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Spring 2021

COVID-19 and the Achievement Gap

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Herr, David, "COVID-19 and the Achievement Gap" (2021). *Williams Honors College, Honors Research Projects*. 1403.

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COVID-19 and the Achievement Gap

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Department of Education

Honors Research Project

Submitted to

The Williams Honors Project

COVID-19 AND THE ACHIEVEMENT GAP

Abstract

In the American education system, student success is heavily correlated with demographic categories such as ethnicity and socioeconomic status, with ethnic minority students underperforming their white classmates, and economically disadvantaged students struggling more than wealthier students. As a result of the COVID-19 pandemic, many students in the United States shifted to a remote form of learning, which presented severe challenges to students and educators. The purpose of this paper is to determine whether remote learning has altered existing achievement gaps between different categories of students. I did this by first reviewing existing literature on the historical context of educational disparities, as well as the impact that remote learning has had on these disparities, and the mechanisms by which the impacts have occurred. According to the research I utilized, the pandemic has widened gaps between students from marginalized backgrounds and their classmates largely as a result of underfunded schools, and an inequitable distribution of technological resources. I then analyzed grade point average data from over 3,000 ninth grade Algebra 1 students in the state of Ohio from before and after the implementation of remote learning. When examining the data of students divided by ethnicity, I found that although achievement gaps did exist for marginalized groups did exist, these gaps appeared to close during the pandemic, with minority students experiencing less losses in GPA (the mean GPA of Black students actually increased). This data did not reflect the national consensus on COVID-19 and learning gaps. This may be attributed to a limited and homogenous sample size, and/or an inappropriate metric of progress. While researching strategies for closing achievement gaps due to remote learning, I found that the implementation of universal access to devices with internet access, and

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Background

One's ability to access education in the United States has been greatly impacted by their race and socioeconomic status for centuries. After the American Civil War, most Black American students were unable to attend the same school as their white peers. This was achieved through Jim Crow laws in the south, and housing segregation via redlining in the north. In 1954, the Supreme Court case *Brown v. Board of Education* determined that it was unconstitutional to segregate schools based on race. It stated that "separate school systems for blacks and whites were inherently unequal, and thus violate the 'equal protection clause' of the Fourteenth Amendment to the U.S. Constitution" (United States Courts, 2015). In spite of this landmark decision, academic segregation persisted to varying degrees, and still does in every part of the nation, both north and south (Library of Congress, 2017). Currently, roughly half of American students attend schools that are not considered integrated, meaning that the student body is either overwhelmingly white or overwhelmingly nonwhite, according to Rebecca Sibilia, founder of EdBuild, an organization that advocates for equitable funding of schools. The consequences of these persistent levels of segregation are highlighted by the fact that, according to Sibilia, predominantly white schools receive a collective 23 billion more dollars in funding than predominantly nonwhite schools (Chang and Mehta, 2020). "This translates to more than 2,200 dollars less spent on each nonwhite student than on each white student per year. It solidifies a pattern of systematic disenfranchisement from the moment children begin grade school — setting these students up for a much harder life" (King and Gaudiano, 2020).

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The connection between property taxes and public school funding also amplifies the educational resource gap between the rich and poor, and white and nonwhite communities. Wealthy communities with higher property values will have schools that are better financially equipped both in facilities and teachers, while poor and working class communities' schools will receive less funding. Even when excluding class, race plays a significant role in real estate value and appraisal. Between the years 1980 and 2015, houses in predominantly white neighborhoods have on average appreciated in value almost \$200,000 more than houses in predominantly nonwhite neighborhoods (Howell and Korver-Glenn, 2020). This manifestation of housing discrimination and segregation bleeds into almost all aspects of life, including education. Schools in largely nonwhite neighborhoods are likely to receive less funding via property taxes than those in comparable nonwhite communities.

A teacher's own implicit biases and subconscious feelings towards students of differing ethnicities can also put students of color at a disadvantage. A well documented phenomena known as "stereotype threat" can cause a teacher's preconceived notions about a student's abilities or lack thereof which can then lead to less positive outcomes by students, and can even cause students to develop negative internalized perceptions of themselves. "Claude Steele has studied the impact of "stereotype threat" on the performance of Black students. He defines "stereotype threat" as "the threat of being viewed through the lens of a negative stereotype, or the fear of doing something that would inadvertently confirm that stereotype". The sad lesson of this work is that even if no one in the school is being overtly racist toward students of color, the strong presence

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of the threat is still internalized and often destructive” (Banks, Cookson, Gay et. al. 2001).

