HIGH SCHOOL EDITION
Journal of Student Research
Volume 13 Issue 3 (2024)

Comparing Birth Month and GPA

Avery Shellow

Calabasas High School, USA

ABSTRACT

In Malcolm Gladwell's book, Outliers, he posits that there are people who do not follow the typical trends found in data, and named people outliers. Students with birth dates closer to school age cutoffs are more mature than their later birth order peers but do their GPAs prove this trend to be true? It does not help that some outliers do not follow the typical patterns causing discrepancies in data. This led to the answering of whether students born closer to the age cutoff have higher GPAs, while students born further from the age cutoff have lower GPAs. This was ultimately tested through a statistical correlational analysis where the information was gathered from High School students in Los Angeles. In addition to birth order, there are additional factors that play into a person's chance of success academically. Birth dates closest to the age cutoff result in higher GPAs while being born further from the age cutoff results in lower GPAs. Despite these findings, there are other factors such as birth order, and the amount of time spent studying that can impact a student's chances of academic success.

Introduction

There is a problem in America regarding predetermined success decided with the month a person is born. Despite different birth months having different advantages depending on age cutoffs, primarily students born in the summer after the school-age cutoff in America have lower grade point averages (GPA)s. Age cutoffs can change a person's ability to attain success by giving them advantages and opportunities not presented to students who seem less developed at a younger age. In reality, age cutoffs affect people in all aspects of life, including academics and athletics. For example, when reading Outsiders by Malcolm Gladwell over the summer for AP English Language, Gladwell found that birth months have a major correlation with National Hockey League (NHL) players and professional soccer players' success. The age cutoff for hockey is January 1, whereas the English premier leagues' age cutoff is September 1. Overall, Gladwell found that 70% of the most elite hockey players were born in the first six months of the year, more specifically with 40% being born from January to March (Gladwell 2008). Similar to the English premier league soccer players, 288 were born from September to November and only 136 were born between June and August (Gladwell 2008). The same is even exemplified at younger ages with a junior world championship for soccer having 135 players born in the first three months after August 1 (the age cutoff) and just a mere 22 born in May, June, and July (Gladwell 2008). It is evident that depending on a person's birth month they are more likely to excel in certain aspects allowing them to thrive more in fields such as athletics. A possible root of this issue is the predetermined age cutoffs set at a young age. To mitigate these issues, it is crucial to understand whether there is a correlation academically between a person's birth month and GPA determined through a survey. By comparing the responses in a similar way that has been done in Gladwell's study, but by catering to how hard a student tries rather than how strong an athlete is, it can be concluded whether there is a correlation between birth month and academic performance. Ultimately, this will identify educational inconsistencies on whether students are set on a perpetual path based on their academic perception at a young age, allowing people to truly understand if there is an optimal month to be born to be given the best chance at thriving academically.

Literature Review

A predecessor to success can be something as minuscule and uncontrollable as when someone was born (Nash & Stevenson, 2004). Age cutoffs unknowingly continue to determine the success of an individual due to when they are born. Different aspects of life surrounding age cutoffs are constantly evaluated to see if there are people given a better chance at success with sports and academics due to when they are born causing them to be under review most frequently.

When someone is born (the month of their birth) creates an everlasting effect on their future since it determines their life plan (The Guardian 2011). Thus certain age cutoffs cause unfair advantages for some kids and disadvantages for others. A person spends an immense amount of time on what they are going to do in their life which can be predetermined by when they are born. Therefore age cutoffs in all aspects of life can unintentionally set people on a path for life.

Children develop their life plans from key domains of academics, athletics, and arts. This paper explores a similar domain but more specifically in the aspect of school. In addition, this paper determines whether or not students are given an advantage in academic achievement. Currently, there are some papers, highlighted below, that examine the correlation between academic performance and birth month as well as athletic performance and birth month. Instead, they mainly focus on test scores compared to birthdays as well as outdated studies and one that focuses on different age groups. This literature review identifies the gap that will determine whether, in high school students, there is a correlation between a student's GPA and birth month.

