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Average High School Teacher Salaries vs Student Performance On Standardized Tests: A Correlational Analysis of Northern New Jersey High Schools

Justin Sousa

Low teacher salaries have been prevalent since the mid-1900s, and teacher strikes, like the one that occurred in Chicago in 2019, have resulted in attempts to raise these salaries. This study analyzes whether raising teacher salaries could have benefits to other groups besides teachers themselves. Through a correlational analysis, the relationship between average teacher salaries and student performance on standardized tests (measured with SAT scores, math proficiency rates, and ELA proficiency rates) was examined among thirty randomly selected high schools in eight northern New Jersey counties. The findings show that average teacher salaries were positively correlated with all three metrics, but only those with SAT scores and ELA proficiency rates were significant correlations. These results do not suggest that raising teacher salaries will increase these metrics of student performance; they are solely an acknowledgment that such causation should be explored in order to properly inform policy on this issue.

Keywords: teacher salaries, student performance, northern new jersey, correlational analysis, high schools, stratified random sampling

Introduction

The issue of low teacher salaries in the United States, while commonly seen as a strictly contemporary issue, has been prevalent since the mid-1900s. This is evident by teacher strikes that occurred in the early 1950s in cities such as St. Paul and New York mainly due to demands for increased salaries (Schiff, 1953, 133). These strikes have continued to take place in the 21st century. Such examples of teacher strikes in the present-day that resulted from a demand for salary increases include the infamous Chicago teachers' strike that happened in October of 2019 where 25,000 teachers missed work for eleven days (Vlamis, 2019). In February of that same year, strikes and walkouts occurred in California, West Virginia, Arizona, Virginia, and many other states around the country due to low teacher remunerations (Wolf, 2019).

While there may be many factors that contribute to the current low teacher salaries, the most direct one is the way that teacher compensation systems in the US are organized. In the US, 96% of public school districts pay teachers using a single salary schedule that bases teacher pay off of both their education levels and their teaching experience (Podgursky & Springer, 2011, 167). This leads to those with more years of experience being paid much higher salaries than those who are new entrants to the education field. This can deter new teachers from joining the field as they know that their salaries will most likely be very low, ultimately leading to schools struggling to hire qualified teachers for certain subjects, and lowering the overall quality of education (Podgursky & Springer, 2011, 169). Lowering education quality can also lead to lower academic achievement among students, which

begs the question of whether or not lower teacher salaries lead to lower student academic achievement and performance or vice versa; some studies have already analyzed similar relationships (Jimenez-Castellanos, 2010; Akhtar et al., 2016).

Literature Review

A sequential mixed-method study conducted in a large urban school district in Southern California (Jimenez-Castellanos, 2010, 351) analyzed the allocation of resources between schools of different Title and Program Improvement (PI) statuses (Jimenez-Castellanos, 2010, 356) and whether or not this contributed to an "achievement gap" between white students and students of color. PI schools do not meet state testing requirements, and Title 1 schools obtain financial assistance in order to provide resources to schools where economically disadvantaged students go (Jimenez-Castellanos, 2010, 356). Through conducting interviews with principals and observing schools, this study ultimately found that schools that have Title 1 status generally receive more administrative and discretionary funds and that non-PI (non-Program Improvement) schools, which generally have higher levels of student achievement, also have higher teacher salaries, indicating a possible correlation between the two (Jimenez-Castellanos, 2010, 364).

Likewise, a study done in Pakistan on secondary schools evaluated as one of its sub-hypotheses whether or not teacher salaries were correlated to academic achievement, defined as "a performance judgment test which evaluates that a learner has gained particular information or he has mastered the essential expertise or not" (Akhtar et al., 2016, 391). While the authors had originally hypothesized that there would not exist any correlation between teacher salaries and student academic achievement, they eventually rejected this hypothesis after gathering and evaluating their data. Using Pearson's product-moment correlation coefficient, the results showed that the correlation between teacher salaries and academic achievement had a value of 0.71, indicating a strong positive correlation between these two variables (Akhtar et al., 2016, 398).

Contrary to the positive correlations that were discovered in these two studies, Springer and Winters (2009) found that increases in teacher base pay did not have any significant impact on student performance (Podgursky & Springer, 2011, 184). When examining the impact of the School-wide Performance Bonus Program (SPBP), a teacher compensation program in New York City that rewarded teachers if the students in their school met predetermined performance targets set by the NYC Department of Education's accountability program, the researchers compiled data regarding student outcomes and the class learning environment through a randomized selection process (Podgursky & Springer, 2011, 184). Ultimately, they found that this program had no significant impact on student proficiency and performance after it had been implemented for two years in the city; Goodman and Turner (2011), researchers who also examined the SPBP program, came to similar conclusions (Podgursky & Springer, 2011, 184). Similarly, other studies that analyzed compensation programs in other US cities (Nashville, TN and Chicago, IL) also found that these programs exhibited no overall effect on student test scores (Podgursky & Springer, 2011, 182). However, the authors did note that this lack of an impact only seemed to occur in the United States; the other studies mentioned in this paper that examined compensation systems in countries such as Israel, India, and Kenya, found that these programs had an overall positive effect on student performance (Podgursky & Springer, 2011).

