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How do caregivers affect children's academic performance? Evidence from Primary Caregivers' Educational Attainment and Children's Performance on Standardized Assessments

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Abstract

Children's performance on standardized testing are affected by a variety of external factors, such as access to resources, school environment, or primary caregiver's education. Educational inequalities, likewise, have a negative impact on the quality of education and access to resources, and impact student performance. Student outcomes and performance, hence, are multidimensional in that there are many factors that play a role in student success. For instance, previous research has shown that mother's educational attainment has an impact on their children's academic performance. By understanding the effects of primary caregivers' educational attainment on student achievement, policies can be created to promote equity in the education system. The goal of the present study is to understand the impacts of primary caregivers' educational attainment and language history on children's standardized assessment performance. We analyzed data from a large-scale study that collected demographic information (age, language background, socioeconomic status, primary caregivers' education), standardized assessment scores (math fluency, oral comprehension, working memory, phonological awareness, and vocabulary size), and performance (accuracy, response times) on a simple multiplication task. The study included a total of 176 children, and we hypothesized that children with highly educated primary caregivers were more likely to perform higher on academic assessments and the math task. Results showed that children with fathers as primary caregivers performed better on our measure of math fluency compared to children with mothers as primary caregivers. Additionally, the primary caregiver's educational attainment showed significance in performance on math fluency, oral comprehension, and math task accuracy in the "some college" and "graduate degree" category. Together, these findings suggest that primary caregivers' educational attainment can affect children's performance on standardized assessments, though future research should explore a broader population sample.

Keywords: children, performance, elementary education, primary caretaker, educational attainment, parental education

1. Introduction

Family and social background are thought to affect children's academic performance, which can later impact other outcomes, such as educational attainment, socioeconomic status, and career prospects. Numerous studies have revealed the impact of external factors on children's performance and outcome, such as the access to educational resources, parenting strategies, and modeling the importance of education (Assari, 2018; Erola et al., 2016; Monaghan, 2017). For instance, studies have noted that impoverished students not only have lower access to materials like technology and are instructed with less advanced curricula, but they are also often treated differently than their counterparts if they attend highly-funded schools (Diamond et al., 2004; von Hippel et al., 2018).

These disparities create achievement gaps for students that face adversities like poverty and family dysfunction. The gaps are seen across other demographic factors. Thus, it is important to understand the role of school and family background on a child's development of cognitive skills. The current study began to investigate this by analyzing the effects of parental education and language background on a child's performance on standardized assessments and on real-time performance on cognitive tasks of math and language. We began with a review of the literature to provide context and background for the present study followed by the analysis of an existing dataset. The current study included elementary school-aged children who performed a series of standardized cognitive measures and explored how parental and demographical information impacted children's performance on the test.

1.1 Theoretical Framework

Many theories support the idea that primary caregivers influence children's academic success. One of these theories is called *cultural capital* and describes the accumulation of knowledge, behaviors, and skills that a person can tap into to demonstrate cultural competence (Bourdieu, 2018). Cultural capital can be beneficial for students who have been socialized in the dominant culture because children of educated parents easily navigate through the school system. This can be observed in language abilities or general knowledge which affects stimulation and children's cognitive abilities (Erola et al., 2016).

Another theory that can be applied is the *human capital theory* which looks at the relationship between investment in employees and the cost-benefits for the company (Smith, 2008). These investments instill skills in individuals, like productivity, which are carried into other aspects of the individual's life, like parenting, if it is viewed as a form of labor. When this is applied to childbearing, affluent or productive parents are typically more involved and invested in their children's lives through learning activities, puzzles, and other forms of cognitive stimulation (Erola et al., 2016; Monaghan, 2017).

Lastly, *social mobility theory* is the movement of people within or between social strata (Sorokin, 1959). Upward social mobility can positively impact children's access to resources as well as to higher education (Erola et al., 2016). Research has found an association between higher education and upward social mobility. Critically, this association is weaker for African Americans when compared to non-Hispanic Whites (Assari, 2018). Altogether, these theories are critical since they describe the diverse ways primary caregivers can impact the development of their children.

Research shows parental involvement, postnatal education, and other demographic factors affect cognitive development (Assari, 2018; Diamond et al.,

2004; Erola et al., 2016; Harding, 2015; Inoa, 2017; Monaghan, 2017; Romo, 1999; von Hippel et al., 2018). This study took advantage of an existing dataset to investigate the impact of primary caregivers' educational attainment and language background on standardized test performance.

