The Relationship of Student Attendance and Student Proficiency in English, Language, and Arts

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Abstract

Introduction

We use data from the Oregon Department of Education (ODE) to examine the following research questions:

- Does attendance rate affect student proficiency in English, Language, and Arts? and;
- Does such a relationship between attendance and proficiency vary for different racial and ethnic groups?

We use data of student attendance rate and student proficiency rate from the ODE assessment group reports for all the schools in the state. We will base our assessment on the latest academic year available for both data sets, which is 2021 – 2022.

Methods

In this research, we ran a regression model on attendance data and proficiency data of schools in Oregon. We obtained two different data sets from the Oregon Department of Education (ODE): attendance rate by school and student group, and proficiency in English, Language, and Arts by student group.

Data description and preparation

We used (R Core Team 2021) package (Müller 2020) to read in the two data sets from Oregon Department of Education (ODE)into the (R Core Team 2021) environment. We use (Firke 2021) to clean the names. After preparing the data sets, we display them as tables using (Wickham et al. 2019).

The first data set is student performance in English Language and Arts (ELA) from all schools in the state. The data set provides the number and percentage of students that are proficient in each of the four levels of ELA proficiency, stratified by school, race and ethnicity, and grade level. This data set has 20046 rows and 20 columns.

The second data set is student attendance data from all the schools in Oregon. This data set provides the number and percentage of regular attenders as well as those of chronically absent students, stratified by school and either race and ethnicity or grade level. This data set has 42295 rows and 11 columns.

We cleaned the two data sets by removing rows with no data and rows with suppressed data, marked as "--" and "*" respectively. We use {dplyr} package functions in (Wickham et al. 2019) to do so.

After cleaning, we merged the two data sets by matching schools' IDs and student race and ethnicity. Rows with attendance data only or proficiency data only will be removed. We used the *left_join* in the {dplyr} and *drop_na* in{tidyr}, all contained in (Wickham et al. 2019).A

Methodological approach

The data sets we obtained from the Oregon Department of Education contain school-level data, broken down by racial and ethnic groups. While the relationship between attendance and student proficiency would be better explained from student-level data, we were not able to obtain data in such format. Therefore, all the data presented here is at the school or institution level.

After cleaning the data, a total of 1086 schools were included in the sample, containing information of the percentage of proficient students and the percentage of regular attendance by race or ethnicity. Six races were identified in the data from ODE: Asian, Black African American, Hispanic/latino, Multi Racial, Pacific Islander and White. Pacific Islander included students identified as having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands and not Hispanic. *Table 1* contains a summary of this information. We used the function *pivot_wider* by student group in (Wickham et al. 2019) package {tidyr} to have columns by race. This is followed by *pivot_longer* and another *pivot_wider* to make the table presentable. We use the *kable* function found in (Xie 2021) to present the results.

The research questions and methodological approach we used to answer each of them are:

RQ1: Does attendance rate affect student proficiency in English, Language, and Arts?

To answer the first research question, we run a linear regression model, using schools' proficiency rate as the dependent variable, and attendance rate as the independent variable. Our regression equation is:

Percent of proficient students = Bo + B1 (Percent of regular attendance) + e

Our hypothesis is that schools with higher student attendance have higher rate of student proficiency in English, Language, and Arts.

RQ2: Does such a relationship between attendance and proficiency vary for different racial and ethnic groups?

Once our hypothesis for the first research question is confirmed, we looked at whether students' racial and ethnic backgrounds had implications on the effect of attendance on student proficiency. In other words, if students have different racial and ethnic backgrounds, would attendance improve proficiency in the same way. Our hypothesis is that schools will see different impacts of attendance on proficiency for different student groups.