Material, cultural, and socio-emotional conditions outside of the classroom have a huge impact on academic outcomes inside the classroom, and the aforementioned conditions have led to consistent disparities along the lines of race and class. The Columbia University Teachers College lists the following statistics as evidence of these disparities:

- By the time they enter preschool, children of professionals’ vocabularies are approximately 50 percent larger than children of blue-collar workers, and double the capacity of children from families on welfare.
- At the completion of fourth grade, African American, Latino, and low income students from all races lag two years behind their more wealthy, primarily white peers in reading and math. By the time these students have reached eighth grade, they have dropped to three years behind, and by twelfth grade, they have fallen to four years.
- Only one in 50 Hispanic and Black 17-year-olds is able to read, comprehend and apply information from specialized text (for example a science article). This compares to approximately one in 12 white students.
- By the completion of high school, the reading and mathematics skills of Black and Hispanic students' can be compared to those of white students in the eighth grade.

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- The likelihood of African American students being placed in special education programs is three times higher than white students. In addition, they are only half as likely to be placed in a gifted program.
- Approximately 90 percent of 18 to 20 year-old white people have either finished high school or earned their GED. The rate is 81 percent for Black young people and 63 percent among Hispanics. Moreover, a much higher proportion of Black people earn their GEDs than white. Only close to 50 percent of Black students attain high school graduation in contrast to 75 percent of whites students.

(Columbia University Teachers College, 2005)

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Review of Literature: Impact of COVID-19 on Achievement Gaps

In March 2020, in response to the COVID-19 pandemic, many schools throughout the world transitioned to a remote learning format. Rather than have students continue attending school in person, classes were held online, both synchronously (teachers giving real-time instruction via video meetings) and asynchronously (students completing academic tasks independently and on their own time). This drastic shift in everyday learning presented many challenges to students and educators alike. The inability of many students to receive more personalized attention and help has resulted in alarming delays in development across the board. In a study held in the United States, researchers used previous data from studies of learning loss over summer break, absenteeism, and the negative impact that extended closure due to severe weather and natural disasters has on student progress. They projected that by completing the 2019-2020 school year remotely, students were likely to experience only 63 to 68% of the learning gains in reading that would be expected during a normal school year. In mathematics, those projections fell even farther to 37 to 50% (Kufeld, Solon, Tarasawa et al. 2020).

Although COVID-19 has negatively impacted the educational experience of students from all levels of society, the general consensus holds that students from ethnic minority groups, as well as economically disadvantaged students have suffered more harsh impacts.

There are a number of factors that have made it more difficult for poor students to adapt to a remote learning environment. Many students rely on schools for a significant portion of their daily food intake. In the midst of a global economic crisis induced by the pandemic, these students are suffering doubly when they are no longer able to attend school physically each day, because many do not have enough to eat at home (Garcia, Weiss 2020). Additionally, the “digital divide” makes poor and non-white students less likely to have access to the necessary utilities

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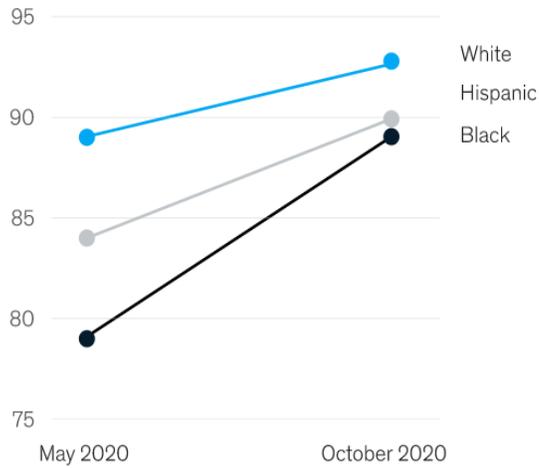
and devices to access their classes and learning materials from home. As of 2017, roughly a quarter of economically disadvantaged eighth graders did not have access to a computer at home, and roughly one third did not have a tablet (Garcia, Weiss, Engdahl 2020). In 2020, these devices are absolutely necessary if a student is expected to maintain their studies remotely. Wealth also can provide an escape from the difficulties of remote learning to which poor students do not have access. Many affluent and predominantly white families have paid to have their children continue personalized learning in “pods” with a few of their peers, and employ private instructors to ensure that they are able to maintain their learning progress (King, Gaudiano 2020).

Unsurprisingly, appropriate technology and access to live instruction has been quantifiably less accessible to students who are members of ethnic minority groups. “Black and Hispanic households are still three to four percentage points less likely than white households to have reliable access to devices, and three to six percentage points less likely to have reliable access to the internet” (Dorn, Hancock and Sarasakatsannis, 2021).