1.2 Primary Caregivers' Educational Attainment

Parental educational attainment, occupation, and social class are thought to contribute to the educational gaps observed in school children, and can influence children's academic performance (Erola et al., 2016). Indeed, primary caregivers provide tools that set up children throughout their education. Moreover, mothers and fathers play different roles in a child's success. A mother's education is typically correlated with early childhood performance, while a father's education has a stronger effect when the child is older due to parent-child interactions and traditional social roles (Erola et al., 2016).

Research has found that when parents earn a higher education, their earnings and resources for their children increase (Monaghan, 2017). Higher parental earnings lead to children receiving academic advantages, like access to Scholastic Assessment Test preparation (SAT), private tutors, or books and technology. Parents who have a higher income can have indirect effects on their children's educational outcomes, for instance, the neighborhood they can afford to live determines which school district they attend (Monaghan, 2017). Studies also explore parenting strategies, which play a role in academic success. These strategies help parents to show their understanding of the educational system possibly through their own educational experiences. College-educated parents are able to become more involved, and cultivate their children academically through attitudes and beliefs, which, in turn, give children positive affirmation and rewards.

1.3 Children's Language Background

The population of bilingual and multilingual children is growing in the United States, therefore, it is important to consider the impact of a child's language abilities on standardized test performance. Previous research has found that bilinguals tend to perform lower than monolinguals on intelligence and cognitive assessments when bilinguals are tested only in their second language, i.e., English (Sotelo-Dynega et al., 2013). For this reason, bilingualism was once thought to be a disadvantage for cognitive development. However, research has now shown that there may be other factors that play a role in a bilingual's performance, such as cultural knowledge and language proficiency, which have a direct impact on test-taking. Bilinguals tend to perform better academically when they are tested in their native language than in their second language (Sotelo-Dynega et al., 2013). Therefore, students' performance should be seen as multidimensional, and examiners should consider that fact when interpreting their findings.

1.4 The Current Study

As discussed above, there are many factors that can influence academic performance of school-aged children ranging from familial factors to the quality of the school system itself. In this study, we took advantage of a previously collected dataset in which a battery of standardized tests, demographic information, and cognitive performance measures were recorded for a large sample of 3rd to 5th grade children. The focus of this study is to understand the impact of the primary caregivers' educational attainment on children's academic performance. Based on the extant literature,

the hypothesis is that children with highly educated primary caregivers will be more likely to perform better on standardized assessments. We investigate whether the primary caregiver's educational attainment, language background, gender, and socioeconomic status contribute independently to their children's performance on multiple standardized tests and cognitive performance measures.

2. Methods

2.1 Participants

Children in elementary grades 3-5 from San Antonio were previously recruited through word-of-mouth and advertisement. They participated in a large-scale study of math and language processing and were compensated for their participation with cash and prizes. This study had a total of 176 children (89 females). Data were collected from two additional participants who were excluded because they were missing critical data. All children were right-handed, had no history of neurological disorders, and no language or mathematical disability (including ADHD, dyslexia, and dyscalculia). The participants' average age was 10 years (range: 6 years 2 months to 11 years 9 months), and the average grade level was 4.5 (range: 3.0 to 5.9) with 68 children in 3rd grade, 61 in 4th grade, and 47 in 5th grade. This sample included 102 monolingual English speakers and 74 bilingual speakers of Spanish and English. Among the bilinguals, 33 were English-dominant and 41 were balanced Spanish-English bilinguals. Socioeconomic status (SES) was recorded by administering a questionnaire adapted from the Four Factor Index of Social Status (Hollingshead, 1975). The participant's average SES was 48.2 out of 66 (range: 16.5 to 66).

2.2 Primary Caregivers Educational Attainment

The present study collected demographic information using questionnaires consisting of items relating to language background, math abilities, SES, financial provider, primary caregiver, and educational attainment. The caregivers in this study included 151 mothers, 17 fathers, and 6 others (e.g., grandparent or guardian) for a sample of n=174. The primary caregivers were divided by education into 4 categories, high school or lower (13), some college (60), bachelor's degree (51), and graduate degree (48). There were 2 primary caregivers who did not provide any information about their educational attainment, resulting in a sample of n=172 for the analyses pertaining to education. It is important to note that the current analysis was conducted on an available sample of data from a larger study on the brain basis of math and language development, and therefore these distributions were based on who had previously volunteered to participate. Below we discuss potential issues with this sample.

