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The Impacts of COVID-19 on Kindergarten Readiness Skills in Preschoolers

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Abstract

Preschool in the US is an important, but costly affair for many children. Roberts and Bryant (2011) found that preschoolers who live in homes with a low socioeconomic status (SES) are less likely to perform highly on measures of kindergarten readiness than their peers who come from homes with a higher SES. Previous research has demonstrated that there is a significant impact of the COVID-19 pandemic and related school closures on children's academic performance in school. However, there is little that is known about the impact of the pandemic on school readiness skills among children who live in homes with low SES. This study analyzed the academic impact of school closures due to the pandemic on children who live in low-SES homes who were in preschool before or after the pandemic forced school shutdowns. We analyzed cohorts of preschool students who participated in a large-scale longitudinal study of school readiness in 2018 - 2019 and 2021 - 2022. We used the Minnesota Executive Function Scale (MEFS) and Woodcock Johnson Scale to test the children's' executive functioning, vocabulary, literacy, and math skills. College students assessed preschool children ages 3-5 in the Midwest. Most of the parents of students we studied had not received a college degree and had an annual income of less than $42,000 a year. Children in the post-pandemic cohort made significantly less gains in their language skills compared to the pre-pandemic cohort. In contrast, children in the post-pandemic cohort made significantly more gains in their pre-literacy skills compared to the pre-pandemic cohort. This indicates that students may need more classroom support in the area of language development as they develop and age through the school system.

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Introduction

School closures due to the COVID-19 pandemic impacted around 98.5% of students worldwide (Ford, Kwon, & Tsotsoros, 2021). These school closures forced children to stay home from school and required an atypical style of learning, if the child continued their education at all. The COVID-19 pandemic likely impacted children and their families in a multitude of ways (Bailey, Duncan, Murnane, & Au-Yeung, 2021). Other historical forced school closures from previous epidemics, recessions/depressions, and wars have been strong enough to hinder a child's normal development (Gonzalez, Loose, Pérez, Rodríguez-Vincon, Tomás-Llerena, & Vásquez-Echeverría, 2022). Therefore, we wanted to determine the impact of COVID-19 on preschool learning in children living in homes that have a low socioeconomic status (SES).

School closures due to the COVID-19 pandemic were lasting and harmful to children's development academically, physically, mentally, socially, financially, etc. (McCoy, Cuartes, Behrman, Cappa, Heymann, López Bóo, Lu, Raikes, Richter, Stein, & Fink, 2021). Additionally, there is emerging evidence that the pandemic affected learning for children. In one study learning loss was demonstrated among children ages 8-11 and was found across reading, spelling and math subject areas. (Engzell, Frey, & Verhagen, 2021). Moreover, in a different study students' growth in math was significantly lower during the 2019-2020 school year than it had been during the 2018-2019 school year (Kuhfeld, Tarasawa, Johnson, Ruzek, & Lewis, 2020). However, scores for reading during the pandemic year were not affected significantly compared to the prior year. It was also found that the individual differences among primary and secondary school

students' achievement greatly increased during the lockdown period compared to the 8-week period preceding the lockdown (Tomasik, Helbling, & Moser, 2021). An overall decrease in learning pace was also noted, and was believed to be caused by cognitive, motivational and/or socioeconomic factors. Kindergarteners from homes with low SES in Israel in the 2020-2021 school year had a significant gap in morphological awareness tasks compared to students in kindergarten prior to the pandemic (Nevas, 2023). Additionally, it was found that score declines from fall of 2019 to fall of 2020 in third graders throughout the state of Ohio were more pronounced in areas that started the fall 2020 semester with remote learning (Kogan & Lavertu, 2021). However, we know very little about how preschool gains/losses are impacted by the COVID-19 pandemic. Current research on children in preschool settings is limited.

There are many reasons one may expect the pandemic to negatively impact learning besides simply spending less time in an academic setting. Schools account for much more than just academics and their closures affect children in many aspects of life. They can be used for meal programs, pre-kindergarten opportunities, before and after school care, counseling, and more (Kuhfeld, Tarasawa, Johnson, Ruzek, & Lewis, 2020). Children who rely on schools for food, health, and mental health care were among the most vulnerable to feel impacts from school closings (Hoffman & Miller, 2020). Therefore, there were many needs previously being met by the education system that were no longer being addressed. This put more strain on families and parents of children who had previously utilized these resources. Consequently, there was an increase in parenting stress during the COVID-19 pandemic due in part by school closures (Hiraoka & Tomoda, 2020). Additionally, it was determined that parents during the COVID-19

pandemic had more parenting stress because they felt inadequately prepared to teach their children from home, as 71% of parents reported not feeling supported throughout the remote learning process (Lee, Ward, Chang, & Downing, 2021). Parents also struggled with the length and difficulty of educational materials during virtual or hybrid learning, and many parents felt that their preschool aged child needed too much support for remote learning activities (Stites, Sonneschein, & Galczyk, 2021).

