasize practices such as racial socialization and identity development (Allen & White-Smith, 2018) or participate in community-based educational efforts (Cooper, 2009), forms of involvement not easily captured by traditional survey items. As such, the persistence of racial differences in reported involvement may reflect not lower involvement, but rather a narrow conceptualization of what counts as "involvement."

Overall, findings from this study confirm the importance of parental involvement at-home in the early elementary years, especially in supporting student outcomes for minority students. This research suggests that interventions targeted at supporting parents at-home, while their children are building foundational skills, may yield large impacts. Specifically related to literacy skills, parental involvement showed consistent positive effects across white, Black, Asian, and Hispanic kids, apart from multiracial students for whom the association was not statistically significant. While overall the effect of parental involvement diminishes by fourth grade, this research suggests that interventions in early elementary which focus on literacy at home have potential to drive student learning, especially for Black and Asian students who have the strongest marginal effect of at-home involvement on English learning. Interestingly, however, one disaggregated indicator, reading books with a child, had a small but negative association with English learning ( $p < .001$ ). This counterintuitive result may reflect that parents are more likely to read with children who are struggling, or that the content and instructional alignment of at-home reading varies widely.

While the present study is in line with previous literature that suggests the relationship between at-home involvement and math learning is positive and statistically significant (Hill & Tyson, 2009; Fiskerstrand 2011), this relationship is less strong than the relationship between at-

home involvement and English. Specifically, at-home involvement was only positively and statistically significantly associated with learning for Black students during subgroup analysis, with its effects diminishing across the full sample by second grade.

There are multiple reasons why parental involvement at-home could be less effective for math than for English. Cannon and Ginsburg (2008) found that many mothers of preschool-aged children prioritize reading skills at home, while viewing math instruction as primarily the school's responsibility. Moreover, even when kids need math support, some of the existing literature on at-home math instruction suggests that parents' help with math homework is negatively associated with math learning (Robinson, 2014; Maloney et al., 2015; Pattall, Cooper, & Robinson, 2008). In the context of this study, where at-home involvement appears most effective in improving math achievement in the earliest years, it is possible that, as children age, parents may lack the mathematical knowledge or familiarity with instructional methods needed to provide effective support. Thus, even though parents report engaging in math-related at-home activities at similar levels to reading (Table 1), the quality and effectiveness of that involvement may differ significantly. These patterns align with our disaggregated findings: while nature or science activities showed a small positive association with math achievement ( $p < .05$ ), most other forms of at-home involvement, including parents helping kids practice numbers, were either unrelated or negatively associated with math learning.

#### *In-School Involvement:*

Consistent with past research, this research finds evidence that parents without a high-school degree are less likely to be involved in their child's schooling (Kim and Hill 2015; Noel et al. 2013; McWayne et al. 2008). Additionally, findings are consistent with the body of literature that finds significant differences in in-school involvement between racial and ethnic groups, with white

parents reporting higher levels of in-school parental involvement than Black or Latino parents (Noel et al. 2013; Nzinga-Johnson, Baker & Aupperlee 2009).

Primary models which found positive associations between learning and in-school involvement supports an existing literature that indicates that in-school involvement is associated with modest but statistically significant gains in both math and English achievement from kindergarten through fifth grade. However, these effects mostly diminish by third grade, suggesting that the learning benefits of in-school involvement are most impactful during the early stages of education.

There are multiple theories, both developmental and social, which explain why involvement is most important upon entrance to the school system. First, early education represents a time of particular malleability in children's educational development. It is therefore possible that parental involvement during this time is most strongly associated with learning outcomes, as it provides a foundation for skill development and the acquisition of habits associated with greater learning. Second, parent's attendance to and connection with their children's schooling can allow parents to build social capital in their children's school when their children first come into the education system. It is possible this early contact with the school system may promote positive feelings of schooling and self-efficacy, which in turn support student learning for students (Dearing et al. 2006).