2.3 Offline Behavioral Cognitive Assessments

All of the children who participated in the study completed multiple cognitive assessments. The Math Fluency subtest of the Wechsler Individual Achievement Test (WIAT III; Wechsler, 2009) was used to measure fluency in basic arithmetic. Better math fluency is associated with better problem-solving skills and allows for higher arithmetic abilities. Arithmetic fluency was measured with 1-minute subtests for addition (48 problems), subtraction (48 problems), and multiplication (40 problems). A sum of the scores was taken to create a composite score of math ability.

Additional cognitive measures administered were from the *Woodcock-Johnson III Tests of Cognitive Abilities*

(WJIII; Woodcock, McGrew and Mather, 2001), including subtests for Picture Vocabulary, Oral Comprehension, Numbers Reversed, and Incomplete Words. Picture Vocabulary measures the size of a child's vocabulary through word retrieval using a picture naming task. Oral Comprehension measures a child's spoken language comprehension while listening to an audio recording and completing a missing word. Numbers reversed assesses working memory and attentional capacity by asking children to repeat a set of numbers in reverse order to how they were presented. Lastly, Incomplete Words measures children's auditory processing through phonemic awareness by playing a recording of a word with missing phonemes and having the child pronounce the complete word. Bilingual children were tested on both the English and Spanish versions of the tests described above (Muñoz-Sandoval et al., 2009).

2.4 Multiplication Verification Task

All participants also performed a multiplication verification task. The children were presented with a single-digit multiplication problem and then were asked to verify if the problem was correct or incorrect. There were two versions of the task: one with Arabic digit operands and one with spoken number word operands. The solution was always a visual Arabic digit. Each number were presented sequentially (2 4 12 or "two" "four" 12), and participants were asked to determine as quickly and accurately as possible if the third number was the correct multiplication product for the first 2 numbers. The experiment was set up as a game where the children earned coins by answering problems correctly. Participants responded from the onset of the third number, the solution, by pressing one of two buttons on a videogame controller (correct/incorrect), with correct and incorrect buttons alternated between left and right hands across participants. Performance on the task did not affect the child's compensation. 45 children only completed all the Arabic digit task, 39 only completed the spoken number word task, and 92 children completed both versions. Accuracy was averaged across tasks for children who completed both.

2.5 Procedure

Informed consent (parent or legal guardian) and child assent were received prior to participation in any study components, in accordance with the Institutional Review Board (IRB) of the University of Texas at San Antonio. In this study, the participant's primary caregiver completed a questionnaire to categorize their educational attainment, SES, and other factors. The child participants were then asked by the examiner to perform the arithmetic tasks where students had one minute to complete the problems on a worksheet from the WIAT. This was followed by the language and memory tasks from the Woodcock-Johnson. Once the participants completed the offline cognitive assessments, they performed the verification task while performance was measured. All data was collected on site at the University of Texas at San Antonio.

2.6 Statistical Methods

The data from each child and their primary caregiver were compiled into a single document for statistical analysis. This study used between-groups Analysis of Variance (ANOVA) and Pearson's correlations to examine if there is a significant difference in the educational attainment of primary caregivers and performance on standardized tests. Levene's Test was used to ensure homogeneity of variances across samples of different sizes (Levene, 1960).

3. Results

Table 1 summarizes the children's performance on the standardized tests. We also report the bilingual children's performance on the Spanish assessments for completeness, but do not use them in the analyses described below (only tests that both monolinguals and bilinguals completed were used).

Table 1: Participant's performance on standardized tests

	Mean	***SE***
Math ability[1]	73.05	1.37
Working memory[2]		
English	12.70	0.23
Spanish	12.24	0.65
Phonological awareness[3]		
English	19.76	0.29
Spanish	18.33	0.85
Vocabulary size[4]		
English	24.28	0.26
Spanish	18.37	1.14
Oral comprehension[5]		
English	20.64	0.28
Spanish	16.40	1.26

N=176 for each English assessment
N=74 for each Spanish assessment

[1]Composite score of Math ability (maximum possible = 136)
[2]Raw scores of Numbers Reversed (maximum possible 30)
[3]Raw scores of Incomplete Words (maximum possible =44)
[4]Raw scores of Picture Vocabulary (maximum possible = 44)
[5]Raw scores of Oral comprehension (maximum possible = 34)

