COVID'S EFFECT ON ACADEMIC DISCREPANCIES BETWEEN MALES AND FEMALES

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ABSTRACT

Ever since males and females have enrolled in school, differences in their academic performance have been observed. It is generally believed that these differences stem from differences in motivation between the sexes, caused by differences in the developmental patterns of males and females. When viewing education as a whole, there is no denying the wide-sweeping disruptions prompted by the coronavirus pandemic, with many students being required to learn from home, without the direct supervision and influence of a teacher. Because male students already struggled with motivation and focus to a greater extent than their female counterparts, it stands to reason that the pandemic, due to less direct motivation from teachers, had a greater adverse effect on male students than their female counterparts. 33 students were randomly selected as part of an explanatory mixed-method study where they were asked questions regarding the pandemic's impact on their education. 10 of these participants were randomly selected to be interviewed; interview questions related to lived experiences during the pandemic. After analyzing the results, there is reason to believe that males fell further behind their female counterparts during the pandemic, but more research is needed to conclude this for certain.

Keywords: academic, achievement, Coronvirus, Covid-19, male, female, Discrepancies, gap

INTRODUCTION

Ever since high schools allowed for the widespread enrollment of females along with males, there have been academic differences between males and females. These differences were initially caused by discrimination and oppression of females within the classroom (which hindered the success of school-aged females), but data from the past few decades paint a different picture: females outperforming males in nearly every measurable metric of high school academic success (Ullah & Ullah, 2019, pg 1). The reasons for this are disputed; there is still debate on whether females' success stems from internal factors (different brain structures, such as puberty onset age, differences in maturity), external factors (attitudes surrounding school, treatment by teachers), or a combination of both (Seifert and Rosemary Sutton, 2006 para. 7-16). No matter the reason, based on current literature, females tend to do better in high school when compared to males.

These academic differences alone are noteworthy, but when viewed in context with the recent Coronavirus pandemic, these differences could have major implications for the future of education. According to The Office for Civil Rights (2021), the Coronavirus pandemic was the largest educational disruption in recent history, with less than 15% of school districts offering regular, in-person learning for every student during the end of the 2019-2020 school year and the 2020-2021 school year (para. 4). The Office claims that one of the most important impacts of the virus was that, during the pandemic, existing academic discrepancies between demographics widened (para. 7). Discovering both the size and cause of these widening academic disparities is imperative to students, teachers, and parents as school districts across the country attempt to rebound from the disruption prompted by the pandemic.

In this paper, the impact of the Coronavirus pandemic on the connection between gender and academic engagement is examined. In order to keep constant with a sizable portion of relative literature, gender will be kept binary for the purposes of this study (further referred to as "sex at birth"). In today's world of personalized classes and individualized graduation plans, it can be difficult to compare students' academic success (Workman & Heyder, 2020). Because of this, "academic engagement" will be examined instead, which is defined by a combination of factors, such as GPA, class rank, schedule difficulty, number of completed classes, and time spent on homework. None of these factors alone can represent the success of a student, but together, they can illustrate a more accurate representation of a student's engagement (Workman & Heyder, 2020). Based on the current literature on both the pandemic and academic disparities between males and females, I hypothesize that over the Coronavirus pandemic, male engagement was more greatly impeded than female engagement due to a lack of male motivation.

LITERATURE REVIEW

Overview

There is no denying the fact that in school-aged children, there exists an achievement gap between males and females (Fox, 2018, para. 1). It is important for parents, educators, and other personnel to consider this gap when dealing with the academic careers of students of different sex. To understand this gap, and to understand why more research must be done, it is critical to review the current literature on the topic, specifically regarding the size of the achievement gap, possible reasons for the gap, and finally, Covid's impact on education.

Size of the Achievement Gap

Throughout history, girls have been repeatedly discriminated against in education systems, being systemically restricted from educational opportunities (Ullah et. al, 2019, para. 1). Logically, it follows that girls would be worse off due to this discrimination, but recent data shows that girls have been dominating the academic sector. Girls get better grades, have higher educational aspirations, follow more rigorous academic programs, participate in advanced-placement classes at higher rates, enroll in more high-level math and science courses, and outnumber boys in student government, honor societies, school newspapers, and debating clubs, while boys are more likely to appear on lists of dropouts, failure lists, and have mental illnesses (Sommers, 2000, para. 7). Expanding on that, researchers found that "girls had significantly higher grades than boys by 6.3%" (O'Dea et. al, 2018, para. 18). Jon Birger (2019) writing for the New York Post furthers this assertion by highlighting that nearly seventy percent of high school valedictorians are female (para. 3). According to researcher Evelyn Iritani (2019), "over the course of 30 years, the percentage of U.S. women 26-to-28 years old who earned at least a bachelor's degree rose from 21% (1980) to 30% (2000) to 36% (2010). Over that same period, the share of men with four-year degrees barely increased, from 25% to 28%." (para. 1).

Despite the plethora of evidence showing female dominance in school, some other viewpoints exist. One group of researchers found no difference when examining different test scores of males in females in medical schools, but their sample size was relatively small and dealt with a very select and able population (Faisal et. al, 2017). Another point to consider is presented by Malek Abu-Jawdeh and Shwetlena Sabarwal (2017) as they explain that males do score lower on average when compared to females, but males have a larger range of scores with a higher concentration on both the lower and higher ends (para. 8). Lastly, researchers have

found that the gap between males and females is large and complex, and in order to better understand the reasons behind it, there must be many other specific studies to deduce these reasons (Ullah et. al, 2019, papa. 3).

Explanations for the Gap

External factors

As males and females progress through school, they are sometimes treated differently by their parents, teachers, and classmates. These different environmental factors could influence the engagement gap. A common trend in research is that although females hold the advantage in every type of class, STEM courses reflect a marginally lower gap compared to other courses. According to some researchers, two possible reasons for this narrow gap are societal pressures that deter women from a career in the field and that women have been shown to choose to participate in subjects in which they have an even greater advantage over men (Fox, 2018, para 14). According to tutor Jed Applerouth (2014), boys are more likely to view school negatively, spend too much time playing video games, and turn towards substance abuse to cope with their problems, which detracts from their academic performance (para. 6). Furthermore, research also shows that males suffer due to social stigma when it comes to succeeding academically. Joseph Workman and Anke Heyder (2020) took a sample of 22,000 students and found that “Males were 1.75 times as likely to report they would be unpopular for trying hard in school and 1.50 times as likely to report they would be made fun of for trying hard in school. Social costs to trying hard in school were directly associated with less rigorous mathematics course-taking and indirectly associated with lower GPA in STEM courses through lower academic effort.” (para 24). Researchers Joscha Legewie and Thomas A. DiPrete (2012) attempted to determine how learning-oriented programs affect the genders differently. The researchers hypothesized that

because the development of anti-social behavior in boys varies strongly with the environment while anti-social behavior in girls is more independent of the environment, boys will see a greater impact with faced with beneficial learning programs. The researchers found that their hypothesis seems to be correct (para. 21). The notion that boys had a greater response to their environment can highlight how external factors can have a greater influence on males compared to females. Lastly, researcher Evelyn Iritani (2019) attempted to view intelligence between males and females while stratifying by income brackets. She found that boys who came from families in the upper brackets performed almost equally to the girls in the same bracket, while boys in the lower-income brackets were greatly behind the girls in the lower-income brackets. The research points to the fact that it is likely external factors that cause the gap, external factors to which males respond more greatly (para. 8).