Table 1: Summary table

Race/ ethnicity	Percent Chronically absent	Percent proficient
Asian	86.21	64.18
Black African American	50.61	19.60
Hispanic/latino	56.12	26.11
Multi Racial	66.25	51.56
Pacific Islander	36.18	15.99
White	67.28	50.98

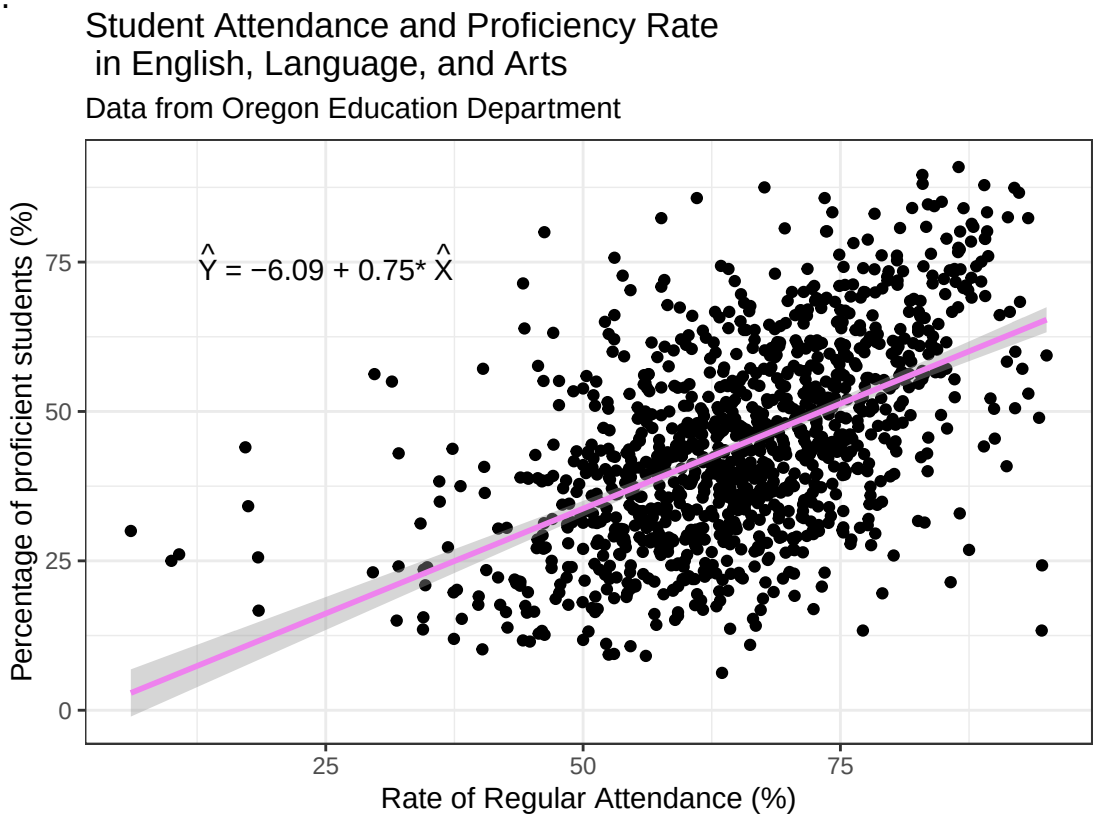
Results

A simple regression analysis was run to examine the relationship between the percentage of regular attenders and the percentage of proficient students in Oregon schools. A total of 1086 Oregon schools with existing data were included in the sample.

Predicted percentage of proficient students = -6.09 + 0.75 (percentage of regular attendance) The results indicated that the percent of regular attendance could statistically significantly predict the percent of proficient students B1=0.75, SE(B1)=0.02, t(2237)=32.5, p<.0001. The results explained that regular attendance accounted for 32% of the explained variability in the percent of proficient students, F (1, 2237) = 1056, p < .0001. The regression equation was:

Percentage of proficient students = -6.09 + 0.75 (Percentage of regular attendance)

Figure 1.



#Summary regression model To interpret our results, we created scatter plots using {ggplot2} of (Wickham et al. 2019). In Plot 1, we plotted the percentage of proficient students based on the rate of regular attendance. In Plot 2 below, we used *facet_wrap* function of {ggplot2} plot the rate of regular attendance by percentage of proficient students based on the race. To answer the second research question, we only included a visual representation of the data, but we didn't fit a regression model. Therefore, we evaluated the data only through a visual assessment.