3.1 Primary Caregiver and Performance

One-way ANOVAs with 3 levels of between-subject Primary Caregiver (mother, father, other) was conducted using each of the dependent measures. The comparison using children's math fluency composite scores (WIAT) as the dependent measure reached significance ($F(2,173)=4.65$, $p<0.05$; Figure 3). Children with fathers as primary caregivers had higher composite scores than those with mothers or others as primary caregivers. However, there was no significant effect of the caregiver on children's accuracy when judging the correctness of the multiplication problems on the multiplication task ($F(2,124)=1.87$, $p=0.16$; Figure 3). Therefore, although the identity of the primary caregiver affected by standardized test measures, it did not affect real-time performance accuracy. Additional analyses revealed that math fluency scores and accuracy were positively correlated ($r=0.68$, $p<0.01$), indicating that math fluency is an accurate measure of arithmetic abilities. No other comparisons using the additional cognitive assessments collected reached statistical significance (all ps>0.08).

3.1 Primary Caregivers' Educational Attainment and Performance

Educational attainment was operationally categorized into 4 groups based on the sample population. One-way ANOVAs with 4 levels of between-subject Educational Attainment (high school or lower, some college, bachelor's degree, graduate degree) was conducted using each of the dependent measures. Educational attainment significantly modulated math fluency - WIAT composite score ($F(3,171)=3.83$, $p<0.05$; Figure 1), Oral Comprehension ($F(3,171)=3.38$, $p<0.05$), and Multiplication Verification accuracy ($F(3,122)=4.81$, $p<0.005$; Figure 2).

Children with primary caregivers with "some college" performed lower on the WIAT than children with primary caregivers with a "bachelor's degree". Children with primary caregivers with "some college" performed lower on the multiplication verification task and Oral Comprehension than children with parents with a "graduate degree". There were no other significant differences across educational attainment categories. Educational attainment did not significantly modulate performance on the language measures: Incomplete Words ($F(3,171)=0.99$, $p=0.400$) and Picture Vocabulary ($F(3,171)=2.54$, $p=0.059$), or on the working memory measure: Numbers Reversed ($F(3,171)=1.60$, $p=0.193$).

3.2 Effect of Bilingualism

ANOVAs with 2 between-subject levels of Language (bilingual, monolingual) were used to measure the effect of bilingualism on standardized test performance, following previous findings reported in the literature. On the English language assessments, English speaking monolinguals scored higher than Spanish-English bilinguals for Incomplete Words ($F(1,175)=24.92$, $p<0.001$), Picture Vocabulary ($F(1,175)=22.63$, $p<0.001$), and Oral Comprehension ($F(1,175)=7.78$, $p<0.01$). Critically, there was no significant difference between monolinguals and bilinguals on the WIAT math fluency score ($F(1,175)=0.092$, $p=0.762$), on the Numbers Reversed score ($F(1,175)=0.003$, $p=0.953$), or on performance accuracy on the multiplication verification task ($F(1,124)=0.162$, $p=0.688$; Figure 4).

3.3 Analyses based on Child Demographic Factors

In addition to measuring the impact of the parents on child performance outcomes, ANOVAs were conducted to determine the effect of the children's demographic factors

on each dependent measure. Our sample included children with the following racial backgrounds: American Indian and Alaska Native (n=2), Asian (n=4), Black/African-American (n=16), Native Hawaiian or Other Pacific Islander (n=2), White (n=144), and More than one race (n=8). Among these children, 128 were Hispanics and 48 were Non-Hispanics. Finally, we also collected information about the children's educational environment (data available for 97 children only): 83 children were enrolled in Public School, 4 were in Private School, 6 were in Charter School and 4 were homeschooled.

Analyses revealed no significant effect on math fluency score (WIAT), accuracy, or other cognitive measures collected across children grouped by race (all *p*s>0.10), ethnicity (*all ps>0.20*), or school environment (*all ps>0.20*). Gender comparisons showed a significant difference in task accuracy ($F(1,175)=3.99$, $p<0.05$) with boys performing more accurately than girls (83% versus 77%). There were no other significant differences across gender on any of the other measures (all *p*s>0.05).

Finally, Pearson's correlations showed no significant relationship between SES and math fluency – WIAT composite scores ($r=0.025$) or SES and the other cognitive assessments (Picture Vocabulary $r=0.13$; Oral Comprehension $r=0.15$; Incomplete Words $r=-0.04$; Numbers Reversed $r=0.03$). Additionally, SES did correlate with accuracy on the Multiplication Verification Task ($r=0.25$).