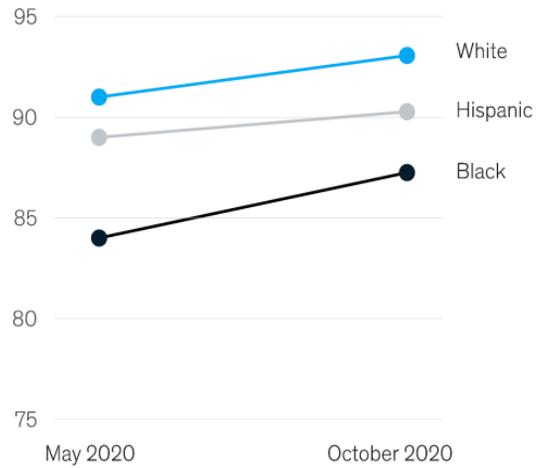
The image below from the US Census Bureau illustrates the disparities between white, Black, and Hispanic students in terms of access to devices and the internet.

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Students who always or usually have access to devices for learning, %



Students who always or usually have access to the internet, %



Source: "Table 3: Computer and internet availability in households with children in public or private school, by select characteristics," US Census Bureau Household Pulse Survey

In a remote setting, live instruction can be a vital way to monitor student progress and ensure active engagement. Unfortunately, nonwhite students are again at a disadvantage. “Black and Hispanic students are twice as likely as white students to have received no live contact with teachers over the previous week and are three to six percentage points less likely to be receiving consistent live instruction” (Dorn, Hancock and Sarasakatsannis, 2021).

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Methodology

All data used in my investigation was obtained with the consent of the Summit Education Initiative. SEI is a non-profit educational research organization located in Summit County, Ohio that focuses on identifying challenges faced by schools, students and educators, and uses data to analyze and track student progress on a large scale.

The students whose data I studied were all ninth grade Algebra 1 students at the time of data collection. Students were selected from eight different high schools in the state of Ohio. Student and school names were all deidentified before I gained access to the data. The primary information with which my research was concerned was the students' grade point average (GPA). Since school closures and rapidly shifting academic protocols impeded the collection of standardized testing data, along with several other forms of information which would normally be made public, I determined that GPA was the best available way to describe a student's holistic academic success. GPA is calculated by averaging their grades in each class, generally on a four point scale, although some students did receive a GPA above a 4.0, most likely from taking weighted classes on a five point scale.

Data was collected at two different points in time: once at the end of the first marking period of the 2019-2020 academic year, and once at the end of the first marking period of the 2020-2021 academic year. This means that there are different students in each data set, as my goal was not to track change among individual students, but rather the performance of two comparable groups (ninth grade Algebra 1 students) from before and after the advent of remote learning. The data from 2019-2020 represents the result of traditional learning face-to-face in a classroom. By the following year, students had transferred to a remote learning format, and the data from 2020-2021 reflects the results of this change.

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My intention was to determine whether remote learning amplified the achievement gap between white and nonwhite students. In order to determine a baseline by which to judge any potential movement of these gaps, I first categorized the 2019-2020 students by their self-identified ethnicities. The distribution among different ethnicities was as follows:

Ethnicity	Number of Students
Total	1,495
Asian	108
Black	706
Hispanic	70
White	470
Multiracial	140

I then calculated the mean GPA of each group. In addition, I plotted the results of all ethnic groups on box and whisker plots in order to determine any gaps in GPA between groups, and to visualize the distribution of all groups. I also determined the existing gaps between white and nonwhite students. I did this by subtracting the mean GPA of every nonwhite ethnic group from the mean GPA of white students, and recorded this as the existing performance gap. If a group had a negative gap value, that meant that they were outperforming white students in terms of GPA. If they had a positive gap value, it meant that their mean GPA was lower than that of white students.

After analyzing the pre-COVID data, I categorized the students included in the 2020-2021 data based on their self-identified ethnicity. The ethnic distribution was as follows:

Ethnicity	Number of Students
Total	1,656

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Asian	140
Black	727
Hispanic	70
White	596
Multiracial	123

As I did with the 2019-2020 data, I calculated the mean GPA of each ethnic group of students and plotted the individual GPA data points from each group on box and whisker plots. I also calculated the net change in each group's mean GPA, as well as the percent change. I once again calculated the gaps between the mean GPA of each nonwhite ethnic group and that of white students. I then determined how each group's GPA relative to white students after the shift to remote learning (whether the gap decreased or increased). Finally, I compared these changes between groups in order to see which ones were most impacted by the shift to remote learning.

