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# Long-Term Impacts of Pre-K Education on Childhood Educational, Social, and Behavioral Development

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**Abstract**

The aim of this study is to run a longitudinal, ten year experimental study studying the effects of preschool attendance on long-term academic performance throughout elementary school. This study will sample 500 students from the Kalamazoo, Michigan community and observe their standardized test scores as well as their behavioral and social development as they progress through elementary school. I hope to discover the long-term impacts of attending pre-K programs on children in order to give educators and administrators a greater insight on how they should prioritize pre-K education in their schools.

**Keywords**, pre- K education, children education, social, behavioural development

## 1. Introduction

One might believe that the earlier a child is exposed to education, the better. They will have more time to process the information given to them and will have been able to pick up on patterns that will appear to them again and again in their time in the education system. While the legal start of a child's education is kindergarten, which they enter at ages 4-5, there also exists head-start programs that give parents the option of doing exactly as the name of the program implies—giving their child an early start to their education.

These programs introduce reading, mathematics, and other basic forms of education to the child before they enter kindergarten. However, there is the question as to just how helpful these programs actually are. Do children gain a "head start" in real terms when they enter preschools? The findings of this longitudinal experiment could be helpful to tens of millions parents for years to come, as well as taxpayers who fund these programs. There is a great deal at stake when it comes to the education of youth, so it is important that we have as much data as possible in order to draw conclusions that can be applied towards educational policies.

Unfortunately, information regarding the efficacy in promoting early childhood cognitive and social development through pre-schooling is scant from the perspective of being able to apply findings to a larger population. Smaller scale studies have performed exploring this subject, but because millions of children attend preschool every year, it is difficult to find a study with a large enough sample size to apply to a broader population. This study aims to fill that gap by observing the performance of students who attended preschool, and those who did not attend, on a wide scale. The findings from this experiment could be used in order to convince policymakers to either increase funding, and attention paid to pre-schooling, or to cut back on this sector of education and put funds towards more important periods of students' educational development. The scope and scale of this experiment will be large and highly ambitious, as it attempts to make a broad impact on the very fabric of education as we know it today.

Education is an important facet of society and a cornerstone of civilization. While current observations may not show an outwardly significant difference between those students who attend preschool and those who do not, any advantage that we can gain in helping educational development could pay off in the long-run. A higher quality of education generally correlates to a higher quality of life, and higher economic productivity that benefits multiple areas of society. After all, our youth are the ones who will inherit the earth from our generation, and they will be the ones who tend to us as we grow too old to take care of ourselves. Our relationship with the youth is symbiotic.

The outcome variables, or dependent variables, that will be used in this study are child behavior and individual student performance on standardized testing taken as a mean. The predictor, or independent variables, will be attendance or nonattendance of preschool programs prior to entering kindergarten. The null hypothesis that attendance of preschool will have no positive or negative effect on students, or no more effect than nonattendance of preschool. My alternative hypothesis is that preschool attendance will correlate with better behavior as well as higher standardized test scores throughout grades K-5.

## 2. Literature Review

Early exposure to educational topics will allow students to have more time to gain hands-on experience with the subject matter and get used to socializing with large groups of peers in their age group. Head start programs will also allow parents and educators to spot any early warning signs that a student might be exhibiting prior to

entering school officially (Gorman). In essence, it is a way to work out the "kinks" in a student's learning habits before they begin in earnest.

*2.1 Variation in pre-K programs*

Currently, the three main types of pre-K educational programs are child care, state pre-K, Head Start programs, and special education preschool programs. Currently, these programs are the most heavily funded by state and federal governments. Roughly 75% of all four-year-olds are currently in preschool of some sort, while 50% of three year olds are in some type of pre-K educational program. Of these, roughly 50% of four year olds and 20% of three year olds are attending public pre-K programs, and 35% of both three and four year olds are in private school programs. Furthermore, 11% of four year olds and 8% of three year olds are attending federal preschools.