4. Discussion

The factors that affect a child's performance on standardized testing reach beyond the classroom. Therefore, it is important to understand the external factors on children's performance in order to advocate and implement policies for equal opportunities for all students. The goal of this study was to determine the impact of primary caregivers' educational attainment on children's performance on standardized tests and real-time cognitive tasks of math and language. We found that the educational attainment of the primary caregiver affected the child's math proficiency on both the standardized assessment and verification task. In addition, we found that the gender of the primary caregiver (father versus mother) affected performance on standardized tests, whereas the gender of the child affected performance on the verification task. Lastly, language proficiency of the child affected their performance on language assessments, but not math proficiency.

Previous research found that parental factors can influence children's achievement and outcomes (Buis, 2013; Erola et al., 2016). As previously mentioned, research has shown that mothers tend to have the greatest influence on the education of the child. These findings could derive from who spends the most time with the children and not necessarily who the person is (mother, father, or other). The relationship between caretakers' investing time into their children and their performance suggests that human capital theory could play an important role in academic outcomes. Indeed, an increase in parental involvement can result in better performance in math and reading, higher performance on standardized assessments, and reduced high school drop-out rate (Assari, 2018).

In the current study, we showed that children with their father as primary caregivers performed better on our measure of math fluency than the children who had their mother as the primary caregiver. These findings are in line with previous research that looked specifically at the relationship between primary caretakers that work in a STEM-related field and their children. The study found that children who have parents with STEM backgrounds performed better than children with parents who did not have

employment in those fields (Bowden et al., 2017). Moreover, it is known that men more than women are more likely to be in STEM fields in the United States (76% versus 24%: Noonan, 2017); the data might also explain why children with fathers than those with mothers as primary caretakers scored higher. However, that study was beyond the scope of the current study.

Interestingly, the identity of the primary caregiver did not affect the performance on the multiplication verification task. That result might indicate that standardized tests are more sensitive to secondary socio-cultural factors than actual real-time performance measures, such as accuracy on a verification task.

Erola et al. (2016) showed that educational attainment was the most influential factor when it comes to children's standardized performance, whereas income was the least. This finding is consistent with the results of our study since there were no significant effect of SES on the children's performance on the standardized math assessment. In contrast, the educational attainment of the primary caregivers affected children's performance on the math assessment, language assessment, and math task. This could stem from cultural capital in that parents with more assets are better able to navigate the education system. Wealthier parents tend to be more involved in the school community (e.g., volunteering); this sort of involvement not only increases children's motivation and self-esteem, but also allows parents to connect with teachers and communicate issues their children may have (Romo, 1999). In contrast, middle-income Latinos experience barriers that stem from a variety of social and economic issues, including demanding work schedules, lack of English proficiency, and occasionally legal status (Inoa, 2017). In this study, children with parents who had "some college" scored lower on the math fluency test (WIAT) and math task than children with parents who had a "graduate degree". However, there were no significant differences between "high school or lower" or "bachelor's degree". Interestingly, two children in the lowest category of primary caregiver's educational attainment scored the highest in this sample on the math fluency test (WIAT). This is encouraging, as it indicates that a primary caregivers' educational attainment does not necessarily predetermine the success of the child. Indeed, this datum would negate the belief that uneducated primary caregivers have negative impacts on their children academically and would supports the idea that there are other contributors to children's performance on assessments. We speculate, however, that because our study recruited children to participate in a math study, our participants may be children who enjoy and excel in academia and might perform better than other populations. As such, our sample could reflect self-selection bias.

This study also found that bilingualism can affect English proficiency. Commonly used language assessments like Incomplete Words, Picture Vocabulary, and Oral Comprehension from the Woodcock-Johnson, revealed that English monolinguals performed better than Spanish-English bilinguals on these tasks. The findings are consistent with the existing research, which shows that bilinguals tend to perform lower than monolinguals when tested in only one language (Sotelo-Dynega et al., 2013). Yet, the findings could be attributed to language proficiency or cultural differences, and show that bilingual children's performance on standardized assessments may measure more than just cognitive achievement and should be considered in light of their individual experiences. Being bilingual did not affect performance on standardized measures of math fluency or performance measures of task accuracy in verifying the accuracy of multiplication problems. The fact indicates

that it is primarily the assessments that measure language fluency or depend on language such as the working memory task used herein, where being bilingual affects performance. This effect did not seem to extend to math fluency, and thereby indicated that bilingual children might not be at a disadvantage in this domain compared to their monolingual peers. It is important to consider that these effects could be specific to Spanish-English bilinguals, so, further research on other types of bilingual speakers is necessary.