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Results

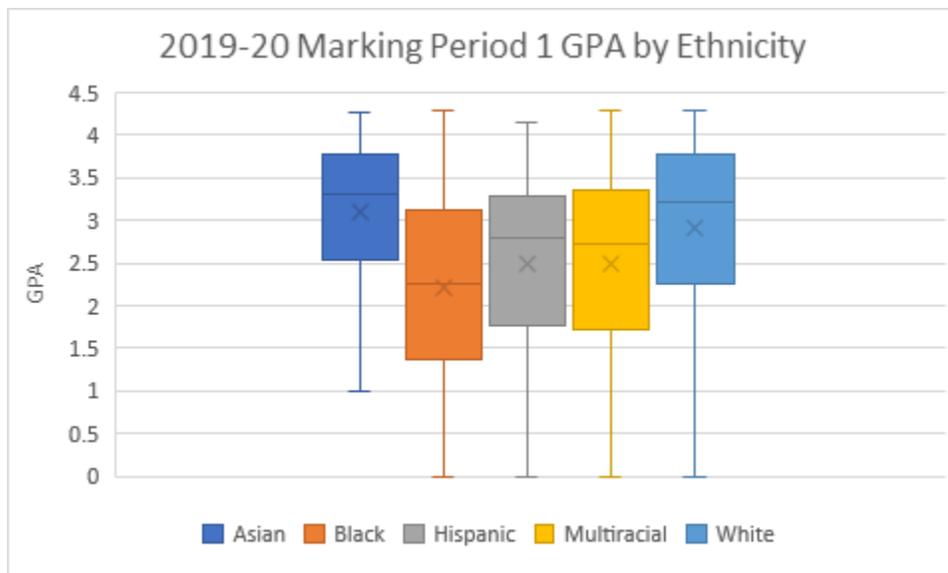
Pre-COVID Data

The following table illustrates the mean GPA of students categorized by ethnicity at the end of the first marking period of the 2019-2020 academic year:

Ethnicity	Mean GPA
Total (1,495)	2.526
Asian (108)	3.102
White (470)	2.905
Multiracial (140)	2.489
Hispanic (70)	2.486
Black (706)	2.034

The following box and whisker plot represents the distribution of all individual GPA figures from 2019-2020 when categorized by ethnicity.

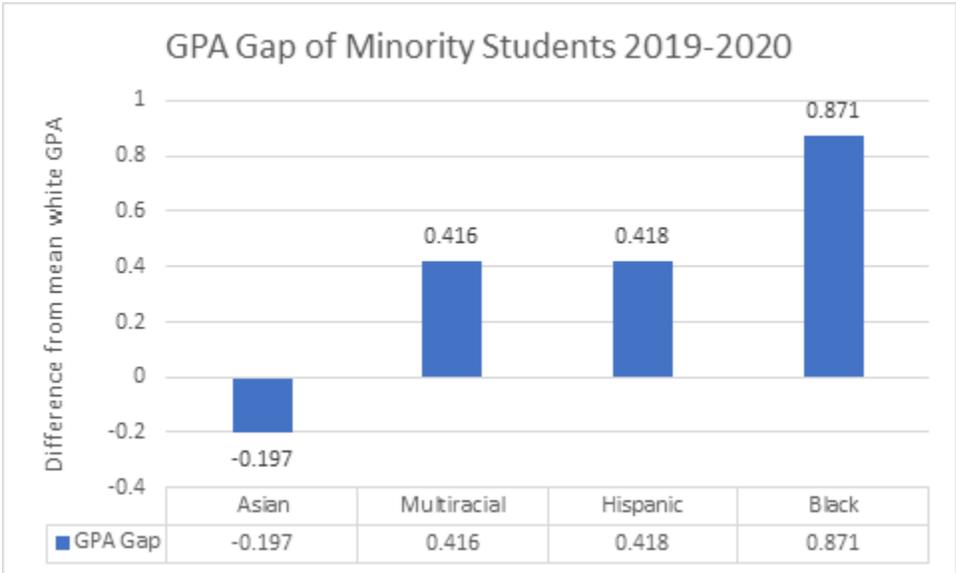
Figure 1



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The following bar graph shows the differences in GPA between nonwhite and white students. If the gap number is negative, that means that the group is outperforming white students. If it is positive that means that their mean GPA is lower than that of white students.