Funding for Head Start and other types of preschooling programs by the federal government has been extensive. In the 2006-7 schoolyear, for example, the federal government allocated a little bit over 3.7 billion dollars to fund preschool programs across the United States. In addition, many local, privately-funded educational agencies contributed extensively to pre-K funding throughout the United States during the same time period. Currently, enrollment in preschool is not universal, but many states are working on passing legislation that would make preschool enrollment mandatory or at least free of charge to parents. This would likely greatly boost enrollment in such programs.

The quality of these programs varies depending on their operating schedules, teacher qualifications, class size/demographics, community outreach, and actual teaching practices. Because pre-K education assumes such a wide range of educational options, there are some programs which have instructors that have only a high school diploma, while others feature classrooms that are led by educators who possess four-year or even advanced educational degrees. Because of the wide degree of variation in pre-K programs, there is also great degree of recorded variation in child performance as they emerge from these programs.

Head start programs have shown benefits for students in the long-term. Head start programs for at-risk students in the inner city showed that the ones who attended the programs saw a reduction in dropout rate and crime rate when compared to their peers who did not attend the head start programs. However, studies are still incomplete on head start programs because the program only started in 1965 (Gorman). Thus, only a handful of longitudinal studies on the lifelong effects of these programs have been completed.

*2.2 Effects of pre-K education on cognitive, social, and emotional abilities/dispositions*

However, one longitudinal study found that head start led to greater cognitive abilities in many students tested against their peers who did not attend head start. These gains were usually maintained over time for all students except those who were considered of "low ability." Those students who were given the low ability categorization did not see a reversal in their poor performances, but did see a reduction in poor performance compared to low ability students who did not attend head start programs(Lee, Brooks-Gunn, Schnur&Liaw, 1990). This demonstrates that there is, indeed, a tangible effect from enrolling students in formal education early on.

However, another study contradicted the aforementioned findings regarding the sustainability of gains made from head start. In another longitudinal study, it was found that the gains that students made did not last through the first grade. Clearly, these contradictory findings suggest that more work needs to be done to hammer out the truth about head start programs and others like them (Guernsey, 2010). This will help guide parents on whether or not they should enroll their students into school early, or perhaps even take the education of their children into their own hands to ensure that they are learning what they want them to.

Some research has shown that the attendance of preschool has correlated with a half-standard deviation increase in intelligence for children. This represents a 7 to 8 point boost on IQ tests and can have a substantial impact on a child's employability and success in school in the future (Barnett, 2008). As far as social and emotional health goes, the results have shown smaller impacts for students who attend preschool with a third of a standard deviation increase in both social and emotional health when they go through preschool programs. These gains are seen as substantial because a half standard deviation boost in cognitive abilities is seen as enough to close the gap in educational performance between students in poverty and those not in poverty by half. Longitudinal studies which have tracked the progress of students into adulthood have shown that those students who attended preschool had a greater likelihood of graduating and finding employment in the workforce.

However these longitudinal studies have shown that the attendance of preschool eventually "wears off" on students as they progress into adulthood. The boost in cognitive abilities that children get from attending preschool closes to between a tenth and a fifth of a standard deviation by the time the students reach adulthood, while behavior scores reduce to 0.15 to 0.20 standard deviations. The behavioral patterns were measured by tracking delinquency in school and crime.

Child care services were shown to have the least significant impact on childhood development. Studies have shown that the effects of child care have translated to scant increases in cognitive performance with between 0.10 and 0.15 standard deviations. Furthermore, other studies have shown that attendance of child care

translates to *negative* effects on child behavior over the course of their time in elementary school. Students who attended childcare were more prone to aggression than those who did not, and these effects increased the longer that the child attended child care services. However, as the quality of these child care services increased in relation to more sophisticated methods of instruction and higher-paid employees, these negative behavioral effects are reduced.

However, studies showed positive social effects of child care on communities. Child care allows women to attain employment, as they leave responsibility of raising their children in the hands of a third party. This allows them to earn income which reduces the strain on social services and helps contribute to GDP and the economy. However, researchers also noted that this time spent away from children might have a negative long-run impact on a child's emotional health since they are spending more time away from their mothers.