The relationship as estimated by ordinary-least-squares regression has a slope of 0.753.

Figure 2.

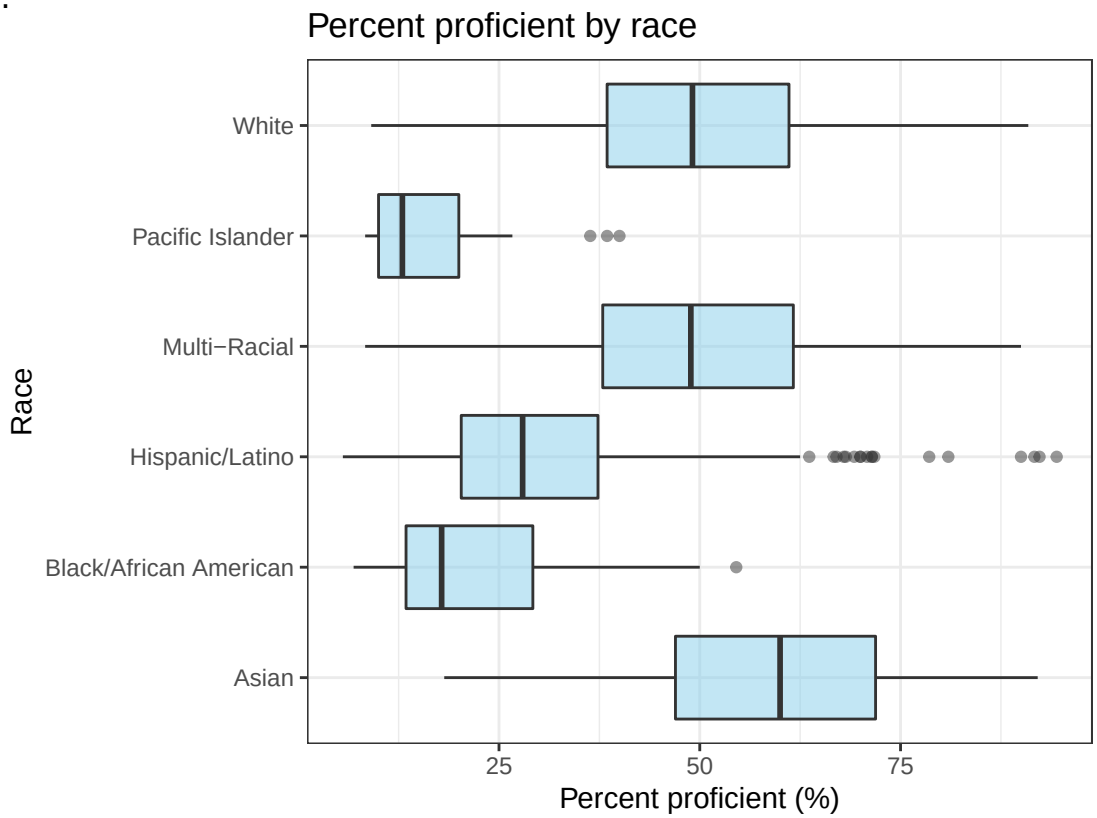

Percent proficient by race
White
Pacific Islander
Multi−Racial
Hispanic/Latino
Black/African American
Asian
Race
25
50
75
Percent proficient (%)

Figure 3.