However, it was found that parents to children in school were engaging in higher levels of parenting activities in almost all direct caregiving activities during the pandemic. Parents of younger children reported completing activities such as reading, playing and watching tv more often with their children (Lee, Ward, Chang, & Downing, 2021). Additionally, it was discovered that during the early months of the lockdown early childhood education students were not missing out on shared reading experiences at home compared to how much shared reading had been occurring at home immediately before the COVID-19 lockdown (Read, Gaffney, Chen, & Imran, 2021). Furthermore, parents reported most often engaging in constrained reading activities and least often reported completing unconstrained math activities with their preschool-aged child at home following the start of the COVID-19 pandemic (McCormick, Weissman, Weiland, Hsueh, Sachs & Snow, 2020). It was also discovered that reading to young children every day helped to compensate for the reading skill losses due to the COVID-19 pandemic. (Bao, Qu, Zhang, & Hogan, 2020).

School closures due to the COVID-19 pandemic also likely increased the achievement gap between under resourced elementary school students and their peers (Bailey, Duncan, Murnane, & Au-Yeung, 2021). The achievement gap was prevalent

prior to the pandemic and many of the families with low SES were frontline workers during the lockdown period, which may have made it harder for them to focus on their child's education during the school shutdowns. Furthermore, it was predicted that children from low-income homes fell an extra half year behind their peers from higher income families in both math and reading achievement (Bailey, Duncan, Murnane, & Au-Yeung, 2021). Additionally, lower middle-income countries were likely negatively impacted the most by early childhood education center closures than wealthier countries were (McCoy, Cuartes, Behrman, Cappa, Heymann, López Bóo, Lu, Raikes, Richter, Stein, & Fink, 2021).

Therefore, the harmful effects of school closures on the younger population of early childhood education centers were not missed by the COVID-19 pandemic. It was predicted that these school closures had even more drastic impacts on the early childhood population than the elementary school population (McCoy, Cuartes, Behrman, Cappa, Heymann, López Bóo, Lu, Raikes, Richter, Stein, & Fink, 2021). Between March 2020 and February 2021, it was estimated that 167 million children lost access to early childhood education school supports due to the COVID-19 pandemic with 19 billion in-person school days lost. It was found that young children enrolled in Head Start preschool programs in the US attended an average of 111 days of in-person school during the 2020-2021 school year compared to 170 days in a typical, pre-pandemic school year (Lynch, Lee, & Loeb, 2022). It was also predicted that the impacts of these school closures may mean that early childhood education children will lose 300 billion dollars in total salary earnings throughout their lifetimes (McCoy, Cuartes, Behrman, Cappa, Heymann, López Bóo, Lu, Raikes, Richter, Stein, & Fink, 2021).

Another impact from the COVID-19 pandemic is the loss of social interaction and peer relationship building for children of such a young age. Barnett and Jung (2021) found that there were more preschoolers experienced social and emotional difficulties from remote learning that were originally anticipated. School closures caused by the COVID-19 pandemic also increased children's likelihood of experiencing trauma in the home in addition to increasing the risk of having a mental health disorder (Fontanesi, Marchetti, Mazza, Di Giandomenico, Roma, & Verrocchio, 2020). School closures during the pandemic meant that there was insufficient access to mental health care in schools, which may have greatly impacted students' ability to learn in the classroom (Childs, Brown, Brown, Iachini, Phillippo, Galib, Parker, & Fujimoto, 2022). Parents surveyed on remote learning for their preschool age child reported wanting more social and emotional learning opportunities and activities for their child, but often received very little to none (Stites, Sonneschein, & Galczyk, 2021). Furthermore, school district officials in New Jersey reported having STEM activities (i.e., number recognition and counting) as a part of their preschool remote learning curriculum less than 50% of the time (Nores & Harmeyer, 2021).

