What determines a student’s success?

In this project, I would like to analyze the various factors that play a role in determining a student's grades. Whether it be parents education level to drinking levels, which factor seem to have the largest impact on a student's success?

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Here is a list of the variables that I worked with from the dataset.

Relevant Variables

AGE - student's age (numeric: from 15 to 22)
SEX - student's sex (binary: 'F' - female or 'M' - male)
FEDU - father's education (numeric: 0 - none, 1 - primary education (4th grade), 2 – 5th to 9th grade, 3 – secondary education or 4 – higher education)
MEDU - mother's education (numeric: 0 - none, 1 - primary education (4th grade), 2 – 5th to 9th grade, 3 – secondary education or 4 – higher education)
AVG PARENT EDUCATION - Average of Parents cumulative education level
STUDYTIME - weekly study time (numeric: 1 - <2 hours, 2 - 2 to 5 hours, 3 - 5 to 10 hours, or 4 - >10 hours)
FAILURES - number of past class failures (numeric: n if 1<=n<3, else 4)
ACTIVITIES - extra-curricular activities (binary: yes or no)
DALC - workday alcohol consumption (numeric: from 1 - very low to 5 - very high)
WALC - weekend alcohol consumption (numeric: from 1 - very low to 5 - very high)
G1 - first period grade (numeric: from 0 to 20)
G2 - second period grade (numeric: from 0 to 20)
G3 - final grade (numeric: from 0 to 20, output target)

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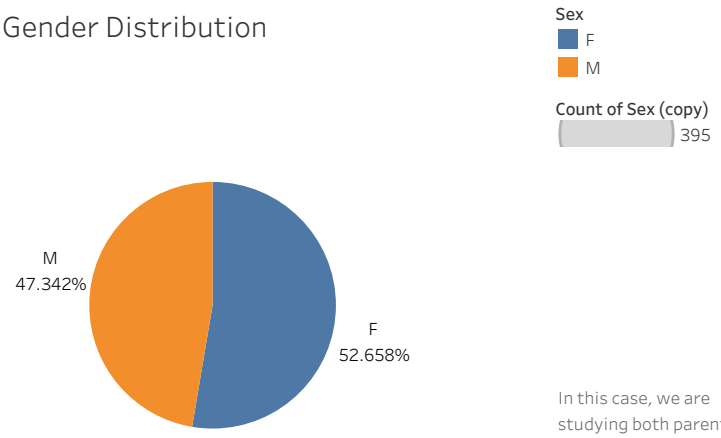
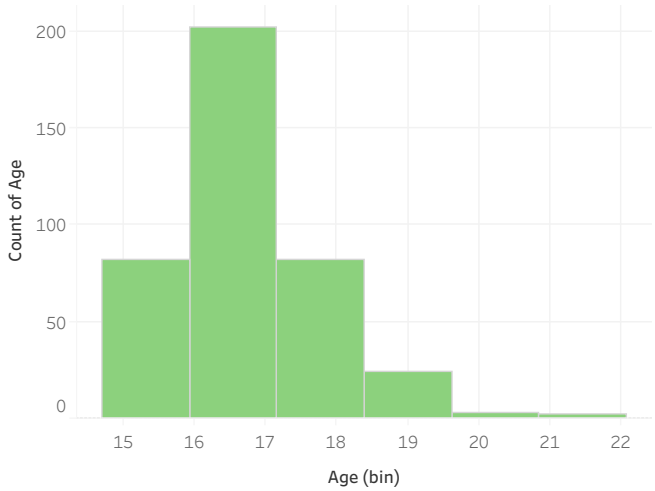
Student Gender Distribution



Student's Age Distribution



In this case, we are studying both parents and students. First let's begin looking at a couple of student statistics. Our dataset is 47.32% male and 52.65% female. As for the distribution of their ages, we have a right skewed distribution curved centered around 16-17. The tail of the curve is at 21-22. Thus we can conclude we are mostly looking at highschoolers getting ready to enter college.