Author Malcolm Gladwell conducted a research study in his 2008 book Outliers. Gladwell, an English-born Canadian journalist, author, and public speaker working for The New Yorker examined the advantages given to people born closer to age cutoffs. Taking a different approach to the age cutoff issue, he evaluated the birthdays of professional hockey players. The people analyzed were from all over North America. Gladwell analyzed the birth month of the players based on four specific domains: (1) Birthdate, (2) Weight, (3) Height, and (4) Teams before the NHL. The researcher collected data relating to the four domains and concluded that the closer you are born to the age cutoff for hockey the more likely you are to go into the NHL (Gladwell 2008). Additionally, the closer to the age cutoff you were for hockey allowed a better chance at success, enabling more practice and in turn even better hockey team recruitments. However, Gladwell's study solely examined professional hockey in North America.

Bjerke, Smestad, Eriksen, and Rognes, professionals in the field, examined the months maturity of students starting on their 6th birthday. According to their study, students born closer to the age cutoff are several months more mature than those born further from the age cutoff due to a few months being a long amount of time at a young age.

Students of different birth months have GPAs that vary monumentally due to them being more mature (Bjerke et.al. 2021). Therefore a prominent issue between when age cutoffs are and what your GPA is needs to be evaluated to determine whether age cutoffs need to be relooked at.

In 2020, another study by Givord, a researcher in education economics, found new evidence demonstrating that birth month plays a role in performance at school. Givord found that "depending on their month of birth, some students may be older than others when they take the PISA test" making it so that they have more of an advantage (Givord, 2020). This causes them to be in a perpetual cycle where they continue to be given more advantages to do better and better in school. More often than not, students seen as more successful become ahead of their peers as they receive more attention due to their accomplishments. However, the test is conducted on students at a young age and does not portray an accurate description of what their academic performance could have been if tested for acceleration at a more developed age.

In the next study, Solli analyzed different age groups over periods in different countries to see how age cutoffs have changed internationally, and if it has affected birth month correlations to GPA. Solli analyzed the data in Norway from 1992-2003 versus the data in Norway from 2002-2007 (Solli, 2017). From analyzing

this data they have been able to see how the results have changed over time depending on how age cutoffs for school have changed. Solli analyzed standardized test scores from the two different periods to see if there was a change over time. Ultimately, they determined that there was no overall difference in GPAs over time, but there was a correlation between the highest GPAs staying closest to when the age cutoff was for each year.

In a fourth study, Bernardi and Graetz, educational researchers, analyzed students in grades 4-5 and 8-9 to see if the same correlations for GPA and birth month were present for both age groups. They also analyzed "a role in explaining the compensatory advantage to students from highly educated families" (Bernardi & Graetz, n.d.) This allowed them to dive deeper into other factors that caused some students to prevail over others and they were able to find that the GPA changes level out over time. Therefore it is necessary to identify other factors that determine if there is a correlation between GPA and effort.

The cutoffs have a detrimental effect on someone's predetermined success that needs to be reevaluated. Age cutoffs set students on a path from the time they enter the educational system. To ensure that future generations are not left behind because of their birth month, it is necessary to fill major gaps within learning deficits by giving more students opportunities to succeed by determining levels within grades for education at a later age. This then allows students to be more equitably developed when they determine what their academic rigor is capable of. By evaluating students at an older age and in their academics, the researcher was able to conclude whether or not there is a correlation between a high school student's birth month and GPA, unlike studies have previously done. Therefore, using the research conducted, age cutoffs can be changed and fixed to give everyone an equal opportunity at success.