Long term impacts on attendance of Head Start showed a great degree in variability in their effect on cognitive performance in attendees. There was between a 0.05 and 0.25 standard deviation increase in intelligence for students who attended head start, which translates into a more or less negligible impact or a boost in 3-4 points on IQ scores for those who are most positively affected by their Head Start experience. However, unlike child care programs, the attendance of Head Start translated to a reduction or non-impact on behavioral and social issues for students. Students who were affected by their Head Start experience saw a 0.13 to 0.18 standard deviation *decrease* in hyperactivity.

Head Start proved to lead to boosts in school performance, with a 0.32 standard deviation increase on vocabulary, and a 0.33 to 0.55 standard deviation increase in mathematics scores for those students who attended. However, the experiments that studied these impacts were in Head Start programs that had well-educated and highly paid teachers relative to other programs around the country, which indicates that the students may have benefited from a uniquely high-quality program and that you can correlate student performance with teacher education and salary (Barnett, 2008).

*2.3 Impacts of pre-K education by demographic*

Other long term effects of Head Start were high school graduation and arrests. White children who attended Head Start had a 22% higher high school graduation rate than students who did not, while Black children who attended head start saw a 12% reduction in arrest rate when compared to those who did not. This demonstrates that Head Start attendance has had significant impact on the behavior and educational careers of many students in the United States and is worth maintaining (Barnett, 2008).

Attendance from preschool and Head Start programs have translated to "modest" gains for students from middle class families, while those students who come from poorer families experience between two and three times the benefit that their middle-class counterparts did. What this suggests is that pre-K programs play a substantial role in closing the education gap between students from varying social classes in the United States. However, data also showed that middle school, white children actually *suffered* in terms of social skills after attending pre-K programs. This follows closely with data observed that indicates that child care programs lead to negative effects on child socialization. Middle class, white children who attend preschools are more likely to be averse to sharing, cooperation, and engagement in class.

English-speaking Hispanic students, on the other hand, saw great social benefits from attending preschool as well as the strongest cognitive benefits of any other racial group in the United States. These gains were attributed to "stronger socialization practices" that are present in Hispanic homes (Maclay, 2005).

## 3. Methods

The participants in this research will be 200 children in the state of Michigan who will be followed in an experimental longitudinal study over the course of their first ten years of life. The participants' parents will be approached upon the birth of the child and be asked whether or not they would like to commit their child to the participation in a study. They will then be followed up and checked to see whether or not they attend preschool or not. The academic career of these children will then be followed up to the fifth grade to see whether or not preschool or head start program attendance had any effect on their educational achievement. The population will consist of Caucasian-Americans, African-Americans, and Latino-Americans. Ideally, there will be a control group of 100 children who do not attend any form of pre-schooling and 100 children who do.

*3.1 Instruments*

The instruments that will be used in this experiment will be standardized tests administered by the State, as well as their performance on in-class assignments and tests. The standardized test will be the Michigan Educational Assessment Program (MEAP), which is administered every year to all students in the state of Michigan. This test is the only standardized test given to elementary school students, and so it will provide the researchers with data regarding what the students are learning according to the academic standards set by the state of Michigan. I believe that this is an appropriate tool to use because it is intimately tied to the administration of the schools that students attend, as many administrative jobs are evaluated by how students perform on these tests. The administration of each school has a big incentive to make sure students do well on

these tests, so they will likely be an accurate measure of student potential. These standardized tests also can eliminate teacher or administrative bias when measuring a child's achievement. The depth and difficulty of in-class work may vary from class to class or school to school, so they might not be reliable indicators of student abilities.

Furthermore, in-class assignments will help gauge a student's behavior and intellectual capabilities. They will also provide researchers with far more data, as the MEAP test is only administered once a year, while the in-class work that a student performs determines whether or not they pass into the next grade, as well as provides researchers with a gauge as to how well they take directions and apply what they have learned from instructors.

*3.2 Materials*

The materials used for this research study will be the course materials provided by the schools and teachers with which the students conduct their work. Their work will be tabulated into a Microsoft Excel spreadsheet in order to track progress and develop statistics for. This will require a PC, Microsoft Office software, and a room to keep the computer in. In addition, paper, a printer, and writing utensils would also be useful.