Notably, the effects of in-school parental involvement appear strongest for Black and Multiracial students, as reflected in the significant and positive associations observed in subgroup analyses for these groups. In English, a one standard deviation increase in in-school involvement corresponded to approximately 56 additional instructional days of learning for Black students and 65 for Multiracial students (without considering the effect of time on involvement, which would likely approximately half this number). Although the effects for other racial minority groups were

not statistically significant, the consistently positive coefficients suggest that meaningful relationships may exist, but these did not meet the  $\alpha=0.05$  threshold for significance, potentially due to reduced power in the disaggregated models. The lack of statistical significance in the white-subgroup analysis is unlikely to be due to power, given the sufficiently large sample size for this group. Instead, it is more likely that the absence of significance reflects either a true lack of association or the conservative nature of the survey design, which incorporates a comprehensive set of controls, rather than a limitation in sample size. These findings are in line with a sizeable yet contested body of parental involvement literature that finds that children from racial backgrounds benefit most from parental involvement (Crosnoe, 2015).

One possible explanation for the differential effects of parental involvement across racial groups is that baseline disparities in involvement shape the marginal returns of involvement. Given that the average parents of a Black child report a lower level of in-school involvement compared to white families ( $p < .001$ ), it is possible that Black children experience the largest association between in-school involvement and learning outcomes because their baseline level of parental involvement is lower. As a result, even a small increase in involvement may lead to a disproportionately large improvement in learning, reflecting a higher marginal return on parental involvement compared to white children who already benefit from higher levels of involvement. This hypothesis is in line with experimental findings that identify the greatest impact of parental-involvement curriculum on student achievement for kids whose parents are otherwise least likely to be engaged, suggesting a pattern of diminishing returns where increases in involvement produce larger marginal gains for students whose families begin with lower baseline levels of involvement (McCormick et al., 2015).

A secondary hypothesis, supported by a large qualitative literature, suggests that parental involvement among racialized students may function as a buffer against both individual and structural racism in children's schools, allowing the deployment of cultural capital in schools to yield greater returns for minority students than for their white peers. In the United States today, racialized minority elementary schoolers and their families are regularly faced with low teacher expectations, disproportionate referral to special education, and higher levels of suspension (Oakes, 1985; Sullivan and Bal, 2013). As evidenced by current racial inequalities in schooling, the school serves as a site for the reproduction of racial hierarchy. In this context, the deployment of cultural capital may yield larger benefits for parents of Black and multiracial students who advocate on behalf of their children. For instance, Black parents report leveraging their cultural capital to disrupt the expulsion process or attend school conferences to advocate for educational access for their child (Allen and White-Smith, 2018). Therefore, Black parents' involvement in schooling could play a critical role in ensuring their children's needs are met by shifting the focus from disciplining to support. In addition, given that Black and multiracial students are more likely to go to under-funded schools than white students (Baker, Carlo & Weber, 2025), it has been possible parental involvement in under-funded schools may be especially crucial to facilitate learning by counterbalancing lack of resources or individualized attention often presented in under-resourced schools. In this way, the involvement of Black and multiracial families may serve not only to resist the direct effects of racism but also as a form of social capital that disproportionately enhances educational outcomes for their children.

In a larger sociopolitical context, parental involvement often functioned as a deficit-oriented rhetorical tool, disproportionately placing the burden of educational outcomes on families. An influential historical example includes the Coleman Report (1991), which attributed declining

standardized test scores in part to “disengaged” mothers returning to work, a theory that has since been debunked (Baquedano-López, Alexander, & Hernandez, 2013). In more recent years, the No Child Left Behind (NCLB) Act’s framing of the family as a site of transformative academic potential, surpassing even other education reforms in importance, has drawn criticism for obscuring structural inequalities within the education system by placing disproportionate responsibility for student achievement on families rather than their schools (Goodall, 2021). The present study lends empirical support to this body of critique. For example, even when involvement “works” for racialized families, a very generous estimate of a 60 days gain in learning across the 4-year period is roughly fifteen extra days of instruction per year, which is unlikely to close large gaps in student learning due to race or socioeconomic inequality. Moreover, the diminishing benefits of involvement as students age suggests while early involvement may offer a short-term boost, it is insufficiently durable in sustaining long-term academic advantages.