Figure 2



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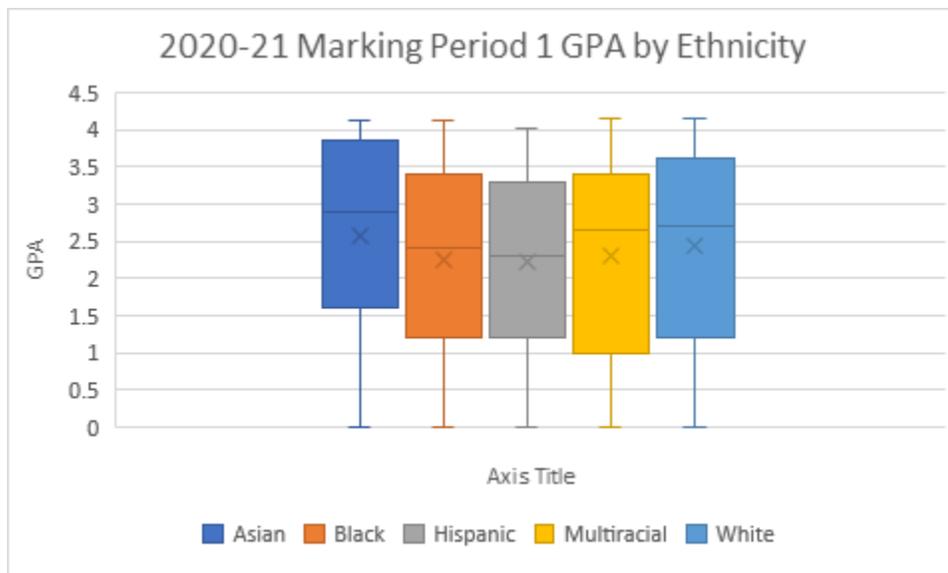
Post-COVID Data

The following table lists the mean GPA values of each ethnic group at the end of the first marking period of the 2020-2021 academic year, after the widespread implementation of remote learning.

Ethnicity	Mean GPA
Total (1,495)	2.346
Asian (108)	2.567
White (470)	2.422
Multiracial (140)	2.300
Hispanic (70)	2.219
Black (706)	2.254

The following box and whisker plot represents the distribution of all individual GPA figures from 2020-2021 when categorized by ethnicity.

Figure 3



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The following bar graph and line graph show the net change in mean GPA of each ethnic group.

In Figure 4, a negative change indicates a decrease in mean GPA.

Figure 4

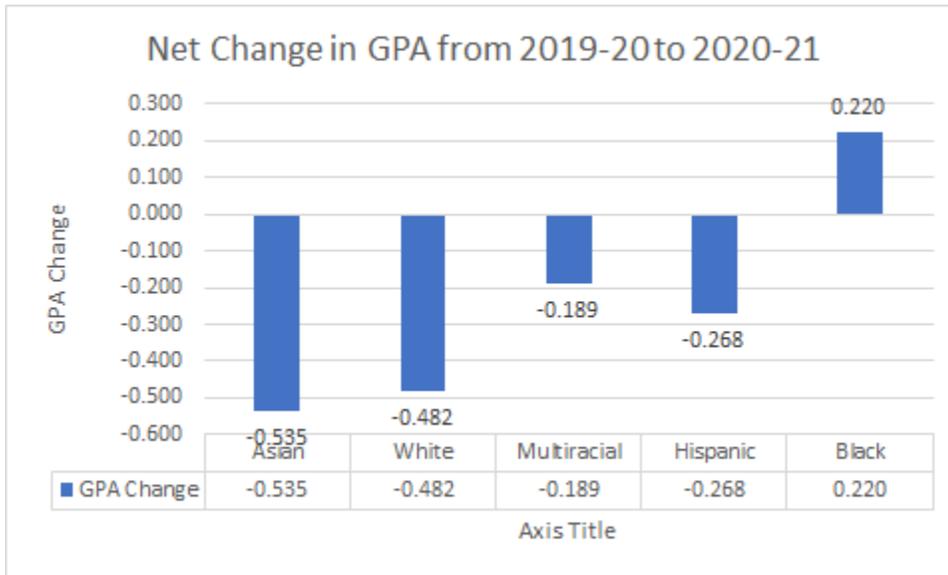
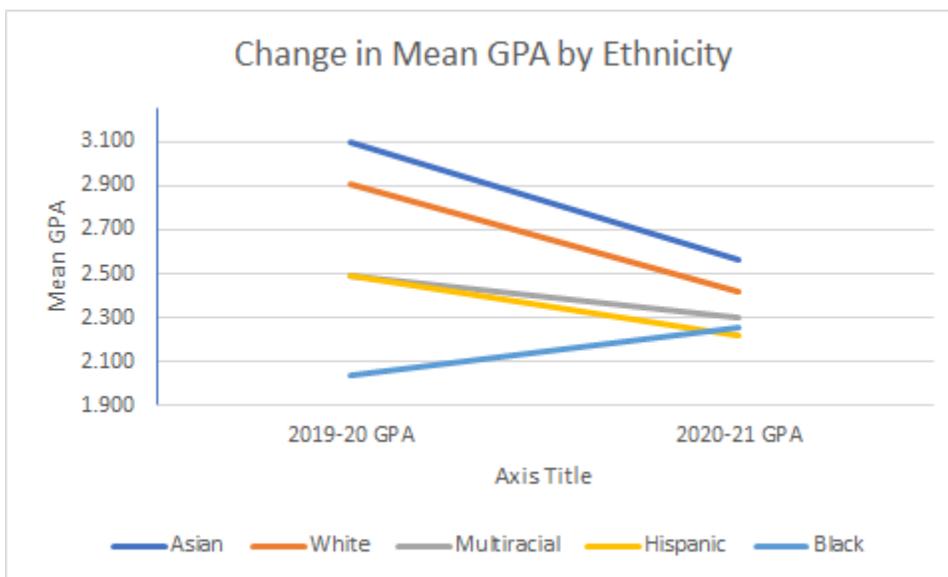