Physical Differences

Lastly, it is important to recognize that physical differences manifest themselves during male and female development. To begin, Jed Applerouth (2014) lists some physical reasons for female dominance, specifically citing their advantages in self-regulation strategies, self-discipline, and relationship building (para. 7). This idea of self-regulation (the ability to set deadlines and stick to a schedule) is expanded upon by Enrico Gnaulati (2014) who explains that because girls can self-regulate, they can perform well in a system that values timeliness and deadlines, while boys who may be just as able as their female counterparts suffer due to these deadlines (para. 13). Building on the idea of personality traits, researchers from the company TalentSmart have rated the emotional intelligence of over 1 million people, and they have found that females tend to score better than males. This is because they have better self-awareness, self-management, social awareness, and relationship skills (Bradberry, 2016, para. 9). These are

all traits that can help one succeed in a classroom environment, so these could influence the size of the achievement gap. Already touched on is the notion that girls mature faster than boys, leading to a larger brain and possibly larger intelligence (Lynn, 1994, para. 21), (Kanazawa, 2010, para. 5). Lastly, there is the notion that boys, specifically younger boys, are generally more active than girls, which can lead to difficulty sitting in the classroom (Kelvin Seifert & Rosemary Sutton, 2006, para. 15). Moving past these differences in traits, there is also evidence that biology plays a role. Researcher Satoshi Kanazawa (2010) explains that when viewing adults, males tend to be more slightly intelligent. This is not because they are males, but because they are taller, and height correlates with brain size, which correlates with intelligence. He points out that because females mature faster, and therefore have larger brains when they are younger (compared to males their age), they appear to be more intelligent (para. 5). Researcher Richard Lynn (1994) presents findings that show nearly the same thing and makes the same assertion that because girls mature faster, due to fitting puberty at a younger age, and therefore have larger brains when they are young, they are more intelligent in their school years (para. 21).

Coronavirus Pandemic

When it comes to the Coronavirus pandemic's effect, there is a general consensus: those who were struggling in school have only fallen further behind. As explained by the US Office for Civil Rights (2021), "Educational gaps that existed before the pandemic—in access, opportunities, achievement, and outcomes—are widening." This idea is corroborated by data gathered by Dorn. et al (2020) who found that black students, who were already roughly 5 months behind their white counterparts in education, have fallen an additional six months behind.

Research Question

Most of the literature surrounding this topic addresses the pandemic's effect on disparate students or the gender education gap in general, with few rigorous studies specifically examining the pandemic's effect on the gender education gap. In order to address this, the present study examines the research question of "How has the coronavirus pandemic affected the gendered learning gap between male and female high school students?"

METHOD

Method Overview:

As stated throughout this paper, this study has two goals: 1. Attempt to understand the discrepancies in academic engagement between boys and girls, and then 2. Attempt to analyze how these discrepancies relate to different situations and attitudes regarding the learning disruptions prompted by the covid pandemic. To address these, I created and conducted an Explanatory Mixed-Method Study utilizing a survey and interviews. I chose to use this method in order to gain quantitative data regarding certain metrics that can be used to quantify these engagement gaps, and then I could follow up with qualitative data to explain possible trends found in engagement gap metrics. I began this process by using an online randomizer. With this application, I randomly selected 15 out of 33 teachers who teach primarily juniors and seniors and then sent the selected teachers an email describing my study and asking if they would allow me to enter their class and present my study to the students (Appendix A). If the students were interested, they were given a consent or assent form (Appendix B and C), and once these forms were turned in, they were emailed the survey (Appendix D). Students had the option to volunteer to possibly be selected for an interview (interview questions on Appendix E), and from the willing individuals, 5 boys and 5 girls were randomly selected.

Survey:

The purpose of this survey was to collect quantitative data on metrics that can be used to describe the engagement discrepancies as well as data on metrics that can be used for the learning disruption caused by Covid. Questions aimed to identify engagement discrepancies centered around GPA, class rank, time spent on homework, number of AP classes taken, number of classes taken at a local community college, number of STEM classes taken, and time spent

doing extracurricular activities (including jobs). As concluded by Mary R. Anderson-Rowland and James R. Rowland (2007), students who put in more effort generally receive higher GPAs, so because of this, I chose GPA as one of the many measures of engagement. Class rank standardizes GPA by comparing it with others within the same school, which helps illustrate differences in GPA, which in turn can illustrate differences in academic engagement. Furthermore, Michael Holmes and Paul Croll (2006) determined that time spent on homework significantly correlates with academic success, so, given my study's definition of engagement, more time spent on homework correlates to greater engagement. Questions regarding AP, STEM, and community college classes were asked to understand the breakdown of engagement between groups. Questions regarding time spent on extracurricular activities were asked to determine a possible association between external involvement and academic engagement. Next, questions regarding the maturity of male and female classmates were asked. According to Kanazawa (2010), gaps in engagement can be attributed to the differences in maturity between males and females, so this question was asked to identify data about maturity. Lastly, questions regarding Covid were asked. I asked questions to investigate how long students remained at home and how Covid affected their learning. For the full listing of questions, view Appendix D. I included these to determine any possible association between one's level of engagement with school and their situation and attitudes during the pandemic. It is important to consider that students may have some social desirability bias to appease the interviewer or appear more successful, and these questions were written by a human, but question bias was removed at all points possible.

Interview

At the end of the survey, students had the option to opt in to possibly be selected for an interview. Interviews lasted approximately 10 minutes and sought to gather qualitative data about the lived experience of students regarding engagement and the pandemic. I began by asking questions about their greatest distractors during school and what learning style motivates them in order to gather a small picture of their academic persona, which can be compared with other answers regarding their teachers or peers. Using Evelyn Iritani's (2019) notion that a gender bias by the school or teachers could account for engagement gaps, the next questions I asked involved teachers and possible gender biases at school. This was followed by open-ended questions regarding grades and involvement in extracurricular activities in order to obtain qualitative data regarding the trends in quantitative grades and involvement found in the survey portion. In order to explore possible reasons behind any observed gaps, I then asked the participants which gender they believe performs better in school. After this question, I reveal that by most available metrics, females perform better, and I then asked why they think that is. Lastly, I ended with some open-ended questions about how Covid affected their learning. The purpose of these questions was to obtain qualitative data regarding the trends in quantitative data regarding Covid found in the survey portion. Moreso than the survey, the interview provides a potential for students to answer differently than they truly feel due to social desirability bias to make themselves look good, and it is possible that interview bias took effect based on the slight variance in the manner of questioning (wording was kept the same, voice inflection and pitch changed slightly each time).

Participants

I chose to limit my study to only involve juniors and seniors at a large southern suburban high school. The reason for using juniors and seniors exclusively has to do with the fact that the Covid pandemic hit near the beginning of 2020, and many students have yet since then had a regular school year. Current high school sophomore and freshman students never experienced high school pre-pandemic, making it difficult for these students to compare how well they did in high school before the pandemic and during the pandemic, which is a large part of this study. Because of this, I decided to only sample those who at least had one semester of regular high school, limiting my participants to current high school juniors and seniors. Many of these participants were minors, so many assent forms were needed. Data was kept both anonymous and confidential. Participants did need access to the internet (usually through a computer or phone) to complete the survey.

Procedure

To begin, I created my survey on Google Forms and wrote out my interview questions. Then, I emailed the department heads of the core classes (math, science, English, history) at the high school to explain my study and to ask for a list of all teachers in their departments who teach primarily juniors and seniors. (Appendix F). Once the teachers responded, I consolidated a list of 11 AP teachers, 11 Honors teachers, and 11 CP teachers, and then I used an online randomizer to randomly select 5 of each (15 total). I stratified by difficulty level in order to keep the sample diverse and representative. From here I sent an email to all of the selected teachers, explaining my study and asking if I could present my study to their class (Appendix A). If they responded, I would email the teacher to find a time that works best for them, then I would enter

their class and give a brief summary of what my study entailed. (Appendix G). From here, I would ask for volunteers to participate. If they were 18 or older, they were given a consent form, if they were 17 or younger, they were given an assent form (Appendix B and C). The students could return the form to their teachers and after 5 days, I would return to collect the forms. From here, I would send the students the survey. After collecting surveys for 5 weeks, I took the emails of every girl who expressed interest in an interview and a separate list of every guy who expressed interest in an interview, and then, using that randomizer on the internet, selected 5 of each for the interview (10 in total). Interviews were conducted in person in the cafeteria while the interview was recorded on my phone, as well as after school via Zoom, which was also recorded. The recordings were kept secured on a locked computer and phone and were not shared with anyone.

