

Dataset Introduction

The following analysis was conducted on a subset of the data collected by the US Census Bureau for the National Center for Education Statistics in their Parent and Family Involvement in Education (PFI) survey, a survey conducted in order to gather data informing the condition of education in the US [2]. The curated dataset includes 2019 data only, omitting all 2016 data as well as records associated with homeschooled children. The respondents, parents of children in grades K through 12, answered questions regarding their involvement in their child's education, family activities, academic performance, and extracurriculars.

The curated dataset includes the responses from 15,500 surveys and 75 unique variables for each survey. None of these variables are missing a response. However, some variables allow a 'Valid Skip' response. Most variables concerning parent information pertain to a 'first parent' respondent. The goal in the analysis of these variables is to gain insight into parent involvement in student education shortly before the COVID-19 pandemic beginning in 2020. This analysis is meant to provide a baseline for household situations and parent involvement before schools began pandemic-specific remote learning.

Household Income, Employment, and Structure

Total household income over the past 12 months was recorded in this survey. Among the 15,500 households surveyed, about 23% made less than \$40K, about 36% made between \$40K and \$100K, and about 41% made more than \$100K in the past year. Figure 1 shows that the greatest proportion of surveyed households made between \$100K and \$150K in 2019. In addition, Figure 1 shows that a greater total proportion of households made more than \$60K in 2019 than made less than \$60K. Based on

ranges, household size, and the 2019 Poverty Guidelines from the US Census Bureau [1], an estimated 13.5% of surveyed households live below the Federal Poverty Level (FPL).

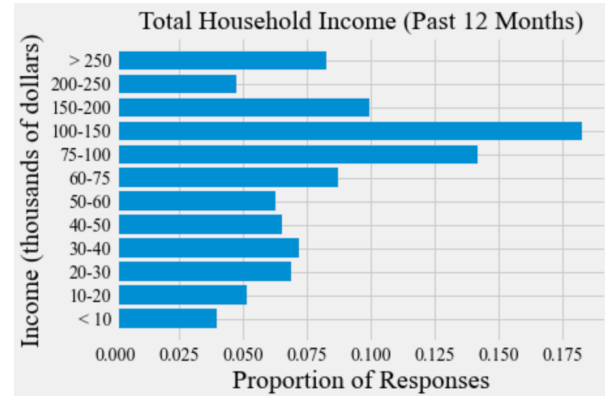


Fig. 1: Proportion of households by income

	Below FPL	Above FPL
Unemployment Rate	0.09	0.02
Single Parent Rate	0.56	0.22
Non-Parent Guardian Rate	0.09	0.03

Fig. 2: Unemployment rate, single parent rate, and non-parent guardian rate of households by FPL

Figure 2 indicates that the proportions of surveyed households below the FPL with at least one unemployed parent, a single parent, or a non-parent guardian are higher than those above the FPL. Of the 15,500 surveys, roughly 2% of 'first parent' respondents estimated to be above the FPL identified as 'Unemployed or out of work'. Of households below the FPL, 9% had at least one unemployed parent. Among survey respondents above the FPL, about 22% identified as single parents (no second parent living in the household). Of households living below the FPL, about 56% of respondents identified as a single parent. 3% of respondents living over the FPL identified the structure of the household as having a non-parent guardian, while 9% of respondents living under the FPL identified this same structure.

Further analysis shows that the unemployment rate for households making less than \$40K in the past year is 7.2%. This rate falls to 2.5% for households making between \$40K and \$100K. For those making more than \$100K in the past year, the unemployment rate is only 1%. Thus, household incomes are negatively correlated with unemployment rates in this dataset.

In addition, students living in households making less than \$40K in the past year attend public school at a rate of 93.5%, while students in households making between \$40K and \$100K attend public school at a rate of 91.5%. The dataset excludes homeschooled students, so non-public school students likely attend private schools. For students in households making more than \$100K, the rate of public school attendance falls to 84.1%. For families in this dataset, a lower household income is correlated with a higher rate of public school attendance.