Further, many families from racially marginalized backgrounds or with lower levels of formal education, report feeling marginalized in their children’s schools (Gaitan, 2004; Love et al., 2016; Ishimaru et al 2016). The ECLS-K data suggests that disparities in in-school involvement are strongly associated ( $p < .001$ ) with parents’ educational attainment and students race and, as such, are deeply connected to broader structures of racial and educational inequality in the distribution of educational capital. Therefore, while strategies to increase parental involvement in schools may support outcomes for minority students, this study does not suggest that involvement alone can close the achievement gap, as parental involvement itself is deeply shaped by, and constrained within, existing structures of educational inequality. Here, an extension of the Ecological Theory Framework which considers children as embedded within their sociopolitical contexts, is essential in considering the evolving and historical systems which have enabled educational inequality. In

doing so, the findings in this study urge us to phrase discourses of gaps in both parental involvement and parental achievement in the literature as one of educational debt (Ladson-Billings 2006) owed to Black and Brown families who have been systematically denied equal access to quality schooling, resources, and civic power historically and currently (Foubert 2018).

In reviewing other studies that use the same dataset, findings consistently show that parental involvement is positively associated with student learning from kindergarten to third grade, particularly for minority students. Christina McKoy (2023), who focused specifically on Black students, found that specific indicators included within both the in-school and out-of-school composite variables, such as volunteering at school and singing songs to children, are positively associated with greater learning from kindergarten to third grade, whereas parent-teacher conferences is negatively correlated to growth beginning in second grade (2023). Disaggregated models in the present study, located in the appendix (table 1), largely replicate these patterns: non-disciplinary involvement including attendance at Back-to-School Night, volunteering in school, and taking to other parents all had statistically significant positive associations with learning in this study while parent-teacher conference attendance is negatively associated with English achievement and nonsignificant for math. Given that parent-teacher conferences were the only form of involvement negatively associated with learning in this study and is also where teachers are most likely to express behavioral or academic concerns, McKoy's findings may reflect broader dynamics in which school-based involvement for Black families, particularly through conferences can be shaped by racial bias, lowered expectations, and negative stereotyping, ultimately contributes to slower student learning. In addition, while previous researchers have used the ECLS-k for cross sectional analysis, such as Durand (2011), who identifies positive associations between parental

involvement and literacy for Latino kindergarteners, the present study extends and strengthens these conclusions by using longitudinal data to track outcomes over time.

This study makes several important contributions to the existing literature which has yet to reach consensus on the extent to which parental involvement matters in schooling and for whom. First, by leveraging longitudinal data which controls for an extensive set of covariates, this analysis is positioned to meaningfully identify relationships between parental involvement and outcomes over time. In addition, another key methodological strength of this thesis lies in its use of multiple analytical methods, including weighted growth curves that adjust for non-random non-response and three-level hierarchical linear models that cluster students within schools, which allows for a more robust involvement with the tension between theoretically-driven models and real-world data constraints. Second, unlike past research which has either utilized the ECLS:K dataset to examine the impact of individual involvement variables or combined them into undifferentiated indices, this study employs composite measures grounded in Bronfenbrenner's ecological systems theory to capture distinct and theoretically meaningful dimensions of parental involvement. Finally, by including behavioral covariates, such as student conflict, attention, and impulse control, this study addresses a source of endogeneity which can be omitted in parental involvement research. While this thesis cannot establish a causal relationship between parental involvement and student learning, the inclusion of these covariates enhances the robustness of the estimated associations and mitigates concerns of omitted variable bias.

Taken together, these findings suggest that parental involvement, both at-home and in-school, is most strongly associated with learning for children who have just began their formal education. Further, these associations between involvement and learning are strongest for minority students, suggesting that parental involvement could be used as a tool to mitigate racial disparities

in academic achievement. Therefore, elementary schools with limited resources may benefit from prioritizing relationship-building with parents of racially minoritized children during the early years of schooling, when parental involvement appears to yield greatest academic benefit.