A study done by Lynch, Lee, and Loeb, (2022), examined math, literacy and executive functioning skills in low-income Head Start preschool children during the 2020-2021 school year. They compared their executive functioning scores to 2018-2019 scores and found no significant differences between the scores. Moreover, they found no differences in literacy scores, but did find significant gains from before the pandemic in 2/3 of their numeracy tests (Lynch, Lee, & Loeb, 2022).

There is room for more research to be done regarding the effects of COVID-19 school closures on kindergarten readiness scores. We want to determine how preschool children's language, literacy, math and executive functioning skill gains were impacted by the COVID-19 pandemic by comparing gains during the school year immediately preceding the pandemic and the school year during the pandemic. We predicted that the COVID-19 pandemic would negatively impacted these skills in children enrolled in preschool and will have affected their kindergarten readiness scores.

Methods

Participants: We examined the gender, parental education level, household income, and race of students in both the pre-pandemic and post-pandemic cohorts. There were 655 children assessed in the pre-pandemic cohort and 435 children in the post-pandemic cohort. 37.4% of parents' highest education level in the pre-pandemic cohort is some college, whereas there was only 21.4% in the post-pandemic cohort. In the pre-pandemic cohort, 51.1% of participants had an annual household income of less than $25,000. However, in the post-pandemic cohort 27.1% of participants' households made $25,000 or less. The race and gender demographics were similar across both cohorts.

Procedure: Parents of children in preschool in the Midwestern US were asked for consent for research assistants to assess their child's executive functioning and school readiness skills. The research assistants were certified through a local university then went out to schools over the course of the fall semester to assess the children that had consented to participate. The research assistants returned in the spring and gathered the time 2 scores for the same children. When the research assistants were working with the children they

first asked for the child's assent and then proceeded to start the assessment. If the child asked to stop the assessment at any time, the examination was discontinued. Assessors attempted to minimize distractions as much as possible. It was a standardized procedure that allowed for strong reliability and validity throughout the assessment.

Materials and Measures: The assessment consisted of using Minnesota Executive Function Scale or MEFS (Carlson, 2017) and the Woodcock Johnson Tests of Early Cognitive and Academic Development (Schrank, McGrew, Mather, Wendling, & LaForte, 2014).

Measures

A. The MEFS was administered using an iPad application that was standardized and normed for children ages 2 and up. Its design is a card game that makes the children sort the cards based on changing rules (i.e., sort the cords first by color and then by shape). The assessment changes based on children's performance and includes standardized prompts for the assessor to maintain reliability and validity. Many schools across the country including some locally use this application.

B. The Woodcock Johnson Tests of Early Cognitive and Academic Development was assessed using three subtests: Picture Vocab, Literacy, and Number Sense. (Schrank, McGrew, Mather, Wendling, & LaForte, 2014). This assessment uses a picture flip book with standardized directions for the assessors. The Picture Vocabulary subtest assesses children's expressive language skills. The Letter-Word Identification subtest assesses children's letter identification, verbal, and

pre-reading skills. The Number Sense subtest assesses children's math ability, including counting and quantitative vocabulary knowledge.

Design

Variables

A. *School Year:* Children were assessed in either the 2018-2019 (pre-pandemic) school year or the 2021-2022 (post-pandemic) school year. The children in the pre-pandemic condition were all assessed prior to the school shutdowns in Ohio in March 2020.

B. *Socioeconomic Status:* At the end of the school year, parents of children enrolled in the preschool promise program were surveyed for their education level and household income.

C. *Age:* Children's age in months based on their age at the time of each assessment was recorded.

D. *Time Scores:* Children were assessed twice in one year. Once during Time 1 towards the beginning of the school year and again during Time 2 towards the end of the school year. We analyzed children based on the gains they made between the Time 1 and Time 2 scores across both the pre-pandemic and post-pandemic cohorts in the ANCOVA analyses.

Analysis

For the descriptive statistics (gender, race, education, & household income), independent samples t-tests were run to determine demographic differences across cohorts. A dummy variable was used for race in order to differentiate between black, white, and non-white/non-black students. The next step was to run ANCOVA analyses for each of the four tests (Picture Vocabulary, Letter-Word Identification, Number Sense, and executive functioning) to determine differences between the gains made between Time 1 and Time 2 scores in the 2018-2019 school year, and in the gains from the 2021-2022 school year.

