**PFI Survey Data**

The data used for this project was taken from the 2019 Parent and Family Involvement in Education (PFI) survey conducted by the National Household Education Surveys Program (NHES). The NHES focuses on three main topics: young children’s care and education before school, parents’ involvement in their children’s education, and homeschooling. [1]

This survey reflects these topics, as it was sent to households with children younger than 20 and enrolled in kindergarten through 12th grade. The survey targeted children in English or Spanish speaking households in the United States of America. It asked questions about the various aspects of parent involvement with the education of their children, and the corresponding children’s academic success. 205,000 households were selected to participate in the survey, and of that amount there is a total of 15,500 responses recorded in the data set provided for this project. These responses come from households screened by the NHES to ensure that the recipients of the survey were representative of the target population of children.

The collection period of data extended from January 2019 to September 2019. Notably this is during the COVID-19 pandemic, which influenced the performance of students to varying degrees and popularized digital schooling for the entirety of the year.

**Characteristics of the PFI Survey Data**

For the purposes of this project, the data set was curated such that home-schooled children are not included to focus on the effects that parental involvement has on children attending institutional schools. Further, the NHES claims that their surveys “includes an oversample of Blacks and Hispanics to increase the reliability of information on these populations” [2]. Nevertheless, Figure 1 shows that most of the children included in the data set are White.

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Figure 1: *Race Distribution of Children Surveyed*

The majority of families in the sample have had a total household income of less than $100,000 in the past 12 months, nevertheless the income bracket with the most representation is the $100,000 - $150,000 range (Fig 2) with a count of 2,834 households. The household counts for incomes between $20,000 - $50,000 appears steady, with most brackets in that range having approximately 1,000 counts. The difference between the counts of these brackets and the brackets between $60,000 - $200,000 may be due to the increase in sizes of each subsequent bracket range. Having a larger bracket will naturally increase the number of counts. Nevertheless, the reported median household income in the United States in 2019 is $68,703, while the median of the PFI survey data lies in the $75,000 - $100,000 range. This may indicate that the sample for the survey included a wealthier part of the U.S., or suggest that households with children tend to have higher incomes than households without.

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Figure 2: *Income Distribution of Households*

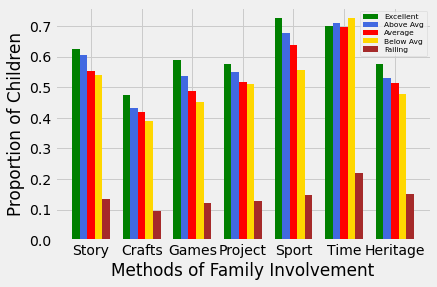
**Relations Between Student Characteristics and Indicators of Academic Status**

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| Chart, bar chart  Description automatically generated  Figure 3A: *Proportion of Student Overall Grades Sorted by Gender* | Chart, waterfall chart  Description automatically generated  Figure 3B: *Proportion of Male and Female Who Attend Public Schools* |
| Chart, bar chart  Description automatically generated  Figure 3C: *Overall Grades of Students Sorted by Number of Siblings* | Chart, bar chart  Description automatically generated  Figure 3D: *Proportion of Students Enrolled in Public Schools Sorted by Number of Siblings* |

Of the many student characteristics recorded in the dataset, I chose to focus on the Gender of the student and the Number of Siblings they have. The motivation for choosing to look gender as independent variables is because a study posted on nbc news claims that “Girls get better grades than boys,” voicing a common gender stereotype [4]. It follows then, that for indicators of academic status I chose to look at overall School Grades across all subjects. As for considering the number of siblings, it seems logical that parents who have to divide their efforts between more children would have a harder time propelling the academic success of the particular child included in the survey data. I decided to group students with three or more siblings together because they make up a smaller proportion of the data. Another indicator I chose to look at was whether the child attends a Public or Private school, because private schools tend to be much more expensive than public schools, which might discourage parents with many children from sending their children to private schools.

The data shows support for the stereotype that girls have higher overall grades than boys. As seen in Figure 3A, the proportion of girls with A’s is more than 10% higher than the proportion of boys with A’s. Proportions were used in this measure instead of counts because there were more boys (8,055) than girls (7,445) recorded in the sample. The actual counts in the survey for students who had an overall grade of A are 4,188 for girls and 3,431 for boys. Despite having less girls in the sample, there are many more girls with A’s than boys.