Looking at all of the existing literature on the relationship between teacher salaries and student performance, it is evident that there exists a gap in the research base on this topic, specifically in the United States. While there are some findings in the US regarding this topic (Podgursky & Springer, 2011; Jimenez-Castellanos, 2010), the majority of the studies have taken place in countries such as Pakistan (Akhtar et al., 2016), Israel, India, and Kenya (Podgursky & Springer, 2011). Current findings from the US show that there is either a positive or no significant correlation between teacher salaries and student academic achievement or performance. However, these findings cannot yet be generalized to the entire country due to both the little research that has been done on this topic and the lack of homogeneity in how school districts are run in the US. These studies were also largely conducted in the late 2000s and early 2010s, so their findings may be outdated and the relationship between teacher salaries and student achievement/performance may have

changed since then. This study will attempt to contribute to the nascent research that is currently published on this topic and revise the current findings so that more concrete generalizations can be made about the correlation between teacher salaries and student performance in the United States. While this study does not explore the direct causation of teacher salaries on student performance, these generalizations can still lead to initial considerations about if teacher salaries should be increased because of potential benefits to groups other than teachers themselves, specifically to students and their performance.

This study will examine the correlation between teacher salaries and student performance on both college entrance and state standardized tests in high schools across northern New Jersey. According to the National Center for Education Statistics (NCES), the average teacher salary in New Jersey for the 2018-2019 school year was $70,212 (National Center for Education Statistics, 2019). Compared with other states in the country, New Jersey, as of the 2018-2019 school year, had the 9th highest average teacher salary (National Center for Education Statistics, 2019). Despite this higher average salary, teacher protests due to issues with pay have still occurred in New Jersey. For example, teachers from Montclair, NJ protested in October of 2019 due to delayed pay raises and the fact that they were still being paid their 2017-2018 salaries (Martin, 2019). These protests indicate that many New Jersey teachers still want their salaries raised, so researching the possible effects of raising teacher salaries, which this study aims to do, is of utmost importance in order to begin to ascertain if raising teacher salaries in New Jersey could be worth the budgetary investment. *The hypothesis for this study is that there will be an overall positive correlation between average high school teacher salaries and student performance on standardized tests.*

Methodology

To test this hypothesis, a correlational analysis was used in order to observe any potential relationship between average high school teacher salaries and student performance. Using such a framework allows for a more quantifiable and more interpretive result to examine any possible correlation between the two variables. It also fits the needs of this study since it analyzes data from a specific area of New Jersey, meaning that collecting data and statistically assessing the level of correlation between the data is more feasible than using and analyzing the results of other studies, all of which do not analyze the New Jersey region specifically. The method implementation includes sampling for thirty northern New Jersey high schools, collecting teacher salary and student performance data, and computing a final Spearman correlation coefficient value for the average teacher salaries against each metric for student performance.

Sampling

Due to time constraints and convenience, only thirty northern New Jersey high schools were selected for the data collection process through a stratified random sampling technique. This sampling method includes dividing the population into different strata (groups) and randomly selecting a sample from each stratum (Taherdoost, 2020, 21). However, the random sample taken from each stratum relative to the sample size has to be proportional to the population of each stratum relative to the total population being drawn from, meaning that strata with more high schools also had more high schools in the sample than strata with fewer high schools. Compared with other non-randomized sampling methods, stratified random sampling is the best fit for the purposes of this study as it ensures that every stratum being drawn from is adequately represented (Taherdoost, 2005, 21), meaning that the final results are more generalizable to the population being analyzed.

In this study, the strata used for the sampling were the eight counties in northern New Jersey: Bergen County, Essex County, Hudson County, Morris County, Passaic County, Sussex County, Union County, and Warren County. A sample size of thirty high schools

was randomly chosen from a population of 418 high schools. The number of high schools being analyzed per county is listed in parentheses next to the county name:

Bergen (7); Essex (6); Hudson (3); Morris (4); Passaic (4), Sussex (1); Union (4); Warren (1)

The stratified random sampling was conducted on Microsoft Excel where all high schools were sorted into their strata (by county), and the '=RAND()' function, which randomly denotes each high school from each county an associated value from zero to one, was used. For each stratum, the schools were then sorted from largest to smallest associated value, and the schools with the highest associated values were chosen for each stratum. However, some of the schools with the highest associated values did not have the available data vital for this study; in these instances, the succeeding high schools in the assortment of schools from highest associated value to lowest associated value whose data was available were chosen instead. The thirty high schools that were ultimately chosen are listed in the table below sorted by county.

Bergen	Essex	Hudson	Morris	Passaic	Sussex	Union	Warren
Emerson Jr Sr High School	Cedar Grove High School	Dr. Ronald E McNair High School	Hanover Park High School	Passaic County Technical Institute	Wallkill Valley Regional High School	David Brearley Middle/High School	Warren County Vocational Technical School
Bergen County Academies	East Orange Stem Academy High School	Bayonne High School	West Morris Mendham High School	West Milford High School		Academy for Information Technology	
Northern Valley Regional High School at Demarest	Columbia High School	Harrison High School	Dover High School	Clifton High School		New Providence High School	
Ramapo High School	Essex County Newark Tech		Parsippany High School	Hawthorne High School		Jonathan Dayton High School	
Rutherford High School	Bard Early College High School						
North Arlington High School	Millburn High School						
Fort Lee High School							

Data Collection

The independent variable for this research study was the average teacher salaries for all thirty high schools being analyzed. However, at least in New Jersey, the average teacher salary per school is not publicly available data. In order to get an estimate of the average teacher salary at each of the schools, the teacher salaries had to be individually obtained and then the average (arithmetic mean) of the salaries had to be calculated. The final procedure for obtaining the average teacher salaries included:

Visiting a particular school's website and finding the staff directory.