Results

Table 1 shows that there was a slightly higher number of males in the pre-pandemic cohort which was not significant (p=0.090). There were more parents who had completed high school or less as their highest education level in the pre-pandemic cohort which was significant (p<0.001). There was a higher percentage of households that had an income of less than $25,000 in the pre-pandemic cohort which was significant (p<0.001). There was also a significantly higher percentage of black students in the pre-pandemic cohort (p=0.001). Additionally, there was a higher number of non-white/non-black kids in the pre-pandemic cohort (p=0.019). Given these demographic differences across cohorts, we controlled for these factors when examining cohort differences in school readiness skills.

We ran individual ANCOVA tests for the individual assessments (executive functioning, picture vocabulary, letter word, and number sense) with six predictors (time 1 scores, black=1, non-white/non-black=1, education, income, and cohort) which is shown in table 2. We found that picture vocabulary scores gains were significantly higher

for the pre-pandemic cohort. On the other hand, the letter word scores gains were significantly higher for the post-pandemic cohort.

Discussion

The purpose of this study was to identify how school shutdowns due to the COVID-19 pandemic impacted preschool children's scores in executive functioning, vocabulary, immergent literacy and math. We wanted to identify the areas that younger children may need more assistance in as they grow in the US public school system. We also wanted to identify the populations of preschool students that may be the most affected by school shutdowns in order to guide teachers' focus as classrooms adjust to a post-pandemic lifestyle.

We found that Black students scored significantly different from their white and non-black peers in executive functioning, vocabulary, and math skills. Preschool and early elementary school teachers should use this information to guide their classroom focus in the coming years. We also found that household income and parent's education were significantly different for math skills as well. This is like previous findings that show homes with low-socioeconomic status were disproportionately affected by school closures due the pandemic (Engzell, Frey, & Verhagen, 2021). Other studies also show elementary school math growth as being impacted the most by the pandemic (Kuhfeld, Tarasawa, Johnson, Ruzek, & Lewis, 2020).

Additionally, we found that school closures due to the COVID-19 pandemic negatively affected preschool children's scores in vocabulary. This makes sense as

preschoolers learn a lot of their vocabulary through interactions with peers and through other social interactions. The lack of relationships and peer interactions caused by remote learning due to school closures from the COVID-19 pandemic may have prevented children from strengthening their vocabulary skills. Preschool teachers should place more of an emphasis on vocabulary skills as children are developing in order to help make up for some of these losses. They should also encourage families to work on these skills at home in order to help increase scores and account for some of the vocabulary losses felt due to school closures.

Preschool children's scores in emergent literacy lso significantly positively increased from the 2018-2019 school year to the 2021-2022 school year. The lack of decrease in literacy scores is like current research done on students' abilities after the pandemic (Kuhfeld, Tarasawa, Johnson, Ruzek, & Lewis, 2020). Teachers should continue focusing on literacy in the classroom. Other research suggests that reading to children at home can improve emergent scores in preschoolers (Bao, Qu, Zhang, & Hogan, 2020). There is also evidence that shows parents were more likely to read to their preschool age children than any other activity at home throughout the COVID-19 pandemic, which may be why literacy scores increased after school closures due to the pandemic (McCormick, Weissman, Weiland, Hsueh, Sachs & Snow, 2020). Additionally, teachers may have focused more on reading skills and less on math skills across remote learning activities (Nores & Harmeyer, 2021). This may have led to scores in literacy increasing after school closures and remote learning periods while showing little gains in other areas such as math or executive functioning.

A limitation of this study is that it was not an experimental design with random assignment of participants. There also may be variables in the cohorts we did not account for that are impacting the results. There also could have been additional factors from the pandemic that impacted the assessments. For example, children who were enrolled in and attended preschool regularly in the 2021-2022 school year were assessed, but those children also may have been more likely to attend preschool during the lockdown as well. This could have prevented us from reaching children who attended less preschool during the pandemic. Future research should look at how parenting stress due to school closures felt by families with a low SES impacted the amount of time preschool age children spent working on remote learning activities at home. Researchers should also examine what kinds of remote learning activities were being provided to preschool children to determine if the differences found in this study were related to the kinds of materials being utilized at home during remote learning periods.

This study is important to current literature because of the lack of studies out on preschool-aged children and the impact of school closures on assessment gains in academic skills. We found that emergent literacy scores increased post school closures due to the pandemic, but that vocabulary scores decreased throughout the same period. We also found that Black students had significantly different scores during the pandemic in executive functioning, vocabulary and math scores. It was found that household income and parent's education level significantly impacted preschool gains across the pandemic. More research should be done to examine preschool children's gains now as compared to the pre-pandemic and to see if we are still finding significantly different results.

