

Introduction

Standardized test scores such as the SAT and ACT have long been a staple in students' college application portfolios. It has been used as a uniform method of assessing a student's academic readiness across different schools and backgrounds (McNeish, 2015). Many colleges and universities rely heavily on these scores in their admission process. Students with high scores thus are more likely to get into their desired school. In addition, their scores could help them receive tuition awards and scholarships.

However, there is a lot of controversy surrounding standardized tests. In December of 2019, a coalition of students and advocacy groups sued the University of California system over its use of standardized test scores for admissions (Hartocollis, 2019). They claimed college entrance exams are biased against poor and minority populations. In their lawsuit, they cited that in California 44 and 53 percent of white and Asian students respectively score above a 1200 on the SAT compared to 10 and 12 percent of African Americans and Hispanics respectively (Hartocollis, 2019). For the ACT, a similar gap is found with the average composite scores for white and Asian students of 22.2 and 24.5 respectively compared to 16.9 and 18.8 for African American and Hispanic students ("Average Scores of Students Taking the ACT", 2018). The lawsuit also claimed standardized tests have led to the creation of a test-prep industry. Test preparation has shown to increase a student's score (McNeish, 2015). Therefore, students who come from higher income families that can afford tutors and other means of preparation perform better than students who are unable to receive the same help. FairTest, one of the advocacy groups a part of the lawsuit that calls for the end of standardized testing, claims these tests have found to be more of a measure of family background than of academic readiness (FairTest, 2019). College entrance exams are most often taken by college-bound high school students. Most students opt for one exam or another while there are still others who chose not to take one at all. However, there are some states that sponsor one of these national exams for all high school students to take. Since 2015, the Minnesota Department of Education has sponsored a date in April where every high school junior attending a public school takes the ACT during their regular school day with 99% of the graduating class of 2018 having taken this exam (MN Department of Education; 2019). Since nearly every high school student in Minnesota takes the ACT, test results encompass the state as a whole rather than only college-bound individuals. Through this there is the ability to analyze if the areas of bias such as race and socioeconomic status present themselves in Minnesota test scores. In addition, there is the ability to see if other factors such as parents' education level, location of the school district, and school district characteristics play a role. Thus, the aim was to examine how ACT scores differ across Minnesota's congressional districts and the impact of a district's demographics.

Research Methods

Data on ACT scores for all Minnesota public schools was acquired from the Minnesota Department of Education. The data set used listed the average scores for each section, the average composite score, school district county, and grad class size for each public school and was also summarized for each district. This was done for five grad classes, from 2014-2018. To narrow the scope of the data, the average composite scores of each school district for seniors graduating in the class of 2018 was analyzed. Since charter schools do not belong to a school district, their numbers were counted as if the school itself was a district. Schools districts were broken up into their respective counties. From there, the National Atlas was used to assign Minnesota's counties to their corresponding congressional district(s). While most counties fell into one congressional district or another, there were nine counties that were shared between districts. For the school districts in counties that spanned multiple congressional districts, their ACT scores were counted for all districts they were a part of. This was done because students lived in both of the congressional districts and there is no way to differentiate their scores. In addition, there would be congressional districts without data because they are composed of partial counties.

Data on each congressional district's demographics was obtained from My Congressional District. It lists data on people, workers, housing, socio-economic, education and business for each of Minnesota's eight districts. Demographics selected for further analysis included socio-economic status, parent's education, and diversity for each district. The socio-economic status of the congressional district was determined by the percentage of people below the poverty line for an average family of four set by the US Department of Health and Human Services. The education status of a district was determined by the percentage of adults over the age of 25 with a high school degree or less. Lastly, the diversity was the percent of colored (non-white) residents in the district.

Other factors that were taken into consideration included the location of the congressional district and aspects of individual school districts. The location of the congressional districts compared urban to rural areas. The three largest districts by number of counties and are located on the outskirts of the state were designated as rural while the three smallest districts by number of counties and are located near the capital and metro area were designated as metro. Individual school demographics that were analyzed included the graduation class size of the school district and the percentage of the class graduating. The average class size and average graduation percentage for each congressional district was determined. To analyze how the different congressional districts compared with each other, a series of ANOVA (Independence) and 2 sample T-tests were used using Microsoft Excel. For the 2 sample T-tests, the average composite scores from the congressional districts with the highest and lowest percents or values for each category were used for analysis. All tests were done at a 5% level of significance.

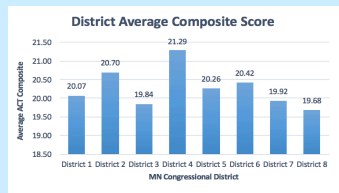
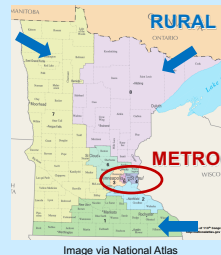
Results

	Avg ACT	Grad Class	% Graduate	Poverty	Below HS Edu	Diversity
District 1	20.07	92.87	88.72%	17.44%	37.27%	10.05%
District 2	20.70	277.33	86.25%	10.60%	28.34%	16.11%
District 3	19.84	401.60	81.26%	10.16%	21.52%	19.78%
District 4	21.29	325.81	79.03%	15.75%	28.81%	29.41%
District 5	20.26	363.78	81.03%	18.98%	26.77%	34.66%
District 6	20.42	293.46	88.43%	10.86%	33.14%	10.36%
District 7	19.92	57.50	88.68%	21.10%	41.61%	9.15%
District 8	19.68	79.04	85.25%	20.70%	38.44%	7.27%

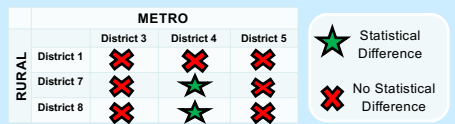
Average ACT composite scores, grad class sizes and graduation rates were found after school districts were organized into their congressional district and their values were averaged. Districts with the highest average percentage are noted in green and districts with the lowest average/percentage are noted in red.