**Appendix**

*Appendix Figure I: Three-Level Hierarchical Model Fixed Effects Predicting English and Math Achievement from In-School Parental Involvement, Controlling for Student Behavior, Demographics, and Family Backgrounds*

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.210	0.017	-12.083	<.001***	-0.333	0.023	-14.491	<.001***
Time	0.244	0.00	328.59	<.001***	0.326	0.001	434.449	<.001***
In-School Involvement	0.030	0.003	8.972	<.001***	0.0181	0.003	4.978	<.001***
Student Conflict	0.134	0.011	11.425	<.001***	0.178	0.015	11.439	<.001***
Student Attention	0.184	0.013	14.194	<.001***	0.285	0.017	16.557	<.001***
Parent Health	0.009	0.004	1.741	0.082	0.009	0.006	1.430	0.152
Race								
Native American	-0.040	0.035	-1.110	0.267	-0.041	0.047	-0.858	0.390
Hawaiian	-0.007	0.048	-0.150	0.881	-0.066	0.064	-1.030	0.303
Asian	0.041	0.014	2.932	0.003**	0.052	0.018	2.847	0.004**
Black	-0.039	0.016	-2.346	0.019*	-0.220	0.021	-10.011	<.001***
Hispanic	-0.049	0.011	-4.533	<.001***	-0.117	0.014	-8.174	<.001***
Multiracial	0.023	0.016	1.390	0.164	-0.016	0.022	-0.719	0.472
Household Income	0.000	0.000	2.996	0.002**	0.000	0.000	4.277	<.001***
Sex								
Female	-0.028	0.007	-4.021	<.001***	-0.168	0.009	-18.382	<.001***
Primary Caregiver Education	0.020	0.002	8.346	<.001***	0.023	0.003	7.408	<.001***
Secondary Caregiver Education	0.024	0.002	10.437	<.001***	0.027	0.003	8.952	<.001***
Non-English Primary Language at Home	-0.02	0.01	-3.34	0.011*	-0.017	0.009	-1.704	0.088

Time-by-Parental Involvement	-0.003	0.00	-6.17	<.001***	-0.003	0.000	-5.263	<.001***
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Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$ .

Appendix Figure II: Three-Level Hierarchical Model Fixed Effects Predicting English and Math Achievement from At-Home Parental Involvement, Controlling for Student Behavior, Demographics, and Family Backgrounds

	English				Math			
	$\beta$	SE	$t$	$p$	$\beta$	SE	$t$	$p$
Intercept	-0.208	0.017	-12.060	<.001***	-0.340	0.023	-14.842	<.001***
Time	0.245	0.001	351.385	<.001***	0.327	0.001	453.382	<.001***
In-School Involvement	0.019	0.003	6.110	<.001***	0.010	0.003	2.981	0.002 **
Student Conflict	0.132	0.011	11.348	<.001***	0.175	0.015	11.307	<.001***
Student Attention	0.180	0.013	13.905	<.001***	0.279	0.017	16.236	<.001***
Parent Health	0.006	0.004	1.348	0.177	0.005	0.006	0.807	0.419
Race								
Native American	-0.040	0.035	-1.110	0.333	-0.030	0.047	-0.641	0.521
Hawaiian	-0.003	0.048	-0.071	0.943	-0.055	0.064	-0.860	0.390
Asian	0.044	0.014	3.176	0.001 **	0.059	0.018	3.234	0.001 **
Black	-0.037	0.016	-2.257	0.024 *	-0.220	0.021	-9.916	<.001***
Hispanic	-0.046	0.011	-4.325	<.001***	-0.112	0.014	-7.909	<.001***
Multiracial	0.023	0.016	1.423	0.164	-0.014	0.022	-0.642	0.521
Household Income	0.000	0.000	2.425	0.015 *	0.000	0.000	3.417	<.001***
Sex								
Female	-0.028	0.007	-4.123	<.001***	-0.168	0.009	-18.546	<.001***
Primary Caregiver Education	0.018	0.002	7.914	<.001***	0.021	0.003	6.828	<.001***
Secondary Caregiver Education	0.024	0.002	10.493	<.001***	0.027	0.003	8.807	<.001***
Non-English Primary Language at Home	-0.021	0.007	-2.866	0.004 **	-0.022	0.009	-2.334	0.019 *
Time-byParental Involvement	-0.002	0.001	-3.800	<.001***	-0.001	0.001	-1.912	0.056

Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$ .