References

Bailey, D. H., Duncan, G. J., Murnane, R. J., & Au-Yeung, N. (2021). Achievement gaps in the wake of COVID-19. *Educational Researcher, 50*, 266 –275. https://doi.org/10.3102/0013189X211011237

Barnett, W. S., & Jung, K. (2021). Seven impacts of the COVID-19 pandemic on young children and their parents: Initial findings from NIEER's December 2020 preschool learning activities survey. *National Institute for Early Education Research.* https://nieer.org/research-report/seven-impacts-of-the-pandemic-on-young-children-and-their-parents-initial-fndings-from-nieers-december-2020-preschool-learning-activities-survey

Bao, X., Qu, H., Zhang, R., & Hogan, T. P. (2020). Modeling reading ability gain in kindergarten children during COVID-19 school closures. *International Journal of Environmental Research and Public Health*, *17*(17), 63-71. http://dx.doi.org/10.3390/ijerph17176371

Carlson, S. (2017). Minnesota executive function scale: Technical report. *Reflection Sciences, Inc*. https://reflectionsciences.com/wp-content/uploads/2018/11/MEFS-Tech-Report-October-2017-v.12.pdf

Childs. T. M., Brown, E. L., Brown, N., Iachini, A. L., Phillippo, K., Galib, L., Parker, A., & Fujimoto, K. (2022). A mixed method study of teachers' appraisals of student wellness services and supports during COVID-19. *Journal of School Health*, *92*(7), 637-645. https://doi.org/10.1111/josh.13186

Engzell, P., Frey, A., & Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences of the United States of America, 118*(71) 1-7. https://doi.org/10.1073/pnas.2022376118

Fontanesi, L., Marchetti, D., Mazza, C., Di Giandomenico, S., Roma, P., & Verrocchio, M. C. (2020). The effect of the COVID-19 lockdown on parents: A call to adopt urgent measures. *Psychological Trauma: Theory, Research, Practice, and Policy, 12*(S1), S79–S81. https://doi.org/10.1037/tra0000672

Ford, T. G., Kwon, K. A., & Tsotsoros, J. D. (2021). Early childhood distance learning in the U.S. during the COVID pandemic: Challenges and opportunities. *Children and Youth Services Review, 131*, 1-9. http://dx.doi.org/10.1016/j.childyouth.2021.106297

González, M., Loose, T., Liz, M., Pérez, M., Rodríguez-Vincon, J. I., Tomás-Llerena, C., & Vásquez-Echeverría, A. (2022). School readiness losses during the COVID-19 outbreak. A comparison of two cohorts of young children. *Child Development*, 00, 1-15. https://doi.org/10.1111/cdev.13738

Hiraoka, D., & Tomoda, A. (2020). Relationship between parenting stress and school closures due to the COVID-19 pandemic. *Psychiatry and Clinical Neurosciences*, *74*(9), 497–498. https://doi.org/10.1111/pcn.13088

Hoffman, J. A, & Miller, E. A. (2020). Addressing the consequences of school closures due to COVID-19 on children's physical and mental well-being. *World Medical and Health Policy, 12*(3), 300-310. https://doi.org/10.1002/wmh3.365

Kogan, V., & Lavertu, S. (2021). The COVID-19 pandemic and student achievement on Ohio's third-grade English language arts assessment. *The Ohio State University*. https://glenn.osu.edu/sites/default/files/2021-09/ODE_ThirdGradeELA_KL_1-27-2021.pdf

Kuhfeld, M., Tarasawa, B., Johnson, A., Ruzek, E., & Lewis, K. (2020). Learning during COVID-19: Initial findings on students' reading and math achievement and growth. *NWEA Brief*. https://www.nwea.org/research/publication/learning-during-covid-19-initial-findings-on-students-reading-and-math-achievement-and-growth/

Lee, S. J., Ward, K. P., Chang, O. D., & Downing, K. M. (2021). Parenting activities and the transition to home-based education during the COVID-19 pandemic. *Children and Youth Services Review*, *122*, 1-10. https://doi.org/10.1016/j.childyouth.2020.105585

Lynch, K., Lee, M., & Loeb, S. (2022). An investigation of head start preschool children's executive function, early literacy, and numeracy, learning in the midst of the COVID-19 pandemic. EdWorkingPaper No. 22-555. *Annenberg Institute for School Reform at Brown University*. https://www.edworkingpapers.com/sites/default/files/ai22-555.pdf