Contrary to expectations, the data suggests that students with no siblings do not actually do better than sutdents with siblings. Figure 3C shows that the highest proportion of students with an A is that of students with one sibling. In fact, single child students have the smallest proportion of students with an A in this sample. In terms of

counts, however, of the students that have an overall grade of A, 3,548 have one sibling, 2,132 have no siblings, 1,426 have two siblings, and 513 have three or more siblings. The high amount of A students who only have one sibling may be due to the larger sample of students with one sibling (5,923) compared to students with no siblings (4,188), two siblings (2,480), or more than three siblings (942). Nevertheless, the proportions shown in Figure 3C suggest that having siblings might be better for the overall grades of students.

Considering the eveness of the bars in Figures 3B and 3D, it appears that the proportion of students who attend public schools is not strongly affected by either gender or the number of siblings that the student has. This correlation might also show up because the number of students in the data set who attend public schools is much greater than the number of students who do not. Of the 155,000 students in the survey, only 1,718 of them go to non-public schools, which is a mere 1.1%. Thus, there is likely to be little variation when looking at gender or number of siblings simply because the sample of students who go to non-public schools is too small.

**Comparing Parental Involvement with Parental Viewpoints**

For this portion of the project I compared how parents describe their children’s work at school with various potential ways that parents can be involved with their children. The question posed to parents was: “How would you describe [your child’s] work at school?” They could answer in one of five ways: “Excellent, Above Average, Average, Below Average, Failing. I considered this an important variable because it relies completely on the subjectivity of parents, and how involved parents are with their children is (oftentimes) up to the parents as well. Activities used to measure parental involvement were answered in the positive if they were done with the child in the past week, and can be categorized by the labels on the x-axis of Figure 4. For clarification, the story told to the child cannot be read, project refers to buildling, making, or fixing something, and time refers to discussing time management.

Figure 4:

*Proportion of Children who do Activities with Their Parents, Sorted by Parent’s Rating of Child’s Work at School*

In every category other than time, there is a correlation between how parents rate their children’s performance at school and whether they participate in activities with their children. Parents who rate their children’s performance positively are also more likely to be parents who spend time participating in activies with their children. The difference in proportion in these categories is particularly noteworthy between children who are rated as ‘Excellent’ and ‘Above Average’ because the total counts in the data set of these children respectively are 5,234 and 5,209. This is only a 25 children difference, but the difference between the proportions of parents who engage in the activity with their child is 2%-6% higher in every category other than time. Even more stark is the low percentage of parental involvement with children who’s parents evaluate them as ‘Failing’. In each category the bar for ‘Failing’ students is more than 25% lower than for ‘Below Avg’ students. These patterns suggests that parental involvement with their children affects how those parents perceive the success of their children in school, especially if the parents are less involved with their children.

The outlying category in Figure 4 is time, which refers to discussions between parents and their children concerning time management. This makes sense, however, because parents who perceive their children as not doing well in school are probably more likely to discuss how to better manage time with their children. This is evidenced in Figure 4 by the largest proportion bar for students evaluated as ‘Failing’ being in the time category.

**Conclusion and Potential Further Studies**

The data from the 2019 PFI survey strongly suggests that parent involvement is important to the academic success of a child, or at least a parent’s perception of their child’s academic success. This supports the general idea that parents who spend time nurturing their children also give their children needed tools and techniques to excell in their studies. While other attributes of the students, such as race, or of their households, such as how many siblings they have, do affect the grades of the student, these trends are not as consistent as the ones seen for parental involvement.

Nevertheless, this dataset of 155,000 households is not representative of every potential household in the USA, and the observed correlations can only be marked as potential trends. A further study into how the enviornment of a student affects the involvement of their parents could be interesting. It is possible that certain students do well not because their parents spend time on activities with them, but because parents willing to spend time on their children are also willing to spend more money on their children’s education. Furthermore, parent perception of their children’s success and children’s grades were used as measures in this analysis. Schools across the nation hold different standards for their students, and these standards might bleed into the preception parents have of their children. Data not provided for this project that could be enlightning include how much households spend on the education of their children and what the average grade in the school that the child attends is. Another analysis with such data could look for trends between how much money is spent on education and how that reflects a child’s academic success relative to the school that they attend.

Sources Cited:

1. “NHES.” National Household Education Surveys Program (NHES), https://nces.ed.gov/nhes/about.asp.
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4. “Girls Get Better Grades than Boys, Even in STEM Subjects, Study Finds.” NBCNews.com, NBCUniversal News Group, 25 Sept. 2018, https://www.nbcnews.com/health/health-news/girls-get-better-grades-boys-even-stem-subjects-study-finds-n912891.