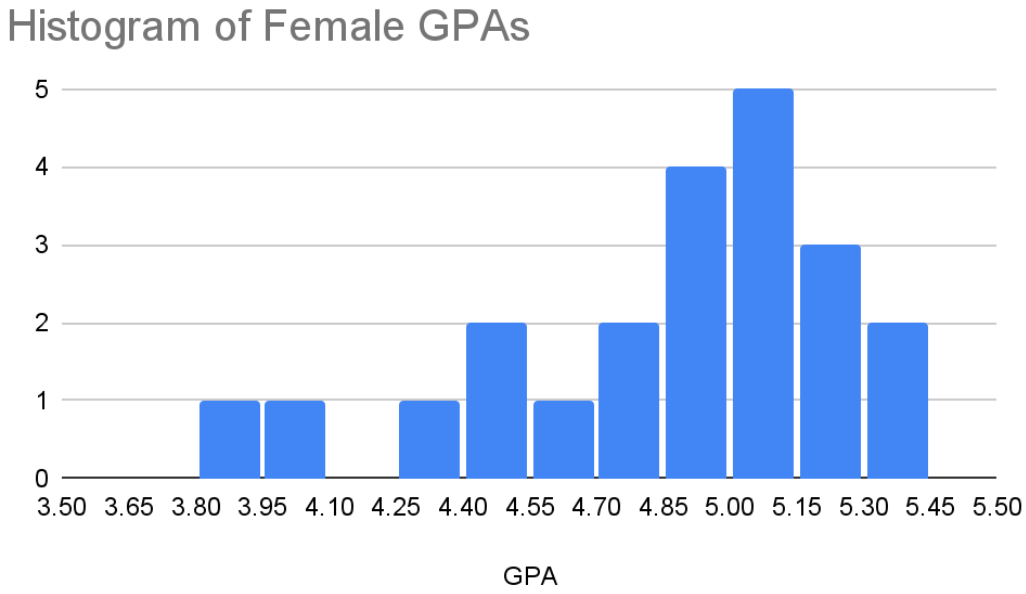
Ethics

This study was approved following a rigorous review conducted by an IRB committee after I added several ethical considerations to the study. Participants were given informed consent during every phase of the process and could withdraw at any time. They were free to question any part of the study and could refuse to answer any questions on the survey or interview. Non-monetary incentives were offered for participating. All data were kept confidential, anonymous, and secured.

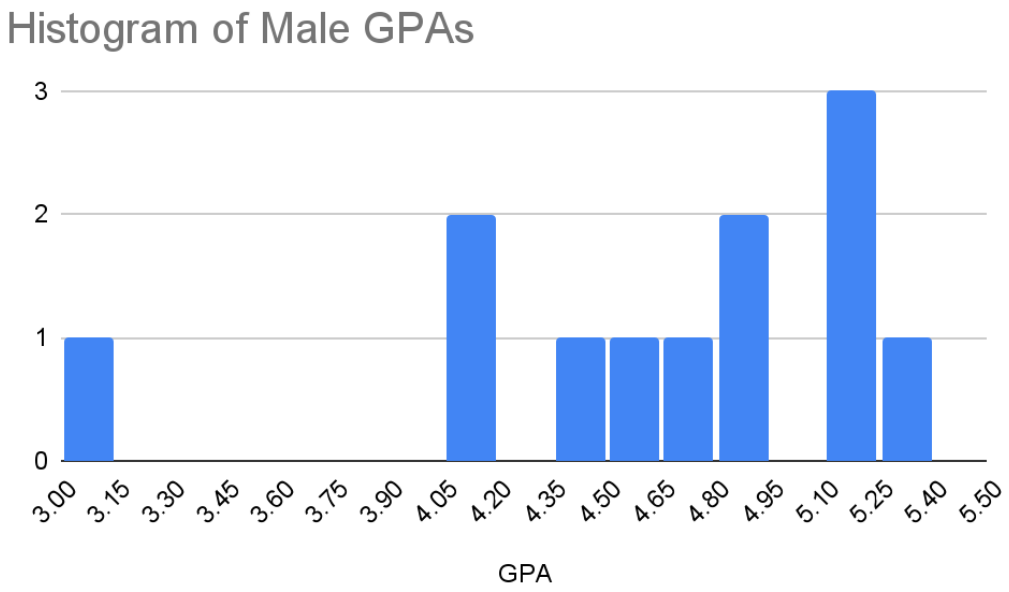
RESULTS:

Within the 34 responses to my survey, 22 respondents (64.7%) identified as female and 12 respondents (35.3%) identified as male.

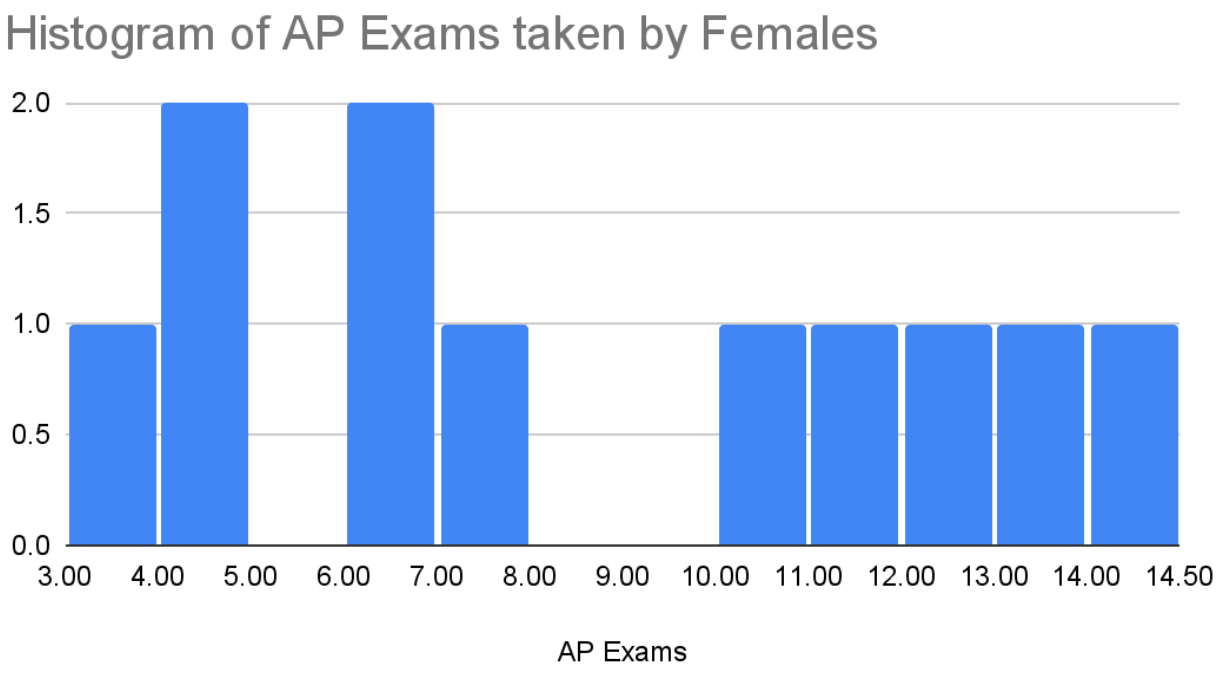
For female respondents, the mean GPA was 4.860 with a Standard Deviation of 0.401.