Appendix Table 1: *Effects of Individual Parental Involvement Behaviors on Student Outcomes*

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	0.66	0.01	47.44	<.001***	0.63	0.02	36.78	<.001***
Time	0.15	0.00	146.289	<.001***	0.22	0.00	174.89	<.001***
Attend PTA	0.01	0.02	.67	0.50	-0.01	0.02	-.65	0.52

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	0.66	0.01	46.64	<.001***	0.63	0.01	36.96	<.001***
Time	0.15	0.00	148.33	<.001***	0.22	0.00	174.43	<.001***
Attend Parent-Teacher Conference	-0.10	0.03	-2.61	0.01 *	-0.04	0.04	-1.27	.22

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	0.66	0.01	46.81	<.001***	0.63	0.01	36.55	<.001***
Time	0.15	0.00	144.44	<.001***	0.22	0.00	169.20	<.001***
Attend Back to School Night	0.03	0.01	2.09	0.04 *	0.07	0.02	3.48	0.00 **

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	0.66	0.01	47.10	<.001***	0.63	0.01	36.84	<.001***
Time	0.14	0.00	144.91	<.001***	0.21	0.00	174.31	<.001***
Volunteering at School	0.07	0.02	4.30	<.001***	0.10	0.02	4.73	<.001***

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	0.67	0.01	47.52	<.001***	0.63	0.02	36.70	<.001***
Time	0.15	0.00	144.62	<.001***	0.22	0.00	171.87	<.001***
Talking to Other Parents	0.05	0.01	3.31	0.00 **	0.05	0.02	2.92	.01**

Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \*  $p < .05$ . Models adjust for all covariates listed in main model. See Methods for full description.

Appendix Table II: *Effects of Individual Parental Involvement Behaviors At-Home on Student Outcomes*

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.17	0.04	-4.42	<.001***	-0.28	0.04	-6.71	<.001***
Time	0.24	0.00	135.16	<.001***	0.32	0.00	142.56	<.001***
Exercise at School	-0.01	0.01	-1.70	0.09	-0.02	0.01	-1.926	.06

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.17	0.04	-4.51	<.001***	-0.29	0.04	-6.861	<.001***
Time	0.24	0.00	138.30	<.001***	0.32	0.00	144.43	<.001***
Help Parent	0.00	0.01	0.11	0.91	0.00	0.01	0.11	.92

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.17	0.04	-4.72	<.001***	-0.29	0.01	-7.04	<.001***
Time	0.24	0.00	139.37	<.001***	0.32	0.00	148.94	<.001***
Nature or Science Experiment	0.02	0.01	2.99	0.04 *	0.02	0.00	2.47	0.01 **

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.18	0.03	-4.59	<.001***	-0.29	0.04	-6.63	<.001***
Time	0.24	0.00	126.38	<.001***	0.32	0.00	135.13	<.001***
Practice Numbers	0.02	0.01	1.852	0.07	0.00	0.01	0.30	0.76

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.16	0.04	-4.31	<.001***	-0.28	0.04	-6.66	<.001***
Time	0.24	0.00	133.80	<.001***	0.32	0.00	141.39	<.001***
Read Book with Child	-0.05	0.01	-5.30	0.00 **	-0.04	0.02	-2.80	.01**

	English				Math			
	$\beta$	SE	t	p	$\beta$	SE	t	p
Intercept	-0.17	0.04	-4.40	<.001***	-0.29	0.04	-6.83	<.001***
Time	0.24	0.00	126.33	<.001***	0.33	0.00	133.83	<.001***
Tell Stories with Child	0.00	0.01	-0.40	0.69	0.01	0.01	0.87	0.38

Note. Significant codes: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ . Models adjust for all covariates listed in main model. See Methods for full description.

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