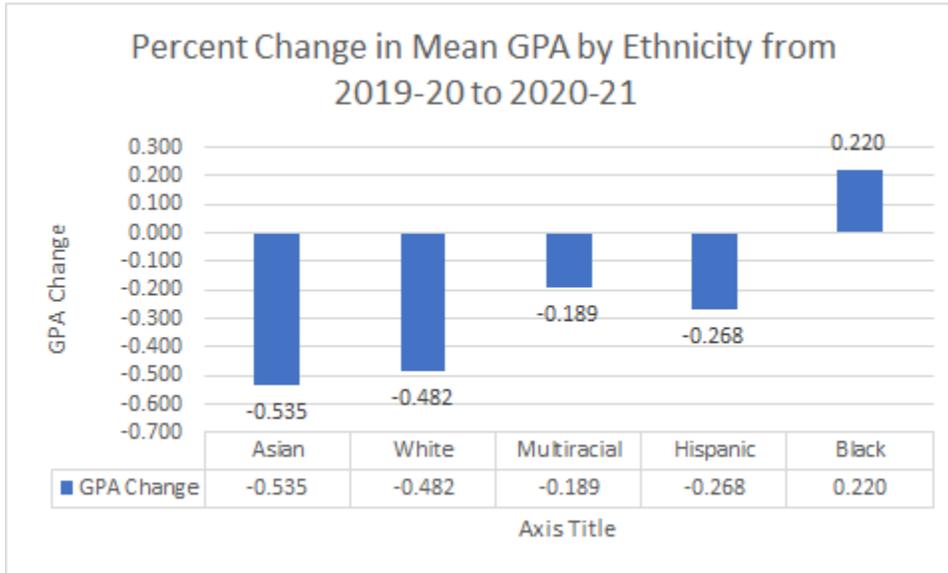
Figure 5



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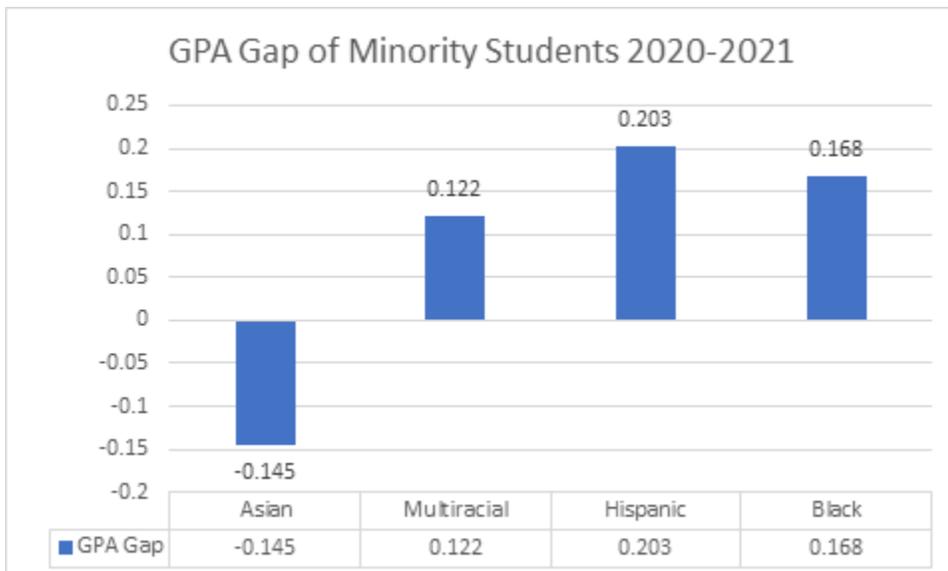
This bar graph also shows change in GPA by ethnic groups, but as a function of percent increase or decrease.