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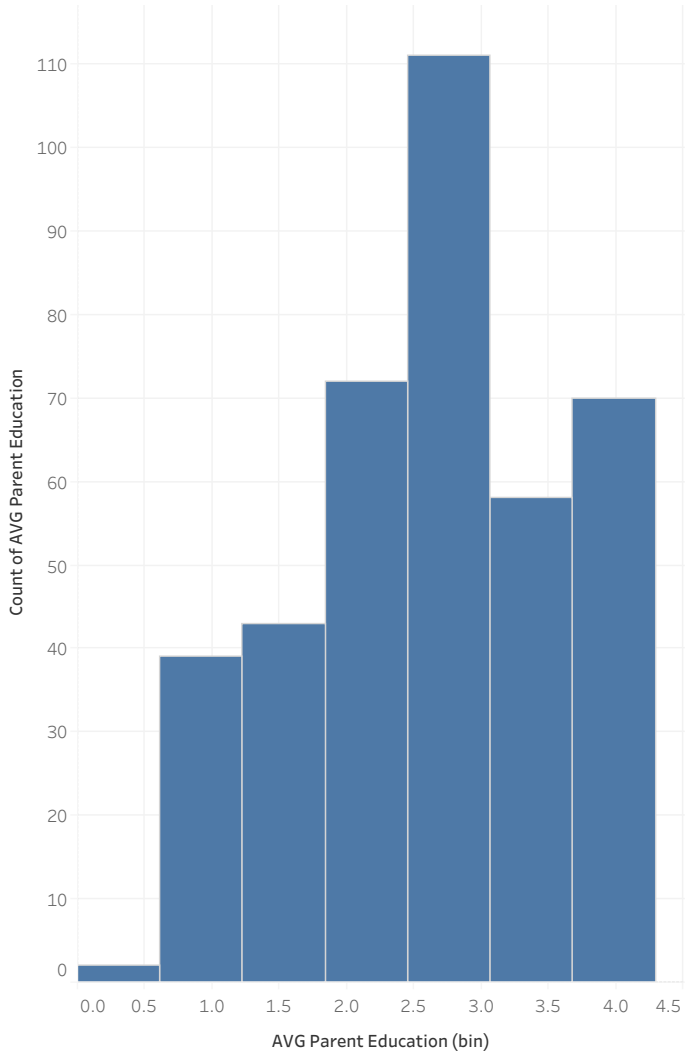
Average Education Level of Both Parents



Another important consideration when looking at the academic performance of students is the education level of their parents. One can assume that students coming from parents that have obtained higher levels of education tend to find more academic success as they generally have more resources to work with.

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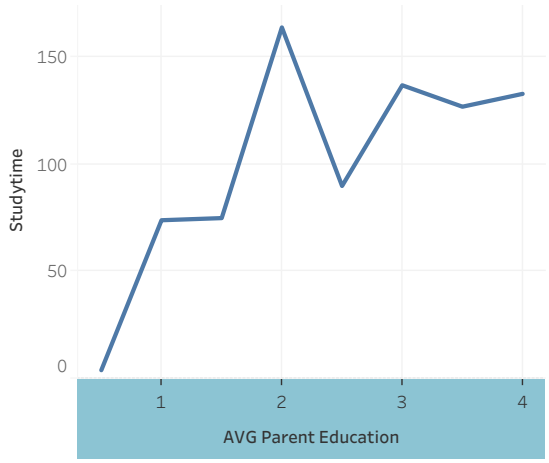
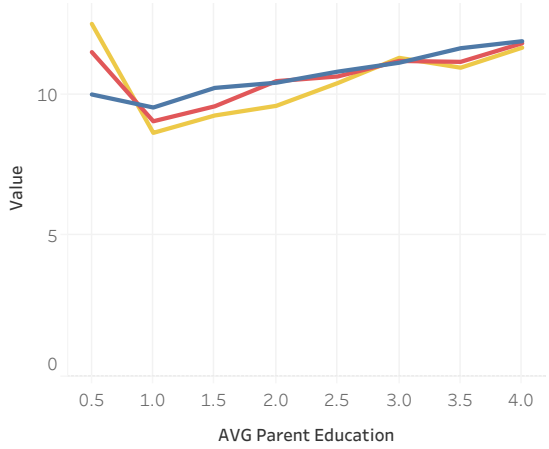
Average Parent Education versus Study Time



Average Parent Education Level vs Grades



Measure Names
- Avg. G1
- Avg. G2
- Avg. G3

We can now begin analyzing whether or not parent's education level has an infllluence on a student's grades. We first look at the Parent Education Level versus Study Time. As we can see, as the Average Parent Education Level increases the study time also increases. This line graph peaks at 2.0 average education level and trails off after.

I would like to conclude that Average Parent Education Level does have an effect up to a certain point. However, once parents have achieved a higher level of education there are other factors that come into play on a student's study time. For example, students from more educated families do not have to study as much as they have certain tools and resources that allow them be more effective during their shorter studying sessions.