Our data did not show significant differences in performance across SES, race, ethnicity, or educational settings (public, private, charter, or homeschool). However, this study did reveal gender differences in task performance with boys performing more accurately than girls on average (83% versus 77%). There were no other gender differences in our study, even on the standardized assessments of math fluency. Previous literature revealed that girls rated their own math ability lower than boys even in the absence of differences in math achievement (Fredericks & Eccles, 2002). The reason why girls relate less to math may come from culturally derived stereotypes that boys are better at math (Bowden et al., 2017; Cvencek et al., 2011). Perhaps this socio-cultural construct operates in adulthood and leads to the secondary impact we observed with regard to better performance when a child has a male parent as his or her primary caregiver.

In line with the literature, we speculate that the girls than the boys in our study might have been less confident in their math abilities. The girls and boys differed in performance accuracy on the verification task, where the children made a judgment about the potential solution, but not on the standardized test, where the children had to calculate and produce the solution. It is plausible that although the girls and boys were equally good at producing the solutions, girls were less confident in judging whether the presented solutions were correct or not. Another possibility is that the constant pace of the verification task created a tension that the self-paced standardized test did not. Under these conditions, lower confidence might interfere with performance. There is a need for further studies to determine the validity of this interpretation.

4.1 Limitations

This study can help further understand the effects of primary caregivers' educational attainment on children's standardized performance. However, a few limitations need to be taken into account. First, the questionnaire about the identity of the primary caregiver may not have been specific enough for parents to interpret that primary caregiver means the person who spends the most time with the child. Parents who brought their children tended to answer that they were the primary caregiver because, as a parent, they are primary caregivers. Thus, it is possible that their response to this question did not accurately measure who spends the most time with the children. Second, as mentioned above, our sample may be biased toward a group of families who self-selected to participate in a study on math. This may have biased our sample toward children who are skilled in math, although it is also possible that some parents brought their children to the study to ensure their performance was appropriate for their age. We did, however, have a fairly broad range of performance on our math measures to ensure that our sample is broadly representative of the population. Third, our sample did not represent all groups of the educational attainment categories equivalently. The majority of parents had high school or higher education. It is possible that families with lower educational attainment would find it difficult to leave

work or travel to University of Texas at San Antonio to participate in this study. That difficulty makes it challenging to draw conclusions about children with primary caregivers who have less than a high school degree.

Future research can aim to address these gaps in our sample, as well as understand other components that may affect children's performance on standardized tests, such as environmental factors like the degree of parental involvement, socioeconomic background, and quality of schooling. Furthermore, a follow-up study could be conducted to see if the children's performance continues to be affected by their development or external factors, such as the parent becoming a student after giving birth (postnatal education) or shifts in social mobility.

5. Conclusion

Disparities in education systems, such as access to resources or quality of education, act in opposition to the idea that schools are equalizers in the United States. This study showed that, on the one hand, a primary caregiver's educational attainment can positively impact the cognitive development of his or her children, as measured by several standardized and performance measures. On the other hand, the highest performing children had primary caregivers in the lowest educational attainment group. Thus, educational attainment does play a role in academic performance observed in language and math abilities, but does not seem to be the sole driving factor of children's language and math abilities. In addition, being a Spanish-English bilingual led to weaker standardized scores compared to monolingual peers; but Spanish-English bilingual did not affect performance on the measures of math ability. The data suggest that monolingual assessments that depend on language, even when testing seemingly language-independent cognitive functions like working memory, should not be used on bilingual children. Instead, bilinguals should be tested using appropriate measures that account for their total language ability. In contrast, measures that do not seem to be affected by language ability, such as judging the correctness of multiplication problems presented as written numbers, should not be affected by the fact that the children are bilingual. Overall, there seem to be underlying social, cultural, and school environment factors that play a role in the performance of school children. When one measures a child's cognitive achievement, one should be measuring the whole child and keeping in mind that standardized measures are not always a complete representation of his or her abilities.