Reviewing the directory and collecting each individual teacher's salary through NJ Records, which contains the salaries of teachers from New Jersey for the 2018-2019 school year. The categories of teachers that were included in the collection of salaries were math, social studies, English/language arts, science, business organization, health, physical education, art, music, world language, and special education. There were also some miscellaneous categories of teachers, especially at vocational schools, including carpentry, automotive, dance, and other subjects that fell outside of traditional academic areas. While these types of teachers do not teach the subjects that are tested on the standardized tests being analyzed, they were still included for the purposes of calculating the average salary of all teachers within a particular high school.

Adding the salaries together and then dividing that sum by the number of salaries collected from that particular school in order to ultimately obtain the average teacher salary rounded to two decimal places.

Note that these average salaries are most likely not exact as in some instances, the teachers' names were in the staff directory but did not show up for that particular high school on the NJ Records website. Therefore, those particular salaries were not included in the average salary for that high school's average salary calculation.

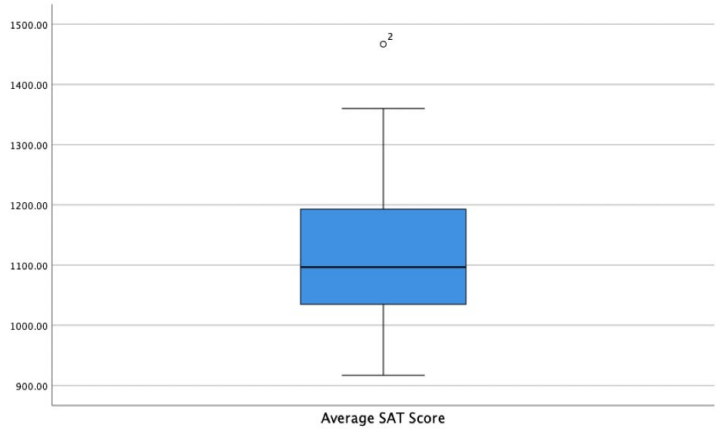
The dependent variable for this research study was student performance, which was broken down into three metrics: average SAT scores (out of 1600), math proficiency rates (%), and English language arts (ELA) proficiency rates (%). Average SAT scores were calculated by adding the average scores for both the reading/writing and math sections for each school. The math proficiency rate is the percentage of students that met or exceeded expectations on the math portions of New Jersey statewide assessments (NJDOE). The ELA proficiency rate is the percentage of students that met or exceeded expectations on the English/language arts portions of New Jersey statewide assessments (NJDOE). The data for these metrics were obtained from the official New Jersey government website under the NJ School Performance Reports for the 2018-2019 school year, the same year that the teacher salary data was obtained. The average teacher salaries and student performance data for each high school were placed in a Microsoft Excel spreadsheet (see Appendix).

Average ACT scores, the alternative college admissions standardized test to the SAT, were not included in this analysis as the SAT is the widely more popular test in New Jersey: 82% of high school students from the New Jersey class of 2019 took the SAT (College Board) while only 25% of high school students from the New Jersey class of 2019 took the ACT (ACT Inc.). Using average SAT scores allows for a larger and more diversified sample of students to be included in the average score of that test; this is not the case with average ACT scores in New Jersey high schools.

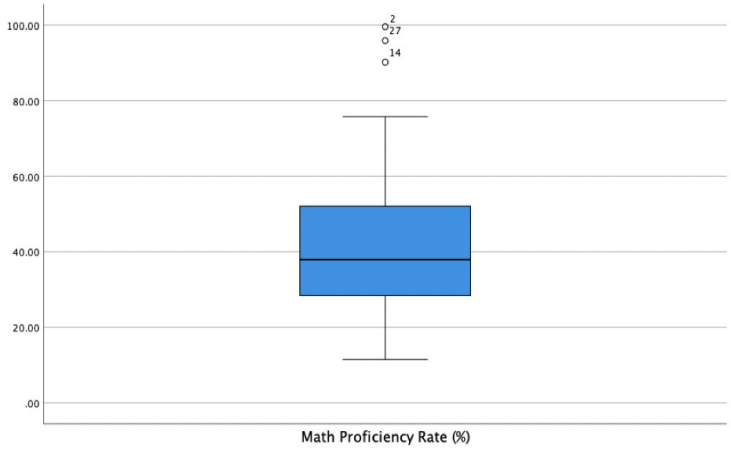
Correlational Analysis

Using the collected teacher salary and student performance data, a correlational analysis was conducted in order to reveal any potential relationship between the two variables. Spearman's rho correlation coefficient (r_s) was used for this analysis as opposed to Pearson's product-moment correlation coefficient due to the presence of outliers in the data. These outliers are shown in the four box plots, with the circles and asterisks indicating statistical outliers in the data sets. With the exception of ELA proficiency rates (Box Plot 4), all of the variables, both independent and dependent, being analyzed have at least one outlier in their set (Box Plot 1; Box Plot 2; Box Plot 3). Outliers in a data set have a significant influence on the value of Pearson's correlation coefficient and may skew it in a particular direction; therefore, Spearman's coefficient was used as it is relatively resistant against outliers (Schober et al., 2018, 1765).