Methods

Hypotheses & Introduction

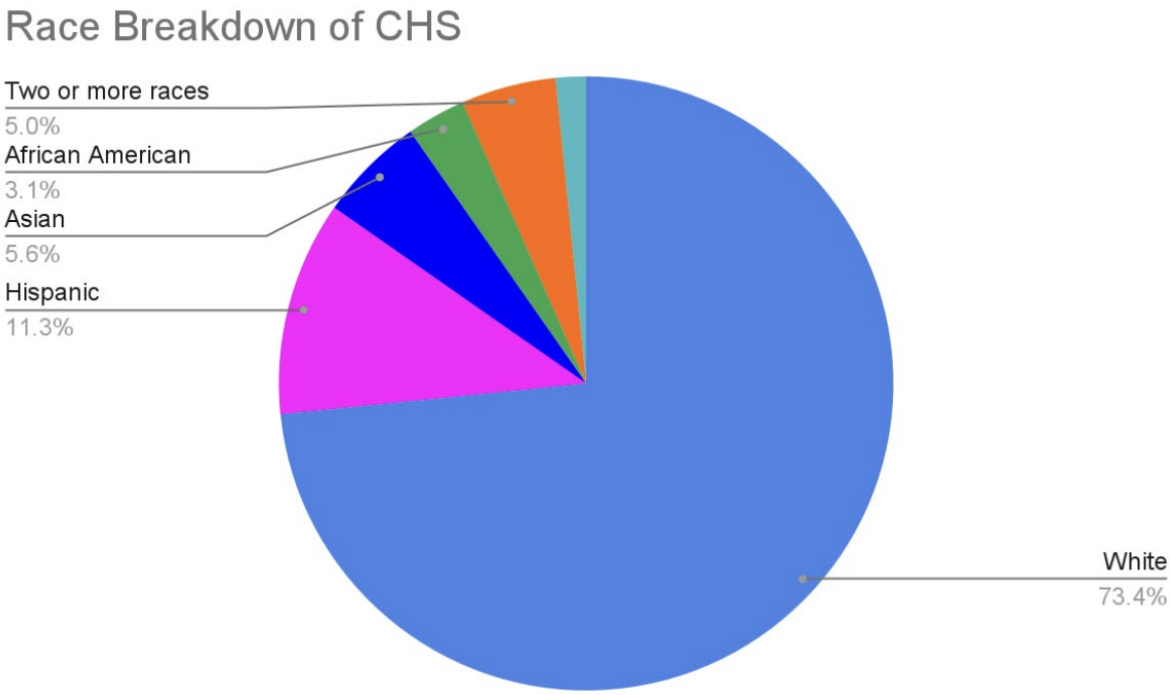
To guide the research in alliance with the gaps identified, four hypotheses were formed:

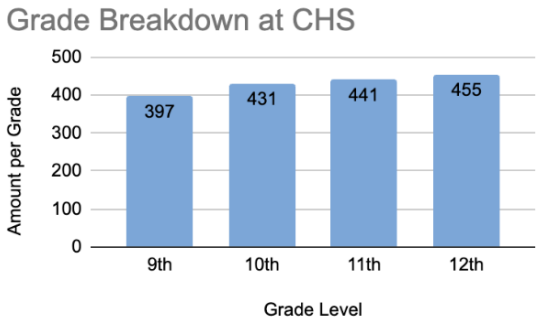
1. Students born closer to the beginning of the school year will have a higher GPA than those born at the end of the school year.
2. Students with more positive attitudes towards school will have better GPAs.
3. The more a student studies the higher their GPA will be.
4. First-born students will be more academically successful than other later-birth-order students.

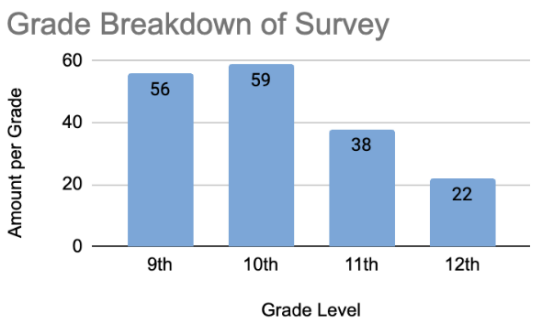
Addressing the first hypothesis, due to the significant emotional maturity of students born a few months earlier, students with higher GPAs will tend to be older in their grades. With students being set on a path of academic rigor from the time they enter the educational system, it is likely that many students who were older and appeared smarter or stronger at the time were set on a path of higher academics causing their GPAs to be higher. The second hypothesis could be supported by similar logic as with more positive perceptions towards school students are more likely to try hard and do better academically. Because they push themselves to do better by holding themselves to a higher standard, students will most likely see this effort in their grades. The third hypothesis was proposed for similar reasons to the second hypothesis. Since students dedicate time to doing well in school, there is a greater chance that those who study more will do better academically. Finally, the fourth hypothesis was arrived upon based on whether birth order attained children more attention. In general, parents tend to push their firstborn children to do better as role models for younger children to follow. Ultimately, it was likely to assume that first-born children perform better in school than their later-born siblings, leading to the hypothesis proposed.