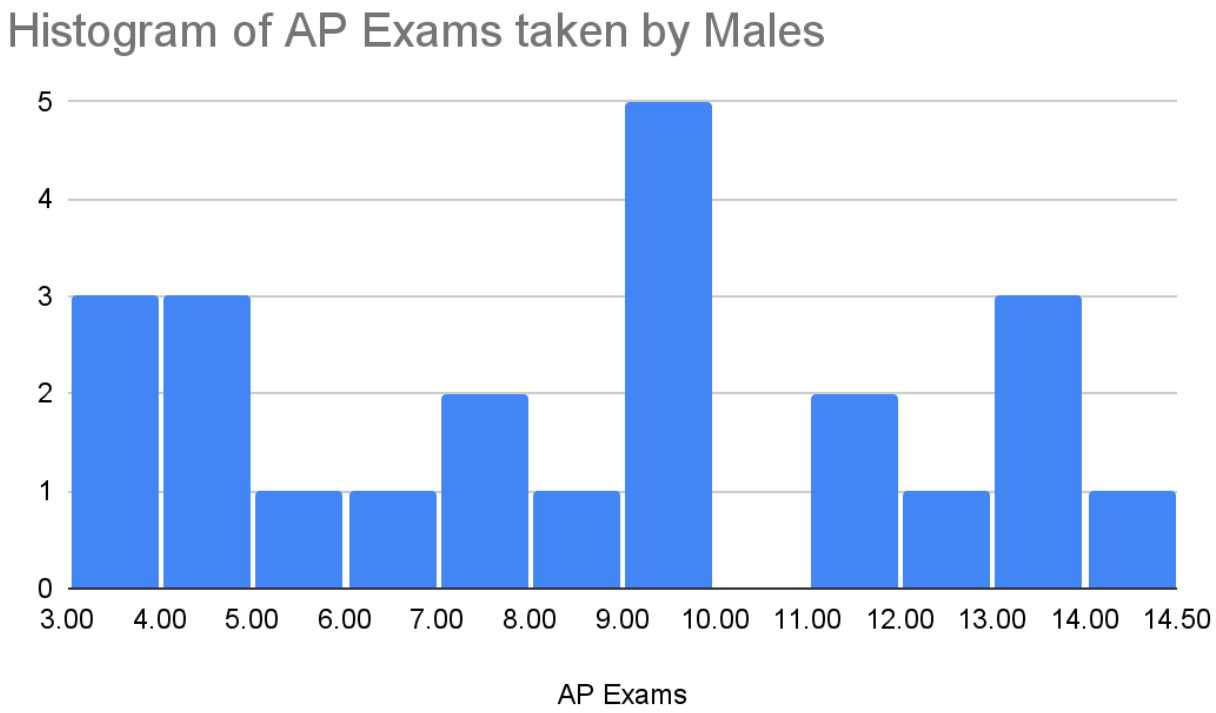
For males, the mean GPA was 4.642 with a Standard Deviation of 0.633.



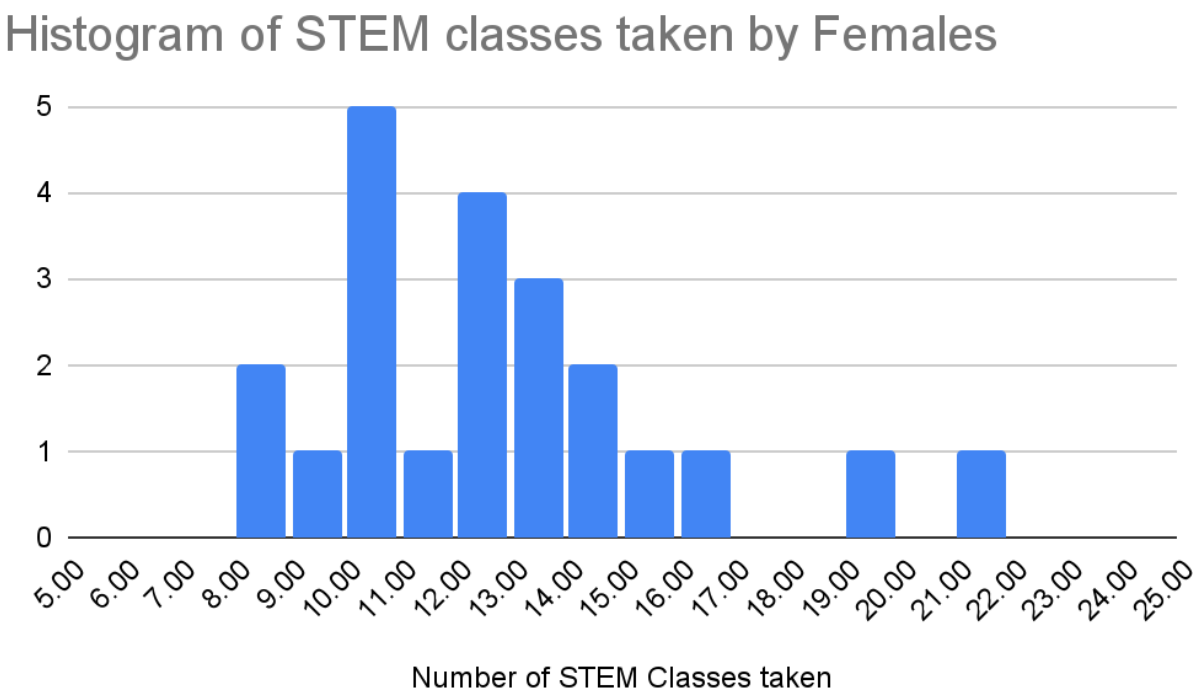
On average, females took 8.318 AP Exams with a Standard Deviation of 3.524 exams.



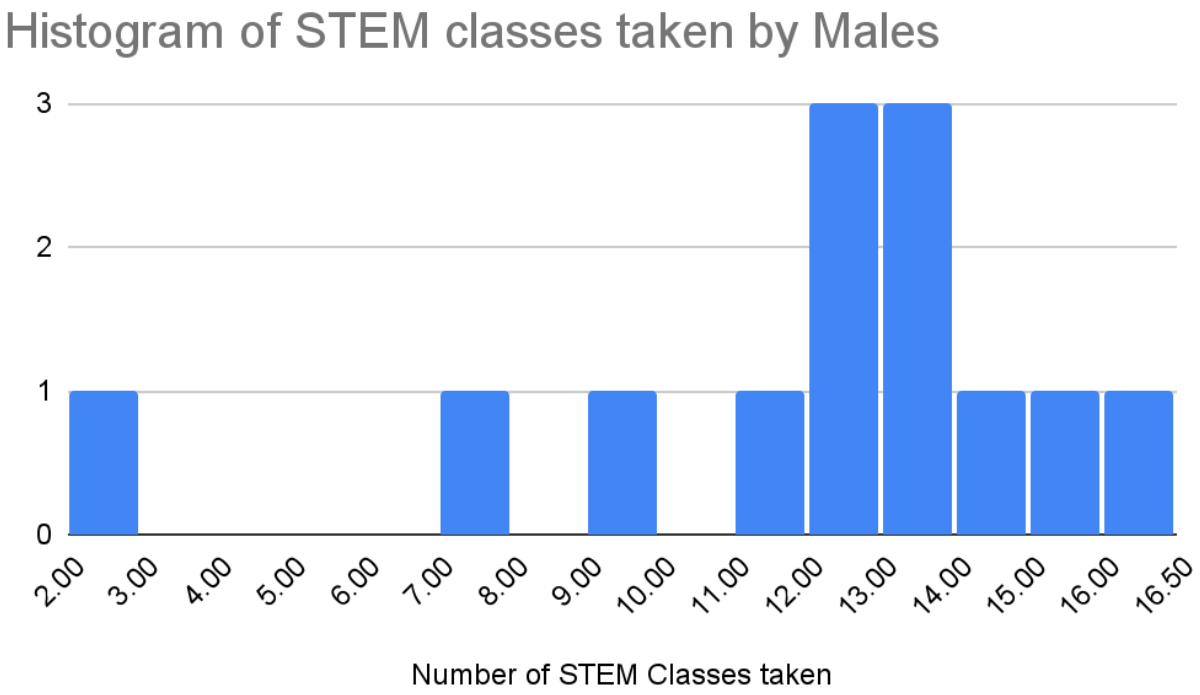
On average, males took 8.182 AP Exams with a standard deviation of 3.945 exams.