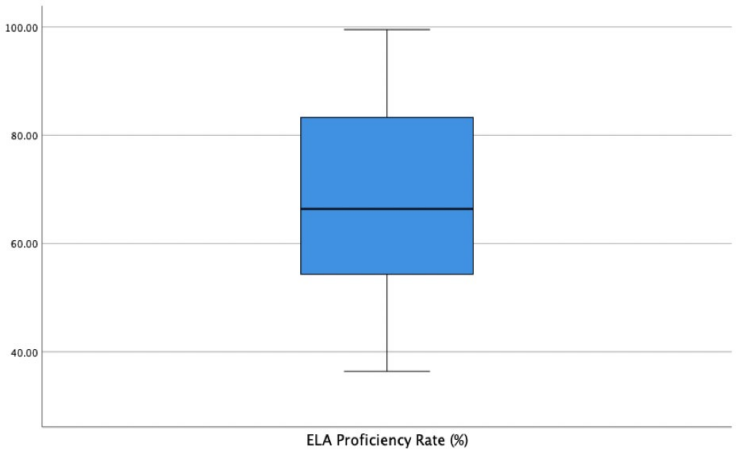
Box Plot 1 Spread and Distribution of Average Teacher Salaries with Associated Outliers



Box Plot 2 Spread and Distribution of Average SAT Scores with Associated Outliers



Box Plot 3 Spread and Distribution of Math Proficiency Rates with Associated Outliers



Box Plot 4 Spread and Distribution of ELA Proficiency Rates with Associated Outliers

The final value of Spearman's correlation coefficient is a number between -1 and +1 (Prematunga, 2012, 196). In the context of this study, a value of -1 means that there is a perfect negative correlation between average teacher salaries and student performance (as teacher salaries increase, student performance decreases by the same percentage), a value of +1 means that there is a perfect positive correlation between the two variables (as teacher salaries increase, student performance increases by the same percentage), and a value of 0 means that there exists no correlation at all (Prematunga, 2012, 196). For this research study, three correlation coefficients were computed to find the relationship between average teacher salaries and student performance. The three different correlations include average teacher salaries and average SAT scores, average teacher salaries and math proficiency rates, and average teacher salaries and ELA proficiency rates. To test these correlations for significance, a two-tailed p-value was calculated for each correlation coefficient with thirty pairs in the sample (N=30) and the degrees of freedom equal to twenty-eight (N-2=28). Calculating a two-tailed p-value means the expectation was that the correlation could go in either direction. The significance level was set at α=0.05, and both a null and an alternate hypothesis, listed below, were established:

Null hypothesis: there is no statistically significant correlation between average high school teacher salaries and student performance on standardized tests.

Alternative hypothesis: there is a statistically significant correlation between average high school teacher salaries and student performance on standardized tests.

If the two-tailed p-value for a correlation was less than the significance level, then the null hypothesis was able to be rejected and the alternative hypothesis was accepted. However, if the two-tailed p-value for a correlation was greater than the significance level, then the null hypothesis was not able to be rejected and that correlation would not be statistically significant. All three correlation coefficients and their associated two-tailed p-values were calculated using IBM's SPSS Statistics software, which has shown to provide valid tests for the significance of correlation coefficients (Obilor & Amadi, 2018, 23).

Results

Average Teacher Salaries vs Average SAT Scores

Table 1 shows the value for Spearman's Rho correlation coefficient for the relationship between average teacher salaries and average SAT scores and the associated two-tailed p-value. A mild positive and statistically significant correlation was found between average teacher salaries and average SAT scores, $r_s(28) = .378$, $p = .039$ (Table 1). This mild relationship is also apparent in Figure 1, which shows the scatter plot for the two variables and the associated trend line, which is in an upward, positive direction: as average teacher salaries increase, average SAT scores generally increase as well. Since this correlation is statistically significant, the null hypothesis is able to be rejected and the alternative hypothesis is accepted, meaning that there is some significant positive correlation between average teacher salaries and average SAT scores for the thirty schools analyzed.

			Average Teacher Salaries	Average SAT Score
Spearman's rho	Average Teacher Salaries	Correlation Coefficient	1.000	.378*
		Sig. (2-tailed)	.	.039
		N	30	30
	Average SAT Score	Correlation Coefficient	.378*	1.000
		Sig. (2-tailed)	.039	.
		N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

Table 1 Correlation Results for Average Teacher Salaries vs Average SAT Scores

Average Teacher Salaries vs Math Proficiency Rates

Table 2 shows the value for Spearman's Rho correlation coefficient for the relationship between average teacher salaries and math proficiency rates and the associated two-tailed p-value. A mild positive but not statistically significant correlation was found between average teacher salaries and math proficiency rates, $r_s(28) = .306$, $p = .100$ (Table 2). This mild relationship is exemplified in Figure 2, which shows the scatter plot for the two variables and the associated trend line, which is in an upward, positive direction:

			Average Teacher Salaries	Math Proficiency Rate
Spearman's rho	Average Teacher Salaries	Correlation Coefficient	1.000	.306
		Sig. (2-tailed)	.	.100
		N	30	30
	Math Proficiency Rate	Correlation Coefficient	.306	1.000
		Sig. (2-tailed)	.100	.
		N	30	30

Table 2 Correlation Results for Average Teacher Salaries vs Math Proficiency Rates

			Average Teacher Salaries	ELA Proficiency Rate
Spearman's rho	Average Teacher Salaries	Correlation Coefficient	1.000	.395*
		Sig. (2-tailed)	.	.031
		N	30	30
	ELA Proficiency Rate	Correlation Coefficient	.395*	1.000
		Sig. (2-tailed)	.031	.
		N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 Correlation Results for Average Teacher Salaries vs ELA Proficiency Rates

as average teacher salaries increase, math proficiency rates generally increase as well. Since this correlation is not statistically significant, the null hypothesis is unable to be rejected, meaning that there is no notable correlation between average teacher salaries and math proficiency rates for the thirty schools analyzed.

Average Teacher Salaries vs ELA Proficiency Rates

Table 3 shows the value for Spearman's Rho correlation coefficient for the relationship between average teacher salaries and English language arts proficiency rates and the associated two-tailed p-value. A mild positive and statistically significant correlation was found between average teacher salaries and ELA proficiency rates, $r_s(28) = .395$, $p = .031$ (Table 3). This mild relationship is also shown in Figure 3, which shows the scatter plot for the two variables and the associated trend line, which is in an upward, positive direction: as average teacher salaries increase, ELA proficiency rates generally increase as well. Since this correlation is statistically significant, the null hypothesis is able to be rejected and the alternative hypothesis is accepted, meaning that there is some notable positive correlation between average teacher salaries and ELA proficiency rates for the thirty schools analyzed.

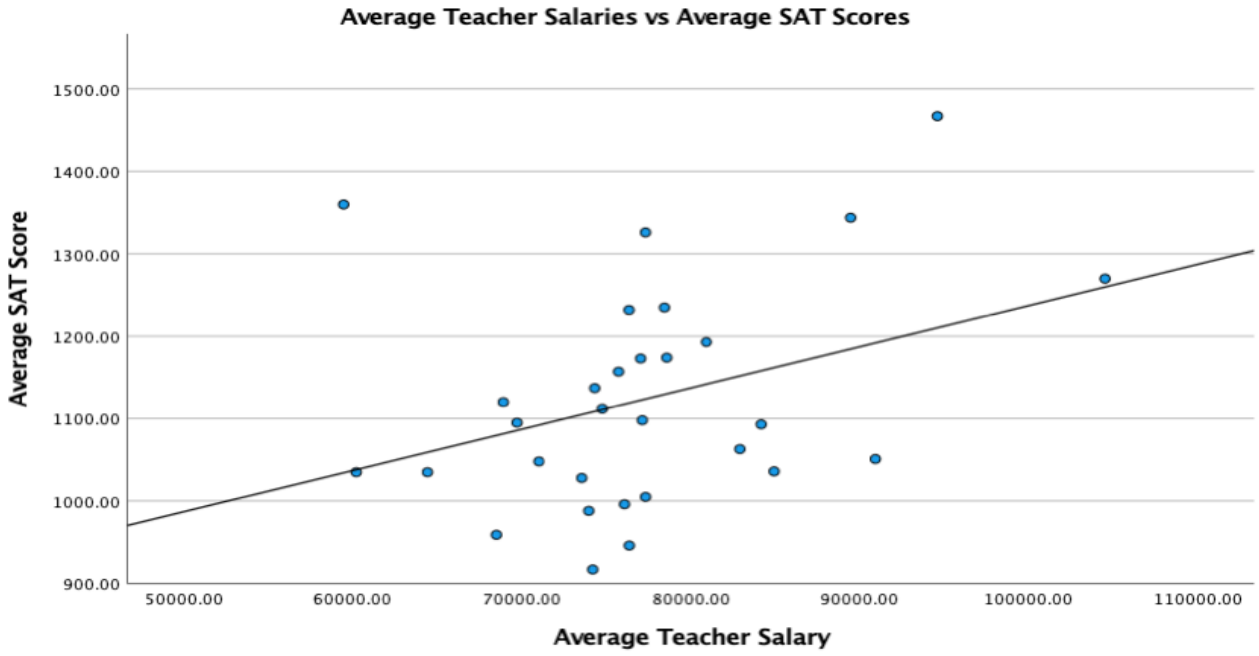


Figure 1 Scatter Plot and Trend Line for Average Teacher Salaries vs Average SAT Scores