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Figures

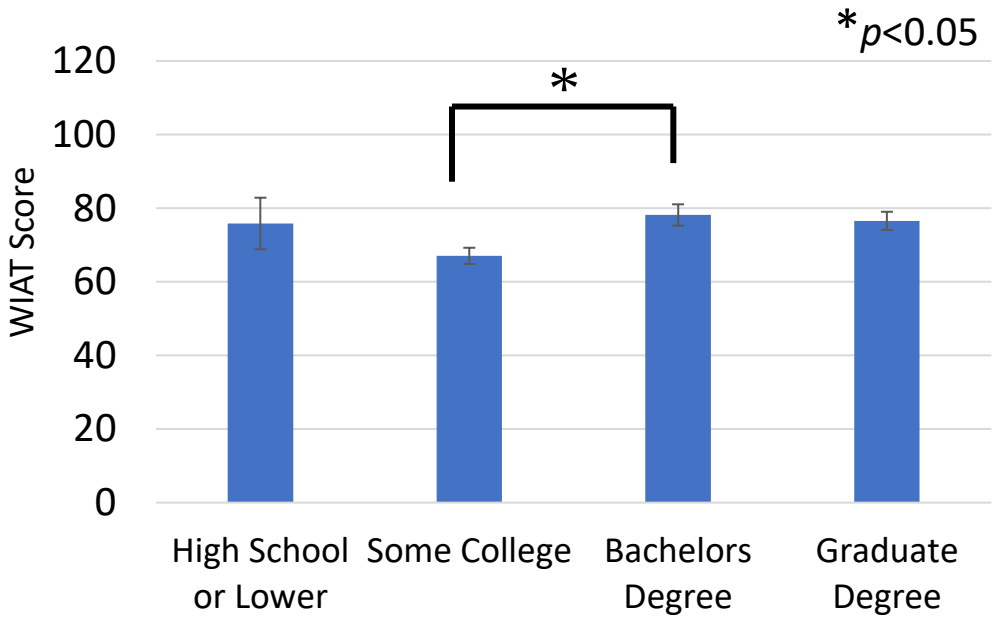

Figure 1. *Primary Caregivers Educational Attainment and Composite Score on the WIAT-III.*

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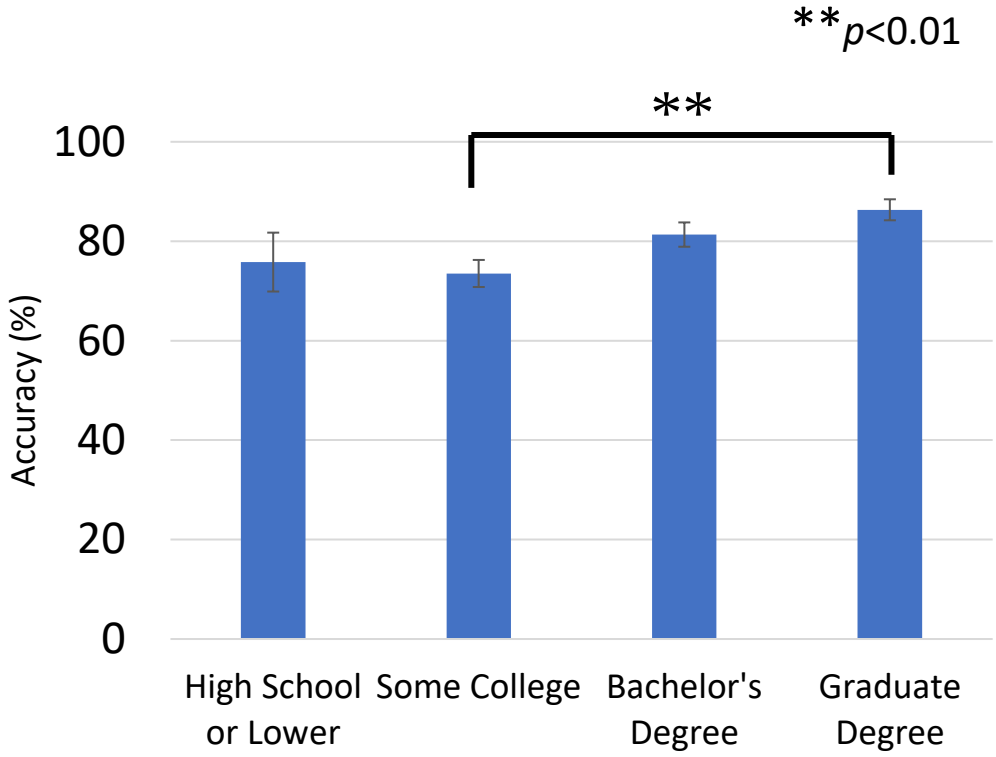

Figure 2. *Primary Caregivers Educational Attainment and Accuracy on the Math task.*