On average, females took 12.364 Stem classes with a standard deviation of 3.274 classes.

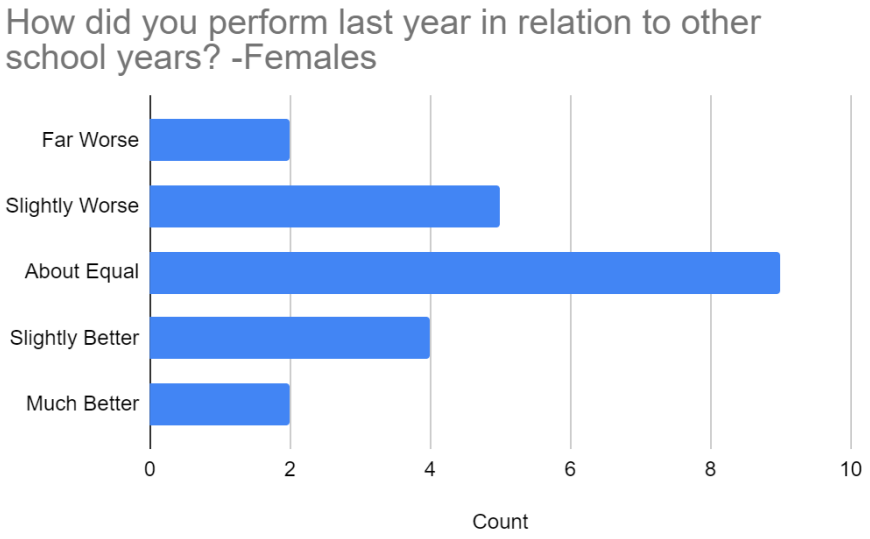


On average, males took 12.25 Stem classes with a standard deviation of 2.454 classes.

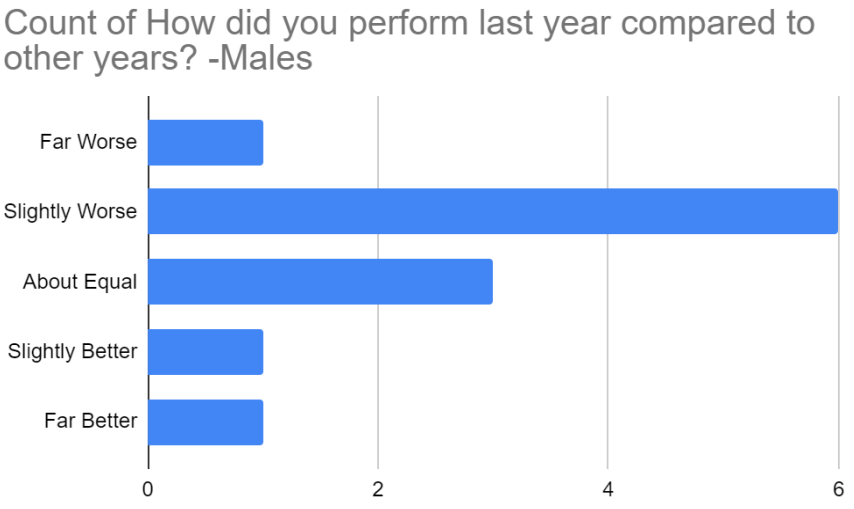


No difference was found between the number of classes taken by females during the 2020-2021 school year and the number of classes taken by males during the 2020-2021 school year.

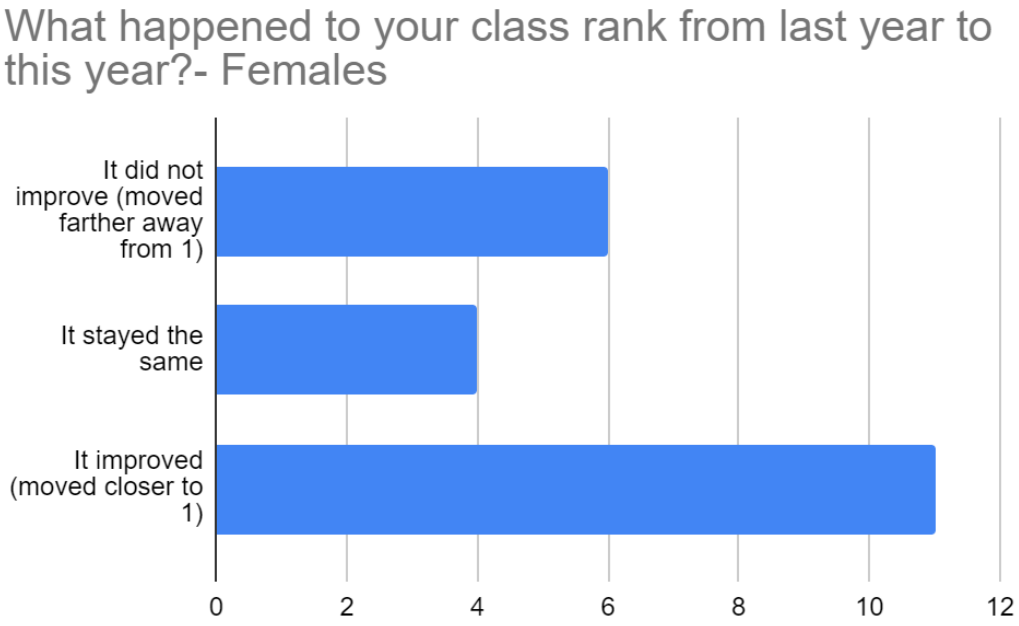
For females, 16/22 respondents (72.7%) claimed they academically did equal to or better than other years did during the 2020-2021 school year.



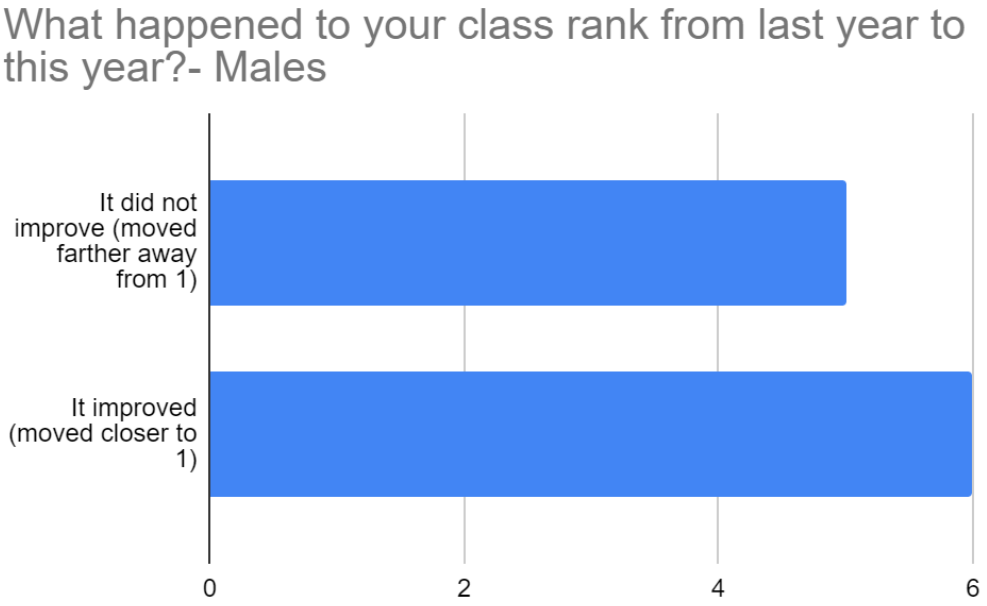
For males, 5/12 respondents (41.7%) claimed they academically did equal to or better than other years did during the 2020-2021 school year.