Source	Sum	Average	Variance
1	75	1905.1	20.068
2	30	621	20.7
3	43	853.9	19.848
4	26	553.5	21.288
5	39	796.3	20.257
6	39	796.3	20.257
7	109	2176.3	19.966
8	75	1472	18.656

ANOVA for Independence between Minnesota's congressional districts found no statistical difference between the average composite scores.



There is an evident range in average composite scores. A two-sample t-test was performed on the highest and lowest averages.



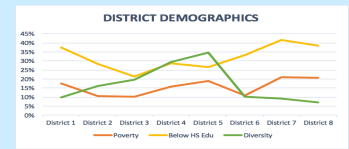
Rural congressional districts, which contained the most counties and were located on the outskirts of the state were found to be districts one, seven and eight. Metro congressional districts, which contained the least number of counties included districts three, four and five. Students in district four were found to average a higher composite score than students in districts seven and eight. However, they did not outperform students in district one. There was no other difference found between metro and rural districts.

	Highest Avg	Lowest Avg	t Critical Value	t Test Statistic	Stat. Significant
Avg ACT	CD 4	CD 8	1.697260887	2.24257367	YES
Grad Class	CD 3	CD 7	1.677926722	2.02857308	NO
% Graduate	CD 1	CD 4	1.701130934	1.67515445	NO
Poverty	CD 7	CD 2	1.683851013	2.0798946	YES
Below HS Edu	CD 7	CD 3	1.677926722	2.02857308	NO
Diversity	CD 5	CD 8	1.663420175	1.20925746	NO

Note: CD stands for congressional district

Discussion

An ANOVA test for independence was ran to see if the average composite scores differed between the eight congressional districts. There was no evidence of the scores differing across the state. However, when a closer look was taken at the averages, there was a noticeable gap between the district with the highest average composite score and the district with the lowest average composite score. By a two-sample t-test it concluded the range in composite scores did show there was a difference in the district a student lives in and their ACT score. In this case, students in Ramsey and Washington counties averaged higher than their peers in the northeast counties of Minnesota. While there is evidence that minority groups perform poorer on average on college entrance exams compared to their white peers, it was not found for Minnesota test scores. Diversity in this study included all non-white residents, whereas the claim in the California lawsuit referenced specifically African American and Hispanic students being at a disadvantage. On the other hand, Minnesota scores do reinforce the claim that the socioeconomic status of the family a student comes from impacts their ACT score. Those that come from a household below the poverty line are on average outperformed by their wealthier peers. Another group that has shown to be at a disadvantage on standardized tests are students whose parents did not earn a degree from a postsecondary institution (FairTest, 2019). In Minnesota, however, there was not a noticeable distinction due to parental education. Additionally, school district characteristics did not impact a student's ACT scores including a school district's graduation class size and graduation rate. Of note, there were districts that were found to have consistently high or low rates across different demographics. For example, district three had a low percentage of residents below the poverty line and having a high school diploma or less and additionally had very large graduation class sizes. Whereas district seven had a high percentage of residents above the poverty line and with a high school diploma as their greatest amount of schooling and contrast to district three had very small graduation class sizes. Due to this trend, further exploration was aimed at seeing if this pattern follows across the rest of the districts. The intent was to see if there was a similar trend between different demographics.



Conclusions

Through the examination of ACT scores across Minnesota's congressional districts, there were different demographics that proved to have statistical significance while others did not. Standardized test scores have been criticized for it is disadvantaged to minority groups and students from low income families. There was found to be a statistical difference between the socio-economic state of a household and a student's performance on the ACT. Students whose family lives below the poverty line score lower than students from families who are above it. However, there was no statistical evidence to show that race has an impact. Other factors also found to have a difference on test results. While from a holistic standpoint, there is no statistical difference between the eight districts, the range of composite scores was found to be statistically significant. In addition, scores found between some of the metro and rural districts proved to be significant. However, other metro areas did not prove to have higher scores than their rural counterparts. There was also no evidence to show the parental education level or school characteristics of graduation class size or graduation rate played a role in students' success.

Future Research

With some districts being consistently low or high across different demographics, further studies should be performed if these results when compacted together impact score outcomes. In addition, it would be interesting to find if different demographics when applied together have a greater positive or negative impact than another combination. While many colleges still look at standardized test results, there are other academic measures that are taken into account including high school grade point average, class rank, and high school coursework and respective grades, with special attention paid to college-preparatory courses. While needed to be done by a more student-to-student study, further studies should be done to see if any of these other application elements reflect a student's test outcome. Also, if there are different subjects or courses that are stronger predictors than others.

References

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