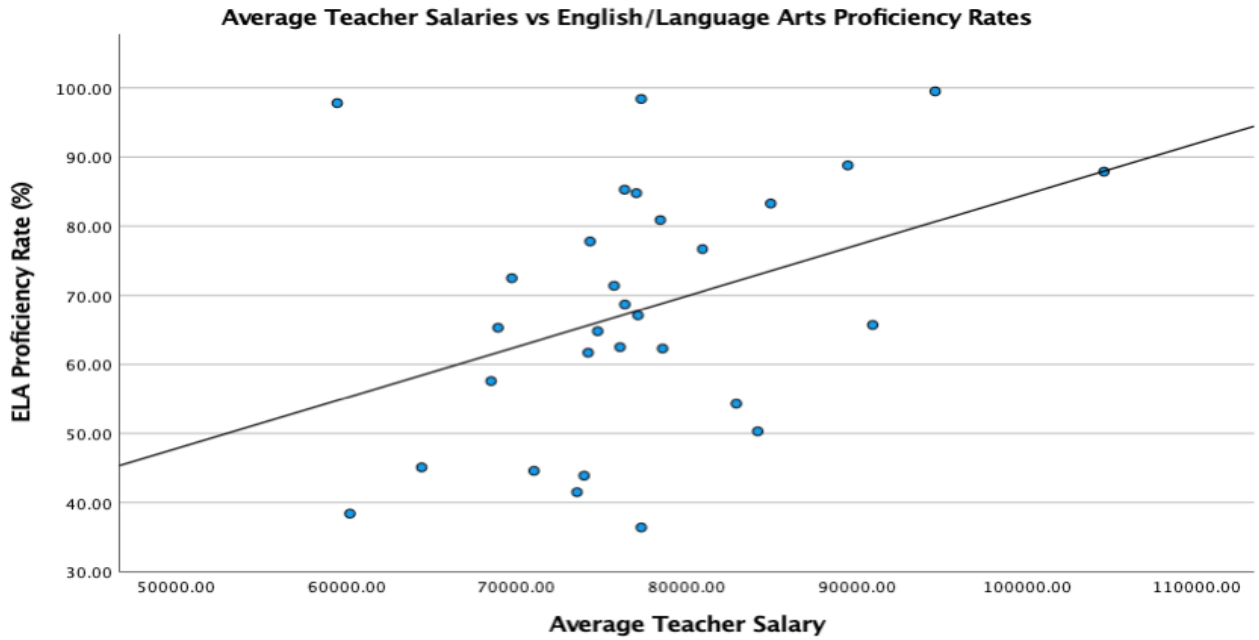


Figure 2 Scatter Plot and Trend Line for Average Teacher Salaries vs Math Proficiency Rates

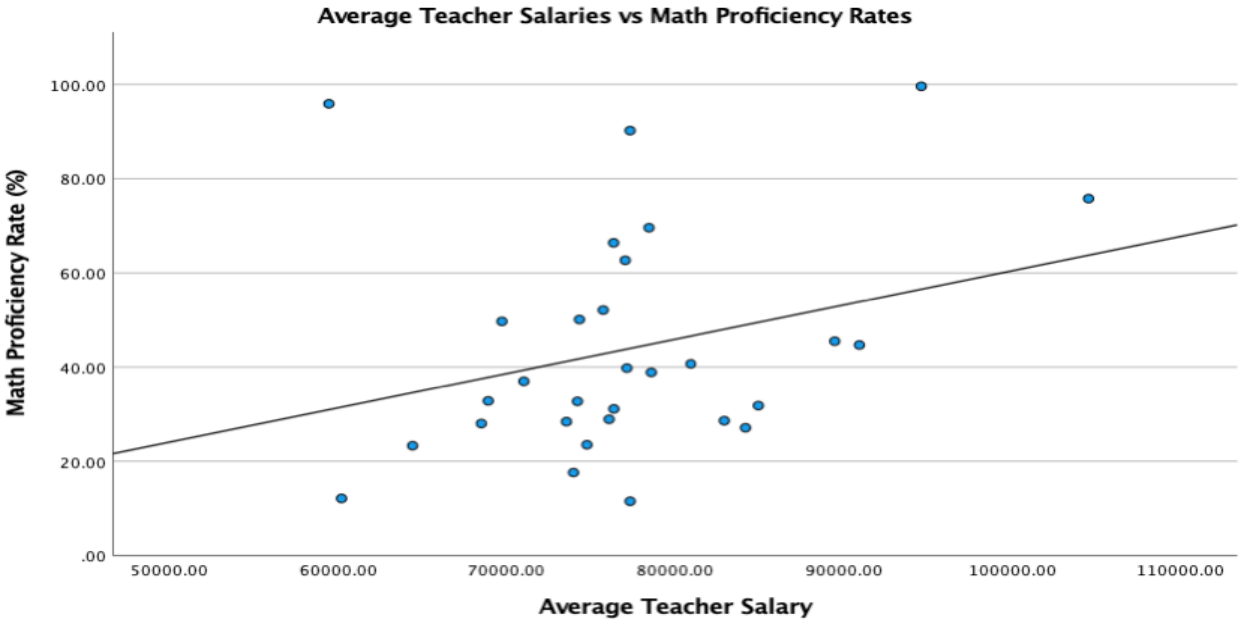


Figure 3 Scatter Plot and Trend Line for Average Teacher Salaries vs ELA Proficiency Rates

Discussion

The data shows that there exists an overall mild positive correlation between average high school teacher salaries and student performance on standardized tests for the region analyzed, with all of the correlation coefficients being between $r_s(28) = 0.300$ and $r_s(28) = 0.400$. These findings generally confirm the initial hypothesis that there would be a positive correlation between average teacher salaries and stu-

dent performance on standardized tests. However, the only statistically significant correlations at the 0.05 level occurred between average teacher salaries and average SAT scores (p=0.039) (Table 1), and average teacher salaries and ELA proficiency rates (p=0.031) (Table 3).