Figure 6



The following bar graph shows the differences in GPA between nonwhite and white students during the 2020-2021 academic year. This was calculated in the same manner as in Figure 2.

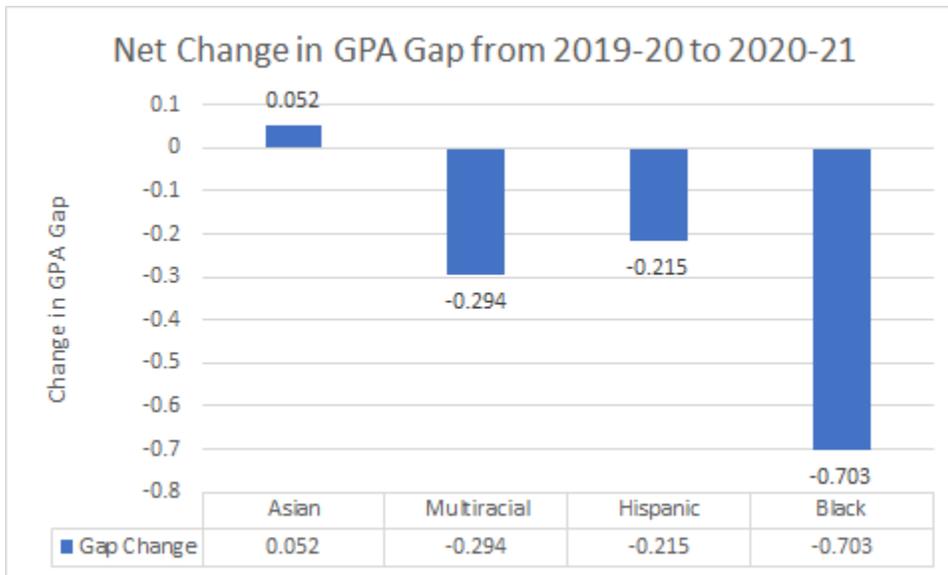
Figure 7



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This bar graph shows the net change in the GPA gap between nonwhite and white students from 2019-2020 to 2020-2021. A positive net gap change means that that group's mean GPA decreased relative to white students. A negative net gap change means that their mean GPA improved relative to white students.

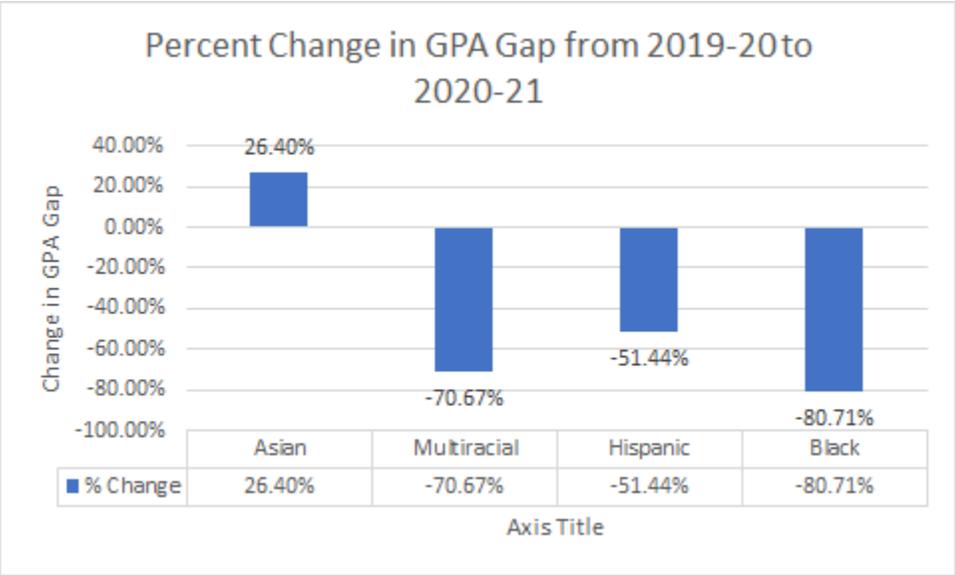
Figure 8



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This bar graph also shows the change in GPA gap, but as a percent increase or decrease.