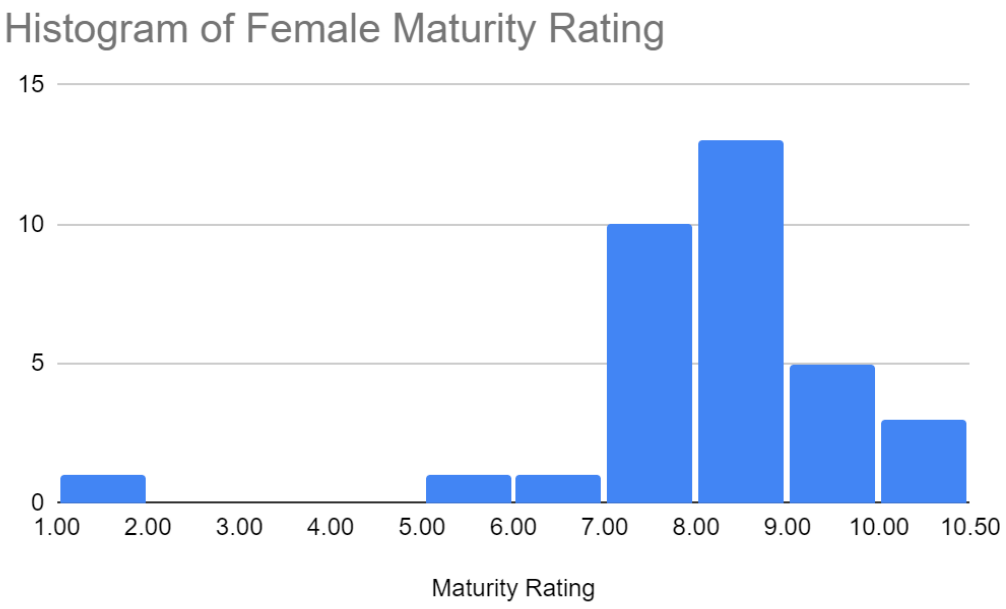
For females, 15/21 respondents (71.4%) claimed that their class rank remained unchanged or improved after the 2020-2021 school year.



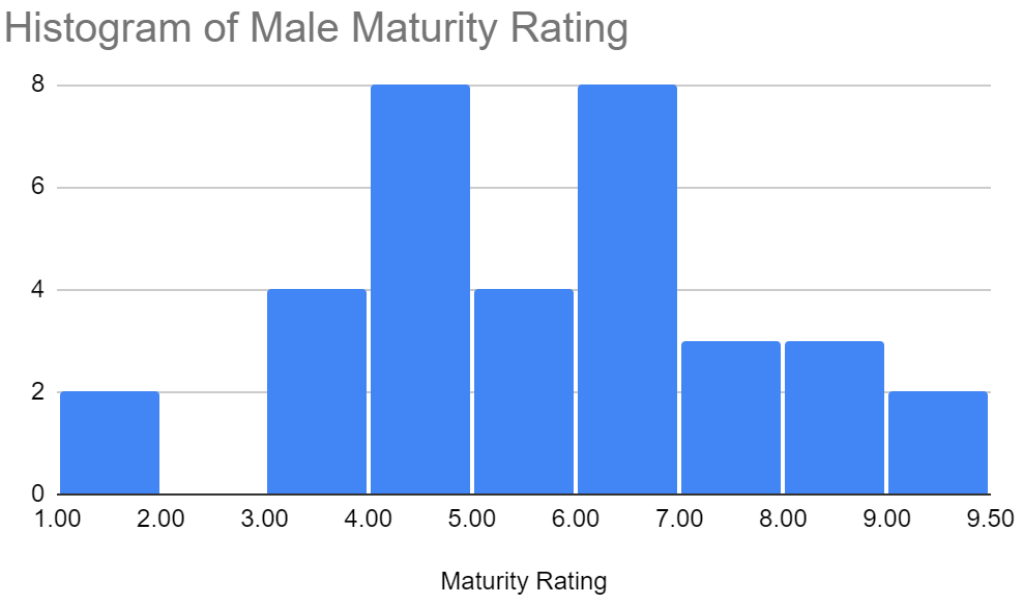
For males, 6/11 respondents (54.5%) claimed that their class rank remained unchanged or improved after the 2020-2021 school year. (0 male respondents answered “It stayed the same”)



When asked to rate the maturity of their female classmates (on a scale from 1 to 10 with 1 being "least mature" and 10 being "most mature"), respondents gave females an average rating of 7.676 with a standard deviation of 1.609.



When asked to rate the maturity of their Male classmates, respondents gave Males an average rating of 5.205 with a standard deviation of 2.011.



As for the interview portion, 5/5 male interviewees and 3/5 female interviewees believed that there is a difference in engagement between males and females in school. When told that by most available metrics, females are more engaged with school in nearly every way, 4/5 males and 4/5 females believed this was due to a difference in the level of motivation for the genders. According to 5/5 males and 4/5 females, females have better study habits, time management skills, and proactivity. According to 3/5 males and 1/5 females, there is a noticeable difference in how teachers treat males and females.

As for questions about covid, 4/5 males believed they were greatly unprepared for the difficulties the pandemic had brought, while 3/5 females believed they were greatly unprepared for the difficulties the pandemic had brought. When asked what they would do differently if another lockdown happened in the future, 5/5 males stated that they would try to be more focused while 4/5 females also said they would try to be more focused.

DISCUSSION

The first figure of note is the number of respondents for each gender. A roughly equal amount of males and females were randomly selected and had the opportunity to participate, which involved the completion of a survey and direct engagement with the academic activity. From the very beginning, females appear to be more engaged than males in school, which is consistent with the literature.

The next data that holds significance is the mean GPA of males and females. Although there is a difference between mean male GPA (4.642) and mean female GPA (4.860), this difference is not statistically significant (p-value of 0.147, alpha of 0.05). With a larger sample size, if the current trend continued, it is easily possible that the difference would become significant. However, according to my data, the difference I observed could be caused by random chance alone. What this data show differs from what the work of researchers Joseph Workman and Anke Heyder (2020) found in their paper: a significant difference between male and female GPAs. Once again, I believe this is due to my relatively small sample size.

Just as with GPA, there is a noticeable difference between the number of AP exams taken by males and females, but also as shown for GPA, this difference is not significant (p-value of .494, alpha of .05). This also differs from the results of Joseph Workman and Anke Heyder (2020), for they did find a significant difference between the AP course load between males and females. Once again, I attribute this to a small sample size. If there was a larger sample size, as long as the trend did not disappear, it is likely that this data would have been significant.

For STEM classes, the findings observed are interesting. There is a common perception that males are more involved with STEM classes than females (Maggie Fox, 2018), but similar to researchers Maggie Fox (2018), Malek Abu-Jawdeh and Shwetlena Sabarwal (2017), and

Evelyn Iritani (2019), my data presents a different possibility: a higher involvement of girls in STEM classes. Because my data does not indulge what grades are received by which gender, nor attempt to gauge involvement within each STEM class, nor stratify by different areas in STEM, it is possible that disproportionate representation exists within the area. Nevertheless, my data does support the fact that females are at least taking the same number, if not more, STEM classes than males do.