The statistical significance of these results indicates that there is a notable positive correlation between both average teacher salaries and average SAT scores and average teacher salaries and ELA proficiency rates among the thirty high schools analyzed in this study. Furthermore, because of the stratified random sampling method that was utilized to select the thirty high schools, this statistically significant correlation is generalizable to all the high schools in the eight northern New Jersey counties where the schools in the sample came from. However, it is important to note that this statistical significance can be considered weak since the two-tailed p-value for both correlations was just under the significance level of α=0.05; there is still a 3.9% probability that the observed correlation between average teacher salaries and average SAT scores occurred by chance, and a 3.1% probability that the observed correlation between average teacher salaries and ELA proficiency rates occurred by chance. Although these probabilities may seem small, they are nonetheless important to consider as they could impact the existence of these correlations to the region being analyzed.

The relationship between average teacher salaries and math proficiency rates was found to be $r_s(28)$ = 0.306 (Table 2), indicating a mild positive correlation. However, unlike the other two analyzed, this correlation was not found to be statistically significant at the 0.05 level. Based on the two-tailed p-value of 0.100 (Table 2) associated with this relationship, there is a 10% probability that the observed correlation between average teacher salaries and math proficiency rates occurred by chance. Therefore, it cannot be said that any true correlation between average teacher salaries and math proficiency rates exists in these thirty schools and in the eight northern New Jersey counties where these schools are located.

It is important to note that correlation does not equal causation, meaning that just because two of the relationships were found to be statistically significant, does not necessarily mean that the independent variable (average teacher salaries) is what caused changes to the dependent variables (average SAT score and ELA proficiency rates). Nonetheless, if such causation were to exist, there are two factors that could potentially be contributors to the statistically significant positive correlations found between average teacher salaries and the two dependent variables: increases in teacher satisfaction and increases in teacher quality.

Higher teacher salaries could have increased teacher satisfaction and morale, which further increased student performance. Results from other studies have shown that low teacher salaries are the prime contributors to low teacher satisfaction (Miraj et al., 2018) and that increasing their salaries is a way to ultimately increase their overall job satisfaction (Fuming & Jiliang, 2007). These studies have also examined correlations between teacher satisfaction and student achievement, finding that better teacher job satisfaction can positively affect teacher performance and ultimately student achievement (Miraj et al., 2018; Akhtar et al., 2016). The significant correlations that were observed in this study may have occurred due to an indirect effect of teacher salaries on student performance through teacher satisfaction. However, because the studies that have come to these conclusions were conducted outside of the United States (Pakistan and China), those results may not be applicable as potential explanations for the observed correlations in this study.

It is also possible that increases in teacher salaries increase student performance indirectly by raising teacher quality. Findings from a study conducted in US public schools using teacher-level data from the Schools and Staffing Survey (SASS) found that, almost without exception, there is a positive relationship between teacher salaries and teacher quality (Figlio, 1996), suggesting that raising teachers' wages generally will attract higher-quality teachers (Figlio, 1996; Hanushek, 2020). Raising teacher quality through increasing salaries could also mean that students are able to learn and absorb class material more efficiently, which would in turn raise student performance. Because this study was conducted within the US, its findings regarding teacher quality are more generalizable to this study than the findings from studies that evaluated teacher satisfaction (Miraj et al., 2018; Akhtar et al., 2016).

Conclusion

Limitations

In assessing the validity of these findings, it is important to state the limitations that may have had an effect on their reliability. The most apparent limitation to these findings is that the correlation results cannot be used to identify any causation of raising teacher salaries on student performance; the only thing that can be said with certainty is that for the thirty high schools analyzed, higher teacher salaries generally correlated with better student performance. In regards to the data collection, there were numerous instances when a teacher who was listed on the school's staff directory would not have salary records for the 2018-2019 school year. This could potentially mean that the average teacher salaries that were calculated for the schools could have been either inflated or deflated from the true average. These results may also be slightly outdated since they are from the 2018-2019 school year, which was the only year in which the teacher salary data could be obtained, and may not reflect current relationships between average teacher salaries and student performance in northern New Jersey.

Connection to Field

The findings of this research study display similarities with those of other studies. For example, Jimenez-Castellanos examined the relationship between school achievement and educational resource allocation among public schools in a California school district, and he found that schools with higher achievement generally had more funds allocated to them (Jimenez-Castellanos, 2010, 364). Akhtar et al. examined the causes of teacher satisfaction and how it related to performance among secondary school students in Pakistan, and they found that higher teacher satisfaction was associated with better achievement among students. Since teacher salaries were a big contributor to high or low teacher satisfaction, they also concluded that higher teacher salaries were associated with better student achievement. The findings of this study also challenge those of other studies. One such example is the study discussed by Podgursky & Springer mentioned previously. This study analyzed the Schoolwide Performance Bonus Program in New York City that would provide teachers with extra compensation if students in their school met NYC performance targets, but they found that there was no significant relationship between compensation and performance (Podgursky & Springer, 2011, 184). These results are contradictory to the positive correlation that was generally observed between teacher salaries and student performance in this study.