Figure 9



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Conclusions

The GPA scores of ninth grade Algebra 1 students collected after the first marking period of the 2019-2020 school year, before the pandemic, aligned fairly closely to my expectations and to the prevailing literature on academic achievement gaps along the lines of ethnicity. On average, multiracial and Hispanic students were significantly outperformed by their Asian and white peers. Black students, who made up the plurality of the population, were even farther behind. On a four point scale, the average Black student's GPA was 0.871 lower than that of the average white student (see Figure 2).

When analyzing the changes that occurred over the course of the following year, the data began to contradict the literature and information I had found in my research. I had expected the pandemic and the shift to remote learning to have a disproportionately negative impact on minority students, specifically multiracial, Hispanic, and Black students. However, the analysis I performed on GPA data did not reflect these national trends.

The most notable and unexpected result of my investigation was that although the mean GPA of Asian, white, multiracial and Hispanic students all decreased from one year to the next (see Figure 5), the mean GPA of Black students actually increased by 22% (see Figure 6). The fact that the lowest performing group would actually benefit from a transition that had negative academic outcomes for their peers was unforeseen.

A significant element of my analysis was change in students' performance relative to each other, and particularly the performance of minority students compared to that of their white classmates. In an attempt to quantify this, I took the mean GPA of each minority group, and compared it to the mean white student's GPA. I did this before and after the advent of the pandemic, and expected to see the gap widen with the onset of remote learning. However, this

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was not the case. Multiracial, Hispanic, and Black students were all on average outperformed by white students before and after the transition, but they all closed the gap from one year to the next. All three of these groups experienced a negative change in GPA gap, meaning that their performance improved relative to that of white students (see Figure 8). In the case of Hispanic and multiracial students, their mean GPA decreased at a lesser rate than that of white students. In the case of Black students, the mean GPA actually increased, causing the gap between the mean GPA of Black and white students to decrease by 80.71%. Asian students were the only minority group to have a greater decrease in GPA than white students (see Figure 4), but they maintained the highest GPA overall (see Figure 3).

Ultimately, the data I analyzed indicated that the groups of students who, according to general consensus as indicated by literature in the field, should be most vulnerable to the challenges of remote learning were actually the least negatively impacted. My investigation was limited in scope. It dealt with students from a fairly narrow section of the population (ninth grade Algebra 1 students) who were all from the same part of the country. This could have led to various lurking variables that would cause my findings to differ from those on a national scale. Additionally, GPA data is an imperfect metric for describing something as complex and multifaceted as academic success. Under normal circumstances, more data would be available. As American education continues to approach a higher level of normalcy, I will be curious to see how metrics such as standardized test scores and graduation rates have been impacted by the changes that were made necessary by the global pandemic.

My limited investigation is certainly not sufficient cause to overturn the scientific consensus on the impact that remote learning has had and will continue to have on marginalized groups. However, it did confirm that achievement gaps can be found between groups of students

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along lines of ethnicity. It also showed quantifiable evidence of the fact that the COVID-19 pandemic has had concrete impacts on student success in the classroom, regardless of categorization.

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Implications

Both my studies of existing research and my own investigations have demonstrated the extent to which remote learning can have disastrous impacts on students' success, particularly students from marginalized backgrounds, be they ethnic minorities or economically disadvantaged. Many strategies have been put forth in an attempt to combat the challenges and disparities mentioned in this paper. These strategies and solutions can be applied to students who are still experiencing remote learning, and they can also be implemented in the event that future situations or circumstances necessitate students learning from home. Additionally, as the American education system addresses the lasting consequences of the pandemic, they can help ensure that vulnerable groups are not left behind in the recovery effort.

Addressing the digital divide is a massive part of minimizing educational disparity, especially in a remote setting. Access to a quality internet connection and devices such as laptops or tablets can transform a student's ability to learn from home. Even under normal circumstances, having the option of using a personal device can be extremely beneficial to a student's studies. By providing universal access to devices with internet capabilities, we can drastically reduce technological disparities. Many districts have already adopted this policy, which has had positive effects during the pandemic. "Schools must be equipped to do needs-based monitoring of students' status in terms of internet access; their access to computers and other technology tools for online learning; and students' capacity to make effective use of the tools they have" (Garcia, Weiss 2020).

Additionally, a targeted and concrete economic agenda is needed to close the gap between wealthy and poor schools, as opposed to an approach that focuses strictly on instructional policy. This financial relief would have immediate benefits for schools struggling to

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support remote learners, but it would also have the potential to address disparities that have accrued over generations. “Children in low-income families—often children of color—lack many of the resources that their higher income and white peers have, which puts them at a disadvantage before they even enter their classrooms. Some opportunity gaps can be addressed by strengthened education policies. But the ones of a different nature would call for better public policies and a stronger economic agenda” (Garcia and Weiss, 2020).

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