Next, there is the first question regarding Covid. This question allowed respondents to select how they believe they did during the 2020-2021 school year in relation to "normal years" (school years not impacted by the COVID-19 pandemic). When comparing the percentage of females who claimed they academically did equal to or better than other years did during the 2020-2021 school year to the number of males who claimed they academically did equal to or better than other years did during the 2020-2021 school year, there is a statistically significant difference (p-value of .03754 and alpha of .05). Based on Evelyn Iritani (2019) and much other relevant research, this difference could have been hypothesized, but until now, few studies have been able to find data supporting it, strictly due to the recentness of Covid. Connecting this to the results of my interview, this can possibly be explained by a difference in motivation and study habits (a trend noted by nearly all of the interviewees), which is supported by the work of researchers Junlin Yu, Ros McLellan, Liz Winter (2020), who found that differences in motivation between males and females lead to differences in success at school (para. 8). According to my interview responses, during Covid, there was a decrease in direct motivation from the teachers, as most students were remote. One male interviewee stated, "...even if we were in-person, most teachers would spend all their time attempting to work with the students on Zoom. When we could get the teacher's attention, we would have to talk to them through the

masks and seven layers of plexiglass between us. It was not the best learning environment." This finding helps shed light on this entire premise, hinting at the fact that males suffered a greater loss in engagement during the lockdown phase of the pandemic than females did.

Despite the significant finding with self-reported academic success, the difference in the percentage of females and males who claimed that their class rank remained unchanged or improved after the 2020-2021 school year is not significant (p-value of .16853, alpha of .05). There still was a fairly large difference between males and females (71.4% for females versus 54.5% for males), but this could have been due to random chance alone. Based on the literature, specifically the work of Christina Hoff Sommers (2000), whose work consolidated many different studies that expressed female dominance in high school academia, and my other findings, I believe that with a larger sample size, this trend would have continued and the difference would eventually become significant.

Lastly, there is the data on the maturity level. Based on Michael Price (2017), Richard Lynn (1994), Malek Abu-Jawdeh and Shwetlena Sabarwal (2017), and Satoshi Kanazawa (2010), the primary reason behind any observed differences in intelligence between males and females is simply due to a difference in maturity levels, caused by the fact that males and females hit puberty at different times. With my data, I found that the difference between the mean maturity rating for females (7.676) and males (5.205) is statistically significant (p-value of 0.0008, alpha of .05). This is consistent with most literature.

New Understanding

Based on my research, I believe there is evidence to support that there still is an academic engagement gap between males and females, and that the Coronavirus pandemic has hindered male engagement more than female engagement. However, further research with a larger sample

size is necessary. Although it is possible all of my data regarding differences in academic engagement are simply due to random chance, finding a difference would be consistent with the literature, which could imply that my data was not merely observing a statistical anomaly, but rather a usual trend, just with too small a sample to view any statistically significant differences. The strongest evidence to support my conclusion is the statistically significant difference in self-reported success during the 2020-2021 school year. Furthermore, based on my interview responses, males seemed to feel more unprepared to face the challenges brought about by the pandemic than females did. If these pieces of data are indicative of a larger trend, it could have important implications. The world will be recovering from this pandemic for many years to come, so it is important to identify areas that need remedy in order to help combat whatever damage the pandemic caused. If males have fallen further behind their female counterparts in schools, it is important for educators to acknowledge and address this fact in the future. Now, most of my data was not statistically significant, and the only parts that were statistically significant were self-reported subjective opinions. Because of this, further research is certainly necessary to truly discern the impacts of this virus on education.

CONCLUSION

The ultimate goal of this paper was to explore the pandemic's effect on academic differences between males and females. Some significant results were found, but most results were statistically insignificant. With a larger sample size, if current trends found in the data persisted, which would be consistent with the literature, it is likely that more significant differences would have been found. Based on the significant differences that were discovered, and based on the interview response regarding motivation in the classroom, there is evidence that supports the original hypothesis, that being that over the coronavirus pandemic, male engagement was more greatly impeded than female engagement possibly due to a lack of male motivation.

Despite this evidence, there were a few points of error and limitations of this study. The primary point of error stems from the fact that, although survey questions were written with a strong emphasis on remaining neutral, they were written by a human, so there is the possibility for human bias. As for limitations, the primary issue was sample size. With a small sample size, the chances of observing true trends are smaller than with a larger sample size, making my results less generalizable. Another limitation of the methodology self-response employed by this study was the fact that all responses were merely self-evaluation, something at which humans are notoriously bad. In an attempt to combat this, there were efforts to use students' previous year's class rank kept by the school (with proper informed consent about the use of this data), but despite the school's initial willingness to provide this data, the school ultimately decided against it.

The data collected supports both the notion that females perform better in school and that the pandemic has widened current disparities in high school students, aligning this paper with the

work of the Office for Civil Rights. The understanding of these effects is imperative when formulating a more equitable tomorrow. Once educators acknowledge these discrepancies between males and females, they can implement more specific and individualized programs to help males who may have a harder time focusing and remaining mature in the classroom. Now, this research was done with a relatively small sample size, and although the results corroborated the literature, future research is necessary to further understand and confirm these findings. Lastly, the results of this study highlight the necessity of new teaching techniques to combat growing discrepancies, but this study did not begin to explore this topic. Further research is necessary to discover the best way to combat these discrepancies.

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Appendix A

Hello _____

I hope you are doing well! My name is Ryan Teachman and I am currently taking Mrs. Sox's AP research class. For my study, I am analyzing the effects covid has had on the academic discrepancies between males and females, and your class has been randomly selected to have the option to participate!

If it is possible, sometime early next week, or the week we get back from break, is it okay if I stop by one of your classes and give a quick spiel to that class? I can do any block, and if there are two blocks that work equally well for you, please give me the one that occurs the latest in the day. It should take no more than 4 minutes, for all I have to do is give a short run-through of my study and then offer consent forms for those who choose to participate. All the students will have to do is fill out a short survey after they turn in their consent forms (the students will do this on their own time).

If you would like one of your classes to have the option to participate in the study, please send me the day and period that works best for you (early next week will work the best for me, but I can do any day).

I know you are likely very busy, so it is perfectly fine if you don't want your class to participate!

Thank You!

Ryan Teachman

Appendix B

Post-Covid High School Academic Discrepancies between Males and Females

Consent Form to Participate in Research Study

Title of Study: Mixed-Method Study on Post Covid High School Academic Discrepancies between Males and Females

Researcher: Ryan Teachman Dept: AP Research Student Phone: (843) 810-2624

Introduction

- You are being asked to be in a research study about the gap in academic achievement between males and females, and the coronavirus pandemic.
- You were asked to be a participant because you are either a junior or senior in high school
- We ask that you read this form and ask any questions that you may have before participating in this study.

Purpose of Study

In the past few decades, a trend has been noticed in education: a growing achievement gap between male and female students. This gap is worrisome to educators who fear that this discrepancy in education could have long-term effects if not dealt with. Furthermore, the coronavirus pandemic has led to great disruption in education, and it is currently unknown how this has affected the achievement gap. The purpose of this study is to determine the extent to which an achievement gap exists between male and female high school students, and then to analyze how covid has impacted this gap.

Description of the Study Procedure

- You will be asked to complete a survey asking basic questions regarding your academic engagement
- You may be asked to complete an interview in which you will be asked questions regarding how the pandemic has impacted your learning and how teachers treat different genders at school.
- Your information will be kept confidential, for within the study you will be referred to by "Participant #" (For interview only)

Benefits for the Study

- You will be contributing to data that could prove useful in the future of educational development
- You will be helping a fellow Wando High School student complete his AP Research paper
- You can earn community service hours for Honors Societies (AP Academy, Beta Club, etc) by participating in this study

- **Service hours can be given through participation**
- **Additional service hours or a cookie can be given for participation in an interview**

Rights

- ALL INFORMATION COLLECTED WILL REMAIN CONFIDENTIAL
- Participation is completely voluntary
- You have the right to withdraw from the study at any time
- You have the right to leave questions blank or refuse to answer any questions
- You have the right to ask questions regarding the study or the results of the study
- If this study is published, any information linking data to you will NOT be included in the publication

Consent

Your signature below indicates that you have decided to participate as a research subject for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the study investigators.