Relationship Between Household and Grades

Figure 3 shows the relative frequency of student grades based on the first parent's employment status. From Figure 3, it can be observed that the frequency of A grades is higher for students living in households where the guardian is employed or self-employed versus in households where the guardian is unemployed. The frequencies of B, C, and D grades of students in households where at least one guardian is unemployed are greater than those of students in households where at least one guardian is employed.

	Unemployed	Employed/Self-Employed
Mostly A's	0.48	0.58
Mostly B's	0.36	0.31
Mostly C's	0.12	0.09
Mostly D's	0.04	0.02

Fig 3: Grades by guardian employment status

Figure 4 shows the relative frequency of student grades based on whether or not the respondent is a single parent. The frequency of A grades is lower for students in single parent households than for students in non-single parent households. The frequencies of B, C, and D grades of students in households with a single parent are greater than those of students in households without a single parent.

	Single	Not Single
Mostly A's	0.44	0.61
Mostly B's	0.38	0.30
Mostly C's	0.14	0.08
Mostly D's	0.03	0.01

Fig. 4: Grades by number of guardians

Figure 5 shows the relative frequency of student grades based on whether or not a student's guardian is a parent or not. From Figure 5, it can be seen that the frequency of A grades is higher among students with a parent guardian than among students with a non-parent guardian. The frequencies of B, C, and D grades of students in households with a non-parent guardian are greater than those of students in households with a parent guardian.

	Non-Parent Guardian	Parent Guardian
Mostly A's	0.34	0.57
Mostly B's	0.40	0.32
Mostly C's	0.21	0.09
Mostly D's	0.05	0.02

Fig 5: Grades by type of guardian

Figure 6 shows the relative frequency of student grades based on household relation to the FPL. The frequency of A grades is higher for students in households at or above the FPL and lower for students living under the FPL. The frequencies of B, C, and D grades of students in households living under the FPL are greater than those of students living at or above the FPL.

	Under FPL	At or Over FPL
Mostly A's	0.38	0.59
Mostly B's	0.42	0.31
Mostly C's	0.16	0.09
Mostly D's	0.04	0.01

Fig 6: Grades by household relation to FPL

The grade trends seen in Figures 3 through 6 show a decrease in the frequency of A grades for students with an unemployed guardian versus an employed guardian, for students living with one guardians versus multiple, for students living with a non-parent guardian versus a parent guardian, and for students living below the FPL versus above. These observations may imply that students under these conditions face additional stresses, responsibilities, or distractions which in turn affect their ability to earn high grades. However, additional survey data from the student point of view would be necessary to more definitively link higher student distraction, responsibility, and stress levels to lower grades.

Family Involvement, Grades, and Student Enjoyment of School

Figure 7 shows a slight positive correlation between the number of family dinners in the past week and frequency of A grades. It also shows a slightly negative correlation between number of family dinners and frequency of B, C, and D grades, implying that as families have more dinners together per week, the rate of A grades increases, while the rates of B, C, and D grades decrease, thus implying that quality family time contributes to student academic success.