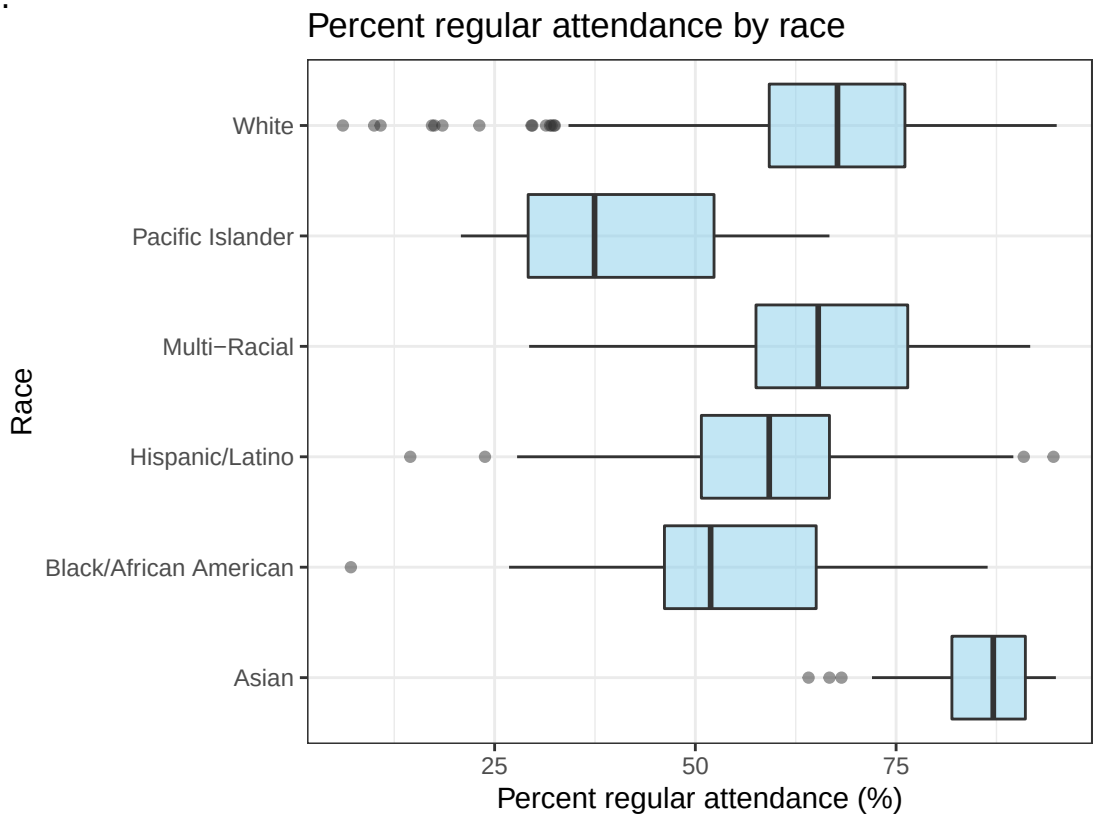
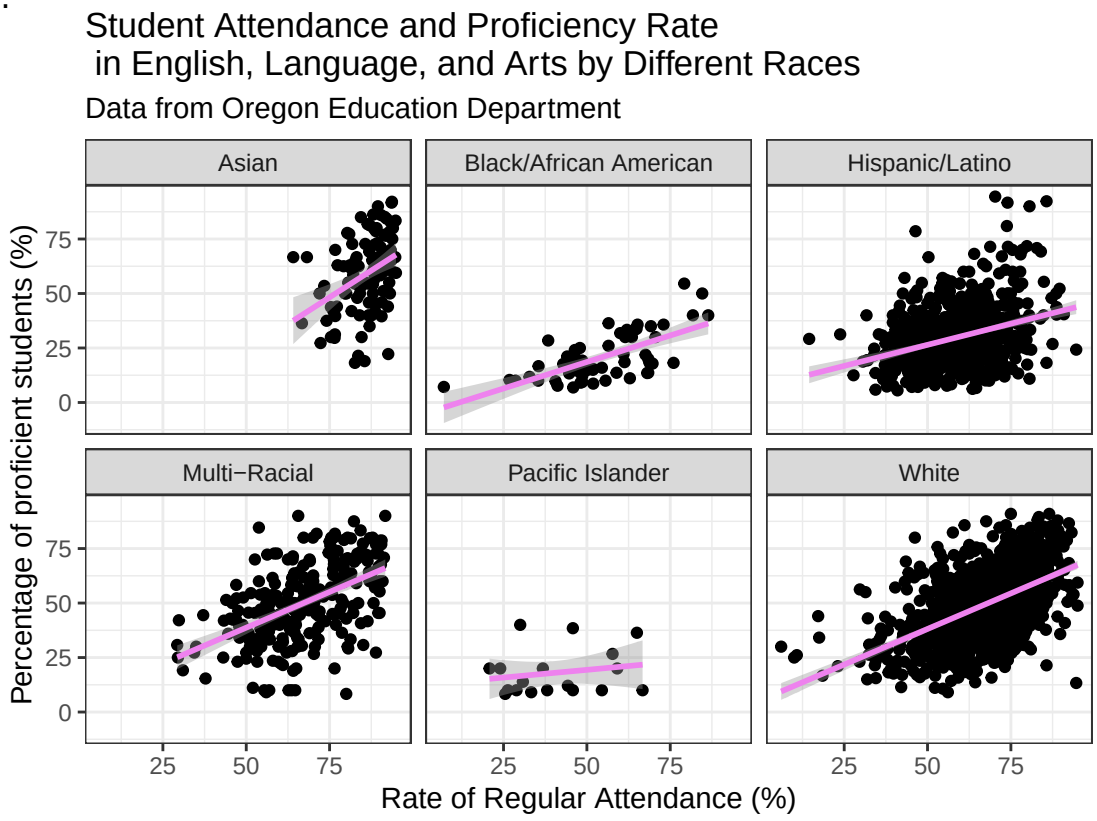