Participant Information:

Participant Name: _____

Participant CCSD email address: _____

Participant Age: _____

Participant Signature: _____ Date: _____

Appendix C

Post-Covid High School Academic Discrepancies between Males and Females

Consent Form to Participate in Research Study

Title of Study: Mixed-Method Study on Post Covid High School Academic Discrepancies between Males and Females

Researcher: Ryan Teachman Dept: AP Research Student Phone: (843) 810-2624

Introduction

Your child is being asked to be in a research study about the gap in academic achievement between males and females, and the coronavirus pandemic.

Your child was asked to be a participant because they are either a junior or senior in high school

We ask that you read this form and ask any questions that you may have before your child participates in this study.

Purpose of Study

In the past few decades, a trend has been noticed in education: a growing achievement gap between male and female students. This gap is worrisome to educators who fear that this discrepancy in education could have long-term effects if not dealt with. Furthermore, the coronavirus pandemic has led to great disruption in education, and it is currently unknown how this has affected the achievement gap. The purpose of this study is to determine the extent to which an achievement gap exists between male and female high school students, and then to analyze how covid has impacted this gap.

Description of the Study Procedure

Your child will be asked to complete a survey asking basic questions regarding their academic engagement

Your child may be asked to complete an interview in which they will be asked questions regarding how the pandemic has impacted their learning and how teachers treat different genders at school.

Your child information will be kept confidential, for within the study they will be referred to by "Participant #" (For interview only)

Benefits for the Study

Your child will be contributing to data that could prove useful in the future of educational development

Your child will be helping a fellow Wando High School student complete his AP Research paper

Your child can earn community service hours for Honors Societies (AP Academy, Beta Club, etc) by participating in this study

Service hours can be given for the completion of the survey

Additional service hours or a cookie can be given for participation in an interview

Rights

ALL INFORMATION COLLECTED WILL REMAIN CONFIDENTIAL

Participation is completely voluntary

Your child will have the right to withdraw from the study at any time.

Your child has the right to leave questions blank or refuse to answer any questions

You and your child have the right to ask questions regarding the study or the results of the study

If this study is published, any information linking data to your child will NOT be included in the publication

Consent

Consent

Your signature below indicates that you have decided to allow your child to participate as a research subject for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the study investigators.

Parent Information:

Parent/Guardian Name: _____

Parent/Guardian Phone Number: _____

Parent/Guardian Signature: _____ Date: _____

Participant Information:

Participant Name: _____

Participant CCSD email address: _____

Participant Age: _____

Participant Signature: _____ Date: _____

Appendix D

1. What was your birth sex?

Male/Female

2. What is your current GPA? (It is displayed in PowerSchool)

3. How many AP Exams will you have taken by the time you graduate? (if you are not a senior, take the total number of exams you will have completed by the end of this school year and add that to the number of exams you anticipate you will take senior year)

4. How many STEM class will you have taken by the time you graduate? (if you are not a senior, take the total number of STEM class will have completed by the end of this school year and add that to the number of STEM class you anticipate you will take senior year) STEM Classes include: Maths, Sciences, Engineerings, Biomeds, Health Sciences, Computer Sciences, etc. (This includes required math and science courses)

5. How many classes did you enroll in for the 2020-2021 school year (last year)?

6. How many Trident classes will you have completed upon graduation?

7. As a student, which describes you best?

8. Approximately how many hours a night do you spend on homework?

9. Approximately how many hours a day do you spend doing extracurriculars/working? (Jobs, music, sports, volunteering, etc.)

11. Academically speaking, how did you perform during the 2020-2021 school year (last year)?

12. Between the start of the 2020-2021 school year (last year) and the start of the 2021-2022 (this year), what happened to your class rank?

13. On a scale from 1 to 10, how would you rate the maturity level of your Male classmates (In all classes)? (1 being the least mature and 10 being the most mature)

14. On a scale from 1 to 10, how would you rate the maturity level of your Female classmates (In all classes)? (1 being the least mature and 10 being the most mature)

Would you be willing to participate in an interview?

These interviews will take no longer than 20 minutes, and can be done before/after/during school or over Zoom. Participation in an interview will be randomly selected from all those who consent to an interview, and participation in the interview can grant you additional service hours or a cookie. If you select “Yes”, you will be sent the Consent Form for Interviews to fully read and review

Would you be willing to participate in an interview?

*

Yes, I am interested in participating in an interview and would like a consent form / No

If you would like to participate in an interview, please enter your email below. Enter N/A if you do not want an interview (Note: Your email will not be used to identify your answers, it will only be used to contact you for the interview)

Appendix E

Interview Questions

It will start with a little blurb: Thanks for doing this. I'll keep it quick. Just a reminder, all of your responses will be recorded using this *holds up recorder* recorder. Even though you are physically present, all of your responses will be kept confidential and anonymous. So, please answer honestly. You can leave at any time and if you do not want to answer a question, just say, "Let's skip this question". If you chose to skip a question, it will not be referenced or used in any form of data analysis. Any questions?

1. At school, what is the greatest distraction to your learning?

2. We all have those moments when a teacher teaches something in a way where we are just captivated, whether they do it through a game, using some book, presenting a video, etc. What teaching style engages you the most?

3. If you could change one thing about your teachers, what would it be?

4. Do you feel like teachers treat males and females differently? Why?

5. How involved are you with extracurricular activities?

6. Do you have a job? How much do you work?

7. How much do you care about grades? Why?

8. Who does better in school, boys or girls?

9. Do you feel like the structure of school benefits one gender over the other or remains neutral?

10. By most available data, girls perform better in school than guys do. Why do you think that is?

11. How did Covid affect your learning in the 2020-2021 school year? Explain.

12. If covid happened again, what would you do differently to do better in school?

13. Did you feel adequately prepared for the challenges that covid brought?

Appendix F

Hello _____

I hope you are doing well!

I am currently in AP research, and for my study, I am attempting to contact teachers who teach classes with primarily juniors and seniors. I spoke with a guidance counselor and they told me to contact the department heads for each subject in order to obtain a list of teachers who teach at least one class with primarily juniors and seniors. They can be any level class, from AP to CP, as well as any different subject. Using this list, I hope to randomly select teachers to contact.

When you get a free moment, can you send the names of the history and social studies teachers who teach a class with primarily juniors and seniors?

If you have any questions, please contact me!

Thank You!

Ryan Teachman

Appendix G

Hello, my name is Ryan Teachman and I am a student in AP Research this year. AP Research is a class where we choose a topic and conduct a study on it in hopes that we will learn more about a topic or discover something new. This year, I am doing my study on how covid has impacted gendered differences in education. Guys and girls have different academic habits, and there is no denying that covid had a major impact on learning.

Anyway, your class was randomly selected to participate! Participation is completely optional and all answers you give will be kept anonymous and confidential. All you will have to do is complete a quick 13 question multiple choice survey and you will have the option to be selected to participate in an interview. For completing the quick survey, you can get service hours, and for completing an option interview, you can earn additional service hours or a cookie. But most of all, you will be contributing to an interesting study that could have real-world implications.

Any Questions?

Alright, because of laws, there are two different consent forms for people 17 and under and 18 and over. If you are 18 or over, you get to sign your own consent forms. If you are over 18, you can sign you own forms, if you are under 18, a parent must sign the form for you. Once you fill out your consent form, you can hand it to Mrs Sox in room E 107 or your teacher. Once I get the consent form, I will email you the survey for you to complete.

So, who would like to participate?