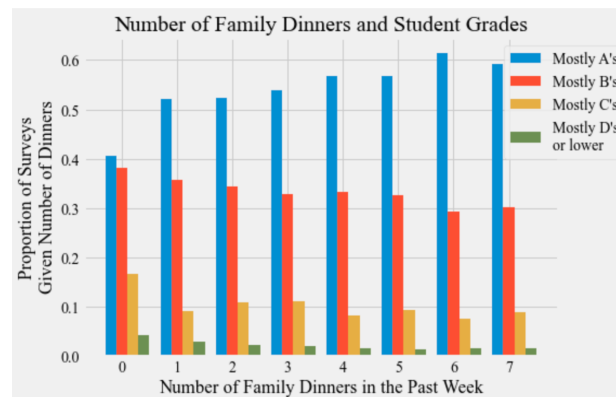


Fig. 7: Family dinners and grades

In addition, the frequency of A grades among students whose parents attend school events is 60.2%, while the frequency of A grades among students whose parents do not attend school events is 42.1%. The frequencies of B, C, and D grades are lower for students whose parents attend school events than for students whose parents do not attend school events. These frequencies for B, C, and D grades decrease from 37.1% to 30.9%, from 16.5% to 7.7%, and from 4.3% to 1.2% respectively. Thus, students with a parent who attends school events have a higher rate of A grades, implying that parent attendance of school events positively correlates with academic success.

Among survey respondents, 90.4% of those who attend school events identified that their student enjoys school, while only 81.7% of survey respondents who do not attend school events identified student enjoyment. Likewise, as the surveyed number of family dinners in the past week increases from 0 to 7, the proportion of students who enjoy school increases steadily from 77.5% to 91.2%. This trend mirrors that seen in Figure 7 in which the rate of A grades increases with the number of family dinners. As the number of family dinners increases, both student grades and enjoyment of school increase. Based on these variables, there appears to be a positive correlation between parent involvement and student enjoyment of school.

Shifts in Education During COVID-19

The analysis of this dataset provides a pre-COVID-19 baseline for the correlation between household situations and student success. Household situation includes a student's household structure, household income, guardian employment status, relation to the FPL, and parental involvement in education. Student success can be measured using many different factors, but this analysis focuses on student grades and enjoyment of their education.

COVID-19 introduced a number of challenges to education as schools moved into student households. With this shift came struggles associated with providing equal access to virtual learning. In a 2020 article for Pew Research Center, Emily A. Vogels addressed growing concern about the ability for low income students to access and afford online resources necessary for remote education [3]. Vogels' article pointed to the already present "homework gap"—a divide created between students with and without reliable internet access—as a barrier to low income student learning [3]. This disadvantage could help to explain the finding in this report that students who come from economically disadvantaged households appear to have lower academic success and enjoyment from school than their peers. When schools moved online, all schoolwork became homework and thus the "homework gap" widened to form an "education gap."

The COVID-19 pandemic also increased pressure for parental involvement in child education. As the pandemic brought parents and students into close proximity, parents naturally became an educational resource, especially for younger children. This report suggests that parental involvement positively correlates with increased academic achievement and enjoyment, leading to questions about whether the pandemic created an increased reliance on parental involvement in student education.

Conclusion

In conclusion, these findings suggest that students in 2019 with low household income, guardian unemployment, a single guardian, or who live below the FPL are less likely to achieve high grades. Analysis of parental involvement, measured in guardian attendance of school events and number of family dinners per week, suggests that increased parental involvement implies higher grades. Thus, this report identifies a positive correlation between parental involvement and student achievement and enjoyment in school as well as a positive correlation between household economic status and these same measures of student success.

Further implications of this analysis arise with regard to the COVID-19 pandemic. Additional analysis of data collected during remote learning, including updated information about household economic situation, parental involvement, and student success would be beneficial to examine the effect of the pandemic on the importance of parental involvement and household situation to student success.

References

- [1] "2019 Poverty Guidelines." *ASPE*, U.S. Department of Health and Human Services, 2019, <https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines/prior-hhs-poverty-guidelines-federal-register-references/2019-poverty-guidelines>.
- [2] Hanson, Rachel, and Chris Pugliese. "Parent and Family Involvement in Education: 2019." *NCES*, NCES, 29 July 2020, <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2020076>.
- [3] Vogels, Emily A. "59% Of U.S. Parents with Lower Incomes Say Their Child May Face Digital Obstacles in Schoolwork." *Pew Research Center*, Pew Research Center, 10 Sept. 2020, <https://www.pewresearch.org/fact-tank/2020/09/10/59-of-u-s-parents-with-lower-incomes-say-their-child-may-face-digital-obstacles-in-schoolwork/>.