Another curious aspect to look at is Average Parent Education Level vs Grades. Similarly to Parent Education Level vs Study Time, these two current factors are positively correlated. On average across all three grading periods, we can see that a student's grades increases with their parent's average education level. There is a curious case to why the peaks for all three grading periods are from students from the parents with lowest educational level.But for the most part, we can conclude that Grades and Parent Educational Level are positively correlated.

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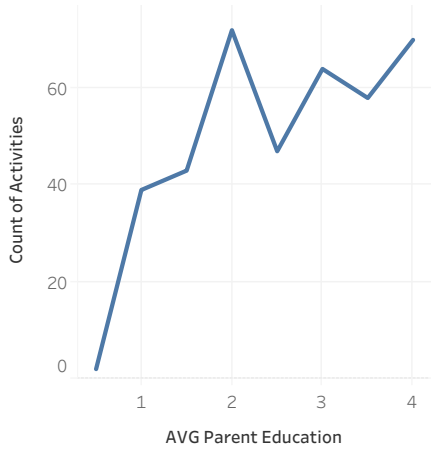
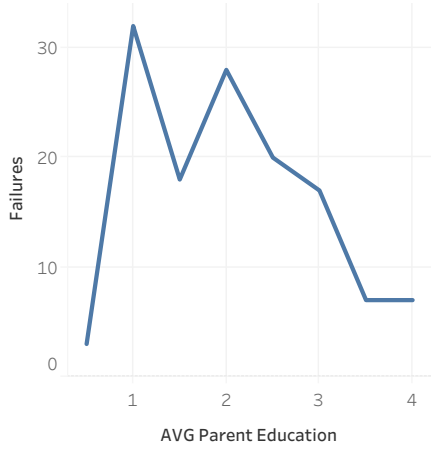
Average Parent Education Level versus Paid Extra Cirriculars



Here are other variables that I compared against Average Parent Education Level. First I compared it against Paid Extra Cirriculars. In this case, we can see that as the Average Parent Education Level increases, Extra Cirriculars increases as well. This makes sense based on the assumption that parents with higher level of education are generally more succesfully and therefore have more money to enroll theor kids in extra cirriculars.

Average Parent Education versus Failures



On the other hand, we can see that Average Parent Education Level and Students Level of Failure is negatively correlated. This graph is relatively intuitive along with our analysis of Parent Education Level vs Grades previously shown. In short, as Average Parent Education Level increases, students' failure level generally decreases.

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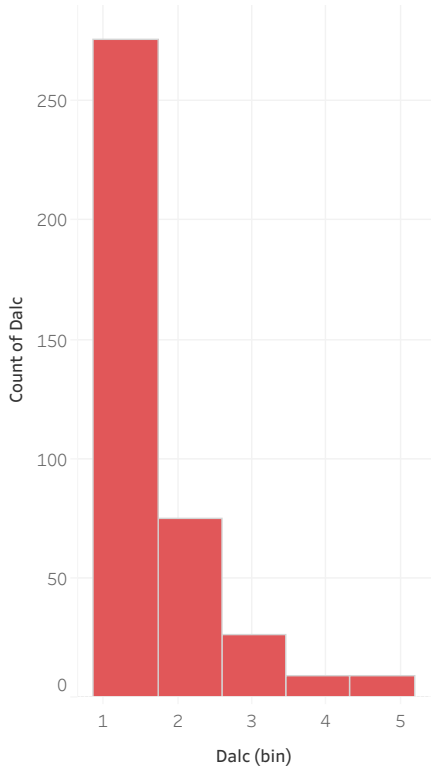
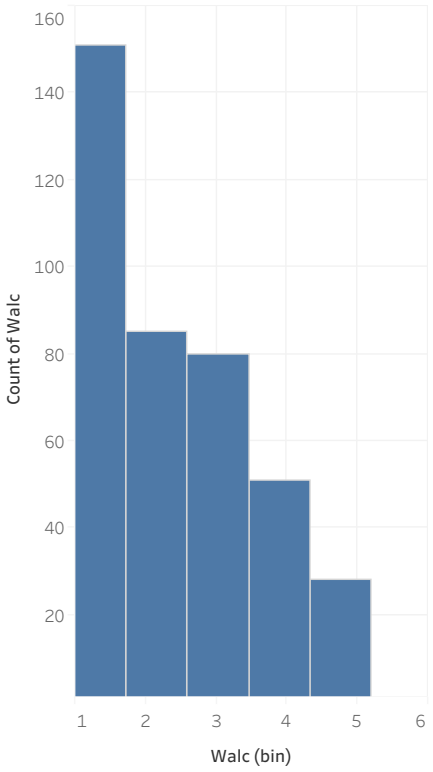
Distribution of Weekday Student Drinkers