Percent regular attendance by race
White
Pacific Islander
Multi−Racial
Hispanic/Latino
Black/African American
Asian
Race
25
50
75
Percent regular attendance (%)

Figure 4.



Not include

Discussion

Regression and Plot 1

When looking at school-level data, attendance rate and proficiency rate has a positive relationship. Schools with 1% higher attendance rate saw a x% increase in their percentage of proficient students. Our linear model explains . . . % of the data point, with the standard error of. . .

Regression and Plot 2

When faceted by students' racial and ethnic groups, we can see a clear change in the slope of the line. Using White students as the reference group, the Asian group has a steeper slope, suggesting 1% increase in attendance rate results in a higher increase in the rate of proficiency for the Asian group than for the White group. Whereas, the Black/African American group, the Hispanic/Latino group, and the Pacific Islander group had flatter line, suggesting that the positive impact of attendance rate on proficiency rate is weaker for these groups than for their White counterparts.

To explain the varying effect of attendance rate on student proficiency across racial and ethnic groups, we suppose that there are other variables that correlate with racial and ethnic groups and it is those omitted variables, not racial and ethnic groups that have impacts on the relationship between attendance and proficiency. For example, students coming from lower-income households that frequently experience food

insecurity might have anxiety and stress that affect their performance, even when their attendance rates are the same as the reference group. This interpretation suggests that this research could be expanded to include other variables such as household incomes, free school lunch, and parents' education attainment.

Interestingly, all the data points for the Asian group show up in the far right part of their plot, indicating high attendance rate for this group of students - above 60% in all the schools we looked at. Contradictingly, the Pacific Islander group had the lowest attendance - below 70% across all schools.

Conclusion

Based on data of Oregon schools in the 2021-2022 academic year, our model predicts that for every 1% increase in attendance rate, schools will see an additional 0.75% in their percentage of students that are proficient in English, Language, and Arts, and the relationship is statistically significant. Our model suggest that a reasonable measure schools can use to improve proficiency rate is to encourage students to attend class more regularly. Policies such as offering free school lunch, addressing bullying, and providing teachers with diversity, equity, and inclusion training have the potential to improve attendance, and should be considered as schools attempt to improve student proficiency.

Our research also preliminary looked at how the relationship between attendance and proficiency varies across student racial and ethnic groups. While our visual exploration suggests the relationship does vary, additional research is needed to confirm this hypothesis and identify the relationship patterns.

References

Firke, Sam. 2021. *Janitor: Simple Tools for Examining and Cleaning Dirty Data.* https://CRAN.R-project.org/package=janitor.

Müller, Kirill. 2020. *Here: A Simpler Way to Find Your Files.* https://CRAN.R-project.org/package=here.

R Core Team. 2021. *R: A Language and Environment for Statistical Computing.* Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Xie, Yihui. 2021. "Knitr: A General-Purpose Package for Dynamic Report Generation in R." https://yihui.org/knitr/.