*3.3 Design*

This experiment will proceed in an experimental, qualitative fashion. The students will be judged according to recorded data acquired from their school administrators and the state of Michigan. These numbers will then be analyzed and compared to the control, non-preschool going group in order to determine whether or not one group scored higher than the other. The data will be compared based on the numerical tally of scores and grades on standardized test scores and in-class work. The number of disciplinary actions on a student, such as written referrals and suspensions, will all be taken into account when evaluating the student's all-around performance in school.

*3.4 Data collection methods*

Data will be collected as the students progress through school. Data regarding academic performance as it relates to their performance on standardized tests, passage to the next grade level, and the number of times they are given official reprimand by the school will be the variables compared to attendance of preschool. These variables regarding standardized test performance, grade passage, and administrative behavioral reports were chosen because I believe that they are accurate reflections of academic performance and behavioral adjustment. Furthermore, I believe that this is a reasonable number of variables to compare and will not overcomplicate the process or lower significance with too many variables. Whether or not these positive or negative behaviors are found with greater frequency in either preschool-attended or no preschool-attended groups will be what this study seeks to find out.

To collect data, I will first seek permission from school administrators to obtain academic and behavioral records for the purpose of this study. After I collect the data in either paper or electronic form, I will then take the mean and median test scores for both the preschool-attended group and non-preschool-attended group. This data collection will be done once a year up to the fifth grade. The mean and median data will for variables for standardized test scores, grade passage, and behavioral write-ups will then be compiled and compared against the over-arching variable of preschool attendance. I will then use this data to determine whether or not the experimental or control group outperformed the other based on my criteria. Parents and schools will also need to be willing to disclose data regarding racial and socioeconomic indicators in order to control for these variables in the study, as they could lead to serious effects on the results if they are not controlled for.

*3.5 Data analysis*

Because I will not have the privilege of random sampling for this study, I will need to perform a single variable, quasi-experimental, nonequivalent control group design. This form of experimental study design calls for subjecting already-existing groups to a treatment. In this case, the treatment will have been administered based on whether or not the students went to preschool, so it is not the experimenter who is directly administering the treatment, rather he is just observing performance and behavior to draw conclusions. In order to control for extraneous variables, the results of this study will undergo an analysis of covariance to reduce their significance.

Unfortunately, this study design is susceptible to some internal and external threats. The internal threats are those of mortality, history, maturation, and statistical regression. Because this is a longitudinal study, it is highly likely that the control and experimental group will exhibit some of these internal validity threats. In addition, reactive arrangements might pose an external threat to validity, as the students and their parents might act differently if they know that they are under study.

Data will be analyzed over the years based on the academic and behavioral performance of the experimental and control groups calculated as a mean. For example, I will add up the scores on the MEAP test within both groups then find the means and compare them. The group with the higher mean will be considered as having outperformed the other group. Similarly, I will add up the official behavioral write-ups given to each

group of students, find the means, and make a judgment based on those values. The group with the higher number of write-ups will be considered as being less well-behaved than the other group. These data should allow me to draw reasonable conclusions about both academic performance and social/behavioral adjustment.

The analysis will be conducted by analyzing the mean and median test scores, grade point averages, and disciplinary actions of the 100 students in both the control and the experimental groups. The group with the higher mean and median test scores and grade point averages will be considered academically superior to the other group as a whole. The group with the lower mean and median disciplinary action taken against them will also be considered to be higher performing. In addition, the researcher will observe whether or not there is any correlation between test scores, grade point average, and behavior in the student populations. Any anomalies will also be reported to demonstrate that there are deviations outside the mean and median when it comes to the information obtained.

*3.6 Limitations*

This experiment will begin when the children enter preschool or kindergarten and end when they graduate from the fifth grade. This will translate to about eleven years of time over which this experiment will occur, as we will request permission to use the children in this experiment upon the birth of that child. This will allow us to examine the progression of students and interview students, parents, and administrators over the years to gain a better understanding of our experiment's subjects.

The estimated budget for this experiment will be about $50,000 over the eleven years, mostly in the form of salary for the researchers. Some budget will be allocated toward the purchase of a computer, software, stationary, and writing utensils as well. The researchers should be paid about 5000 USD per year for their participation in this study.

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