McCormick, M. P., Weissman, A. K., Weiland, C., Hsueh, J., Sachs, J., & Snow, C. (2020). Time well spent: Home learning activities and gains in children's academic skills in the prekindergarten year. *Developmental Psychology*, *56*(4), 710-726. https://doi.org/10.1037/dev0000891

McCoy, D. C., Cuartas, J., Behrman, J., Cappa, C., Heymann, J., López Bóo, F., Lu, C., Raikes, A., Richter, L., Stein, A., & Fink, G. (2021). Global estimates of the implications of COVID-19-related preprimary school closures for children's instructional access, development, learning, and economic wellbeing. *Child Development*, *92*(5), e883–e899. http://doi.org/10.1111/cdev.13658

Nevas, E. (2023). The effect of the COVID-19 pandemic on low SES kindergarteners' language abilities. *Early Childhood Education Journal*, 1-11. https://doi.org/10.1007/s10643-023-01444-4

Nores, M., & Harmeyer, E. (2021). The impact of the pandemic on academic support for preschoolers: Key takeaways from a New Jersey district-level survey. *National Institute for Early Education Research.* https://nieer.org/wp-content/uploads/2021/09/Districts_

COVID_Report_mn_v9.17.21-el9.22.21.pdf

Read, K., Gaffney, G., Chen, A., & Imran, A. (2021) The impact of COVID-19 on families' home literacy practices with young children. *Early Childhood Education Journal*, *50*, 1429-1438. https://doi.org/10.1007/s10643-021-01270-6

Roberts, G., & Bryant, D. (2011). Early mathematics achievement trajectories: English-language learner and native English-speaker estimates, using the Early Childhood Longitudinal Survey. *Developmental Psychology, 47*(4), 916–930. https://doi.org/10.1037/a0023865

Schrank, F. A., McGrew, K. S., Mather, N., Wendling, B. J., & LaForte, E. M. (2014). Woodcock-Johnson IV tests of achievement. [kit] : *Riverside Publishing Company.*

Stites, M. L, Sonneschein, S., & Galczyk, S. H. (2021). Preschool parents' views of distance learning during COVID-19. *Early Education and Development, 32*(7), 923-939. https://doi.org/10.1080/10409289.2021.1930936

Tomasik, M. J., Helbling, L. A., & Moser, U. (2021). Educational gains of in-person vs distance learning in primary and secondary schools: A natural experiment during the COVID-19 pandemic school closures in Switzerland. *International Journal of Psychology*, *56*(4), 566–576. https://doi.org/10.1002/ijop.12728

Table 1
Descriptive Statistics

Variable	Pre-Pandemic Cohort		Post-Pandemic Cohort		Overall		Statistical Significance
	n	%	n	%	n	%	t(df)
Gender							1.695(1088)
Female	312	47.6	230	52.9	542	49.7	
Male	343	52.4	205	47.1	548	50.3	
Education							-3.83(1011)*
High School or Less	278	42.4	141	32.4	419	38.7	
Some College	245	37.4	93	21.4	338	31.2	
Associates	4	0.6	40	9.2	44	4.1	
Bachelors	81	12.4	55	12.6	136	12.6	
Graduate Degree	39	6	37	8.5	76	7	
Household Income							-3.887(917)*
< $25,000	335	51.1	118	27.1	453	41.6	
$25,001 - $42,000	137	20.9	65	14.9	202	18.5	
$42,001 - $60,000	50	7.6	43	9.9	93	8.5	
$60,001 - $79,000	48	7.3	17	3.9	65	6	
$79,001 & up	58	8.9	48	11	106	9.7	

Race							
White	248	37.8	145	33.3	393	36.1	
Black=1	286	43.7	233	53.6	519	47.6	-3.217(1088)*
Non-White/ Non-Black=1	121	18.5	57	13.1	178	16.3	2.353(1088)*

Note. We used the percent of the whole group for these percentages. There may have been missing data that prevented the percentages from adding up to 100%.
*Statistically significant (p<0.05).

Table 2
Between-Subjects Effect Size

Variable	Executive Functioning	Picture Vocabulary	Letter Word	Number Sense
Time 1	0.169	0.441	0.488	0.348
Black=1	0.012*	0.006*	0.001	0.011*
Non-White/ Non-Black=1	0.000	0.004	0.000	0.001
Education	0.000	0.004	0.000	0.017*
Income	0.006*	0.002	0.001	0.006*
Cohort	0.002	0.005*	0.007*	0.001

*Statistically significant (p<0.05)