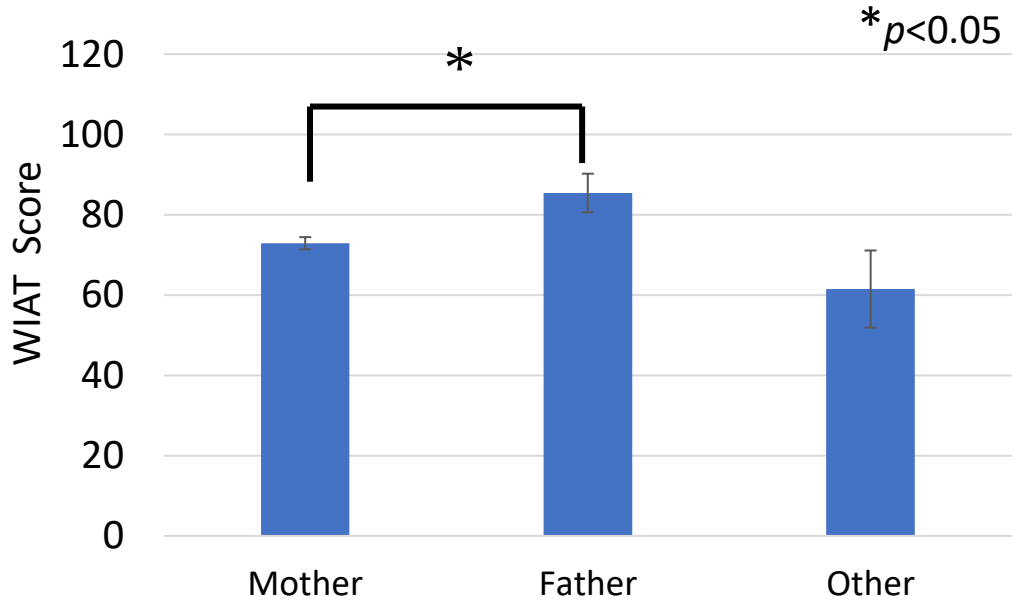

Figure 3. *Primary Caregiver and Composite Score.*

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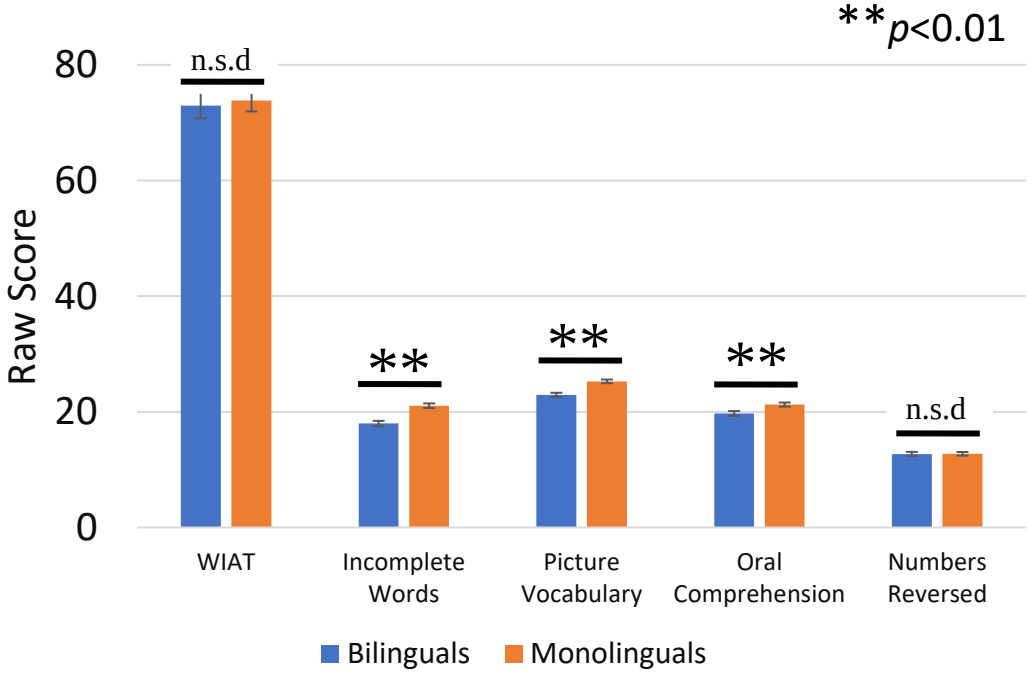

Figure 4. *Language Groups and Performance on Standardized Tests.*

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