Distribution of Weekend Student Drinkers



Now, we can begin looking at the statistics of the students themselves. In this case, we are looking at the difference in distributions between Weekend Drinkers vs Weekday Drinkers. For both of these two distributions, we can see that both of them are skewed to the right with the highest count at 1.0 - 1.5 (very rarely). Although the shapes of the distribtions are relatively the same, their respective counts are more telling of the story. For the weekday distributions, we see that there is a larger count of non-frequent weekday drinkers compared to weekend drinker. This is consistent across all bins.

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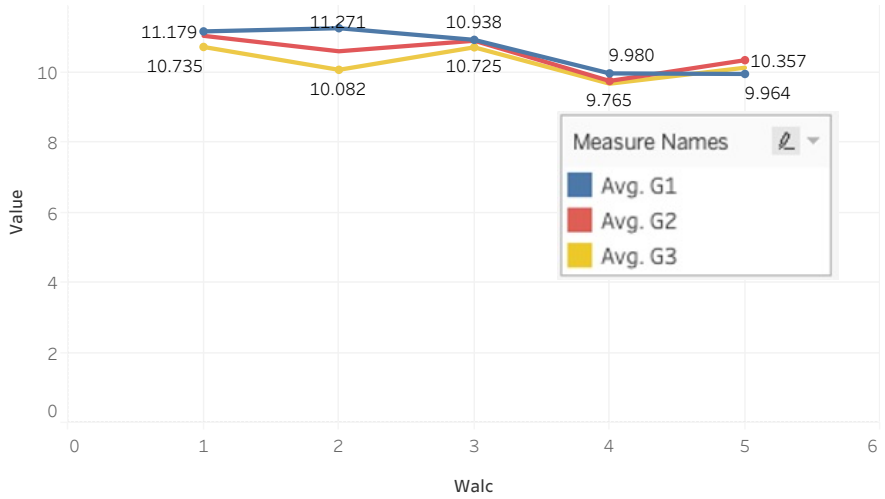
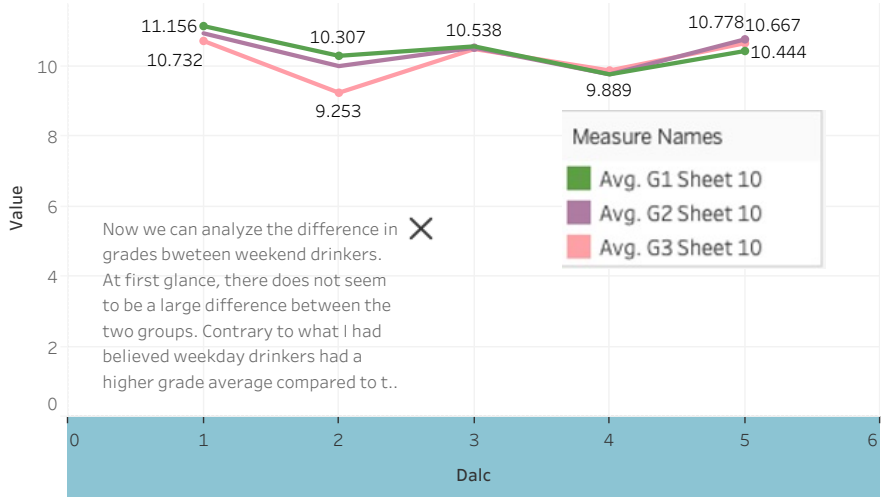
Average Grades for Weekend Drinkers



Average Grades for Weekday Drinkers



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Overall, we can conclude that a student's parent's education level has a greater impact on a students grades compared to drinking levels.

Prior to this project, I had infered that drinking levels would be the greatest influence as that in my mind directly influences how a student performs in school. However, as we can see, there was not a significant difference in grades between the two drinking groups: Weekend Drinkers and Weekday Drinkers.

On the other hand, there were noticeable changes in grades once we compared them to parents' education levels. As we saw earlier, variables such as extra cirriculars, study time, and grades were positvely correlated with parent's education levels. Conversely, failures was negatively correlated with parent's educational levels.

In conclusion based on my analysis, a student's grades and success in school is strongly dictated by their parent's educational level rather than their drinking habits.

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Credits to Mahmoud Shogaa on Kaggle for the dataset