While this study's structure and findings have similarities with those of others, none of these other studies examine direct relationships between teacher salaries and student performance on standardized tests in the United States. The findings of this study contribute to this gap as this direct relationship was examined in Northern New Jersey schools, but more research is still needed from other schools in other states in order for this gap to continue to be addressed.

Implications

There exists ever-growing pressure from teachers and teacher unions across the United States for teacher salaries to be raised. However, elected government officials and officials on school boards will most likely not want to raise teacher salaries, as this introduces higher labor costs, unless there is some external benefit in doing so. The findings of this study exhibit a possible external benefit as they imply that increasing teacher salaries could have slight positive impacts on student performance on both state and college-required standardized tests. This could potentially motivate municipal and state governments, who typically regulate teacher salaries in the US, to raise them as if they truly do positively affect student performance, then raising salaries could make their town's or state's education system look superior to others in the country.

The results of this study could provide teachers and teacher unions in the United States with extra evidence for the fact that raising their salaries will be highly beneficial not only to them but to their students as well. Having such results could ultimately lead to a more convincing argument in favor of raising teacher salaries, but as explained previously, the causation of

changes in teacher salaries to changes in student performance cannot be confirmed by the findings of this study. Parents of high school students may also be interested in the positive correlation observed in this study as it could potentially positively impact their child's quality of education and academic standing if teacher salaries were to be raised. This could also cause parents to consider moving to school districts where teachers are paid higher salaries or to support teacher strikes that aim to raise these salaries.

Future Directions

The limitations that are currently present in this study should be minimized for future studies in order to maximize the validity of the results. This study examined the statistical correlation between teacher salaries and metrics of student performance, and the results of this study shed light on a potential causation of raising teacher salaries and improvements in student performance in high schools. However, the causation of teacher salaries on student performance was not directly analyzed, meaning that the correlational results of this study, while implying a possible causation, do not verify that such causation exists. Future research should attempt to directly examine whether or not raising teacher salaries has direct causes on student performance as the results of these studies will provide further clarity as to whether raising teacher salaries will have positive or negative effects on student performance. Along with this, external factors that could affect student performance such as household income or expenditure per student could also be analyzed to see whether these factors or teacher salaries are what lead to changes in student performance. Future research could also analyze whether or not raising teacher salaries indirectly affects student performance by impacting other variables such as teacher job satisfaction or teacher quality (Figlio, 1996; Miraj et al., 2018; Akhtar et al., 2016). Lastly, future research may also want to look into both middle and elementary schools along with high schools so that the findings can be generalizable to a wider group of both teachers and students.

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Appendix

Average Teacher Salary and Student Performance Data for all 30 High Schools Sorted by County

BERGEN				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Emerson Jr Sr High School	$69,714.97	1095	49.70%	72.50%
Bergen County Academies	$94,614.64	1467	99.60%	99.50%
Northern Valley Regional High School at Demarest	$104,525.84	1270	75.80%	87.90%
Ramapo High School	$77,043.39	1173	62.70%	84.80%
Rutherford High School	$77,141.78	1098	39.80%	67.10%
North Arlington High School	$64,422.94	1035	23.30%	45.10%
Fort Lee High School	$80,937.97	1193	40.70%	76.70%
ESSEX				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Cedar Grove High School	$68,905.27	1120	32.80%	65.30%
East Orange Stem Academy High School	$84,952.84	1036	31.80%	83.30%
Columbia High School	$78,586.30	1174	38.90%	62.30%
Essex County Newark Tech	$76,371.15	946	31.10%	68.70%
Bard Early College High School	$74,213.19	917	32.70%	61.70%
Millburn High School	$89,476.20	1344	45.50%	88.80%
HUDSON				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Dr Ronald E McNair High School	$77,330	1326	90.20%	98.40%
Bayonne High School	$76,088.34	996	28.90%	62.50%
Harrison High School	$77,334.50	1005	11.50%	36.40%
MORRIS				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Hanover Park High School	$74,330.68	1137	50.10%	77.80%
West Morris Mendham High School	$76,356.31	1232	66.40%	85.30%
Dover High School	$68,497.04	959	28%	57.60%
Parsippany High School	$75,737.96	1157	52.10%	71.40%
PASSAIC				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Passaic County Technical Institute	$90,949.03	1051	44.70%	65.70%
West Milford High School	$82,933.34	1063	28.60%	54.30%
Clifton High School	$73,562.31	1028	28.40%	41.50%
Hawthorne High School	$71,013.61	1048	37%	44.60%
SUSSEX				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Wallkill Valley Regional High School	$84,191.55	1093	27.10%	50.30%
UNION				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
David Brearley Middle/High School	$73,979	988	17.60%	43.90%
Academy for Information Technology	$59,457	1360	95.90%	97.80%
New Providence High School	$78,451.62	1235	69.60%	80.90%
Jonathan Dayton High School	$74,776.59	1112	23.50%	64.80%
WARREN				
Schools	**Avg Salary**	**Avg SAT Score**	**Math Proficiency Rate**	**Reading Proficiency Rate**
Warren County Vocational Technical School	$60,204.05	1035	12.10%	38.40%