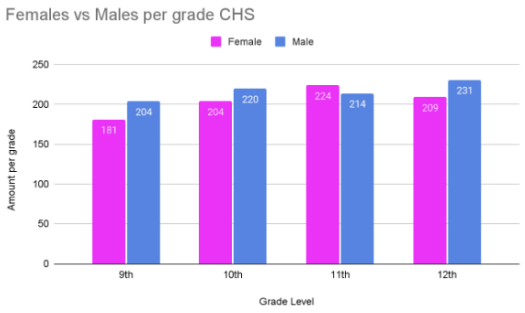
In order to test these hypotheses, a quantitative correlational study was used that collected responses through a Google Form survey. Once the responses were collected, data was analyzed to find correlations between questions and the hypotheses.

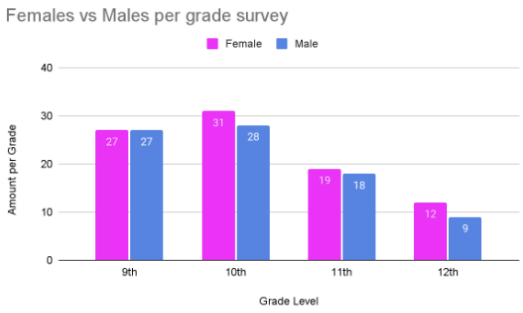
Population











All students at a California High School which will be referred to as CHS were able to participate in a survey. CHS is a large, high-performing public school in a suburban setting with 1,800 students. The student body's ethnic breakdown is 73.4% White students, 11.3% Hispanic students, 5.6% Asian students, and 3.1% African

American students. Moreover, the general income level is high income, with 24.3% of students considered socioeconomically challenged (California School Dashboard). This school is co-ed and serves grades 9, 10, 11, and 12. Additionally, CHS has 48.5% female and 51.5% male students. Compared to the participants of the researcher's study with 51.1% of respondents being female and 47.1% being male.

Implementation Process

The link to the Google Form containing the survey was sent to all CHS English teachers so that they could share the link with their students through Google Classroom. English teachers were selected since CHS students are required to take an English class for all four years that they are enrolled at CHS. This allowed everyone at CHS to take the survey and a random sample to be gathered. These teachers then allowed the researcher to come into their classroom briefly to discuss the project and urge students to complete the survey. Although the link was sent to all English teachers, a majority of the respondents were lower classmen since their teachers were stricter on them doing the survey. This may have affected the correlations since these students are not given as much of an opportunity to take higher-level weighted classes which would cause a difference in their weighted and unweighted GPAs. The responses from the Google Form, filled out by students were then automatically transferred to a Google Sheets' spreadsheet. The respondent's names were then changed to numbers to ensure anonymity. The Google Sheet was then duplicated several times so that different comparisons could be made. For example, a Likert scale question asking how hard a student tries in school would then be tested for a correlation with a student's GPA. These results were cross-referenced with other correlations to test the strongest correlation to grades and then superimposed onto several graphs to show the direct results.

Survey Construction

The questions on the Google Form involved identity-based questions to determine the demographics of participants including their gender, grade, GPA (weighted and unweighted), and age identities. This information was important to obtain to determine discrepancies in the correlation between genders. The survey also consisted of Likert scale questions (1-5) or (Strongly Disagree - Strongly Agree) to determine perspectives. The survey then quantified the amount of time a student spends studying each night on a scale (of less than an hour to more than five hours a night). Additionally, students were asked about their birth order (firstborn, middle child, youngest born). To ensure the information was attained, the questions were required. This ensures that the study conducted all the necessary information to be able to truly test if the respondents had a correlation between their grades and other factors. Gift card raffles were then utilized as an incentive and reward for participation.

When conducting the research, the researcher began by asking questions that were prevalent in other sources. From this, the researcher ensured that the questions chosen had similar correlations to GPA and were relevant for all participants. To analyze the correlation between the Likert scale questions and a student's GPA, the researcher determined whether there was a correlation between Likert scale questions first. To ensure the relevancy of these questions the researcher chose questions applicable to everyone that varied based on participants' responses.

Based on the criteria the researcher asked the 12 following questions to participants:

1. I try hard in school.
2. I push myself to do my best in school.
3. I challenge myself enough in school.
4. I take the most rigorous courses available to me.
5. I strive for validation through my academic achievement.
6. My parents/parental figures push me to do well in school.
7. I procrastinate my school work often.
8. I have a lot of extracurriculars.
9. I feel that I get enough sleep.
10. How many hours of studying/homework do you think you do a night?
11. How many siblings do you have?
12. What child are you (birth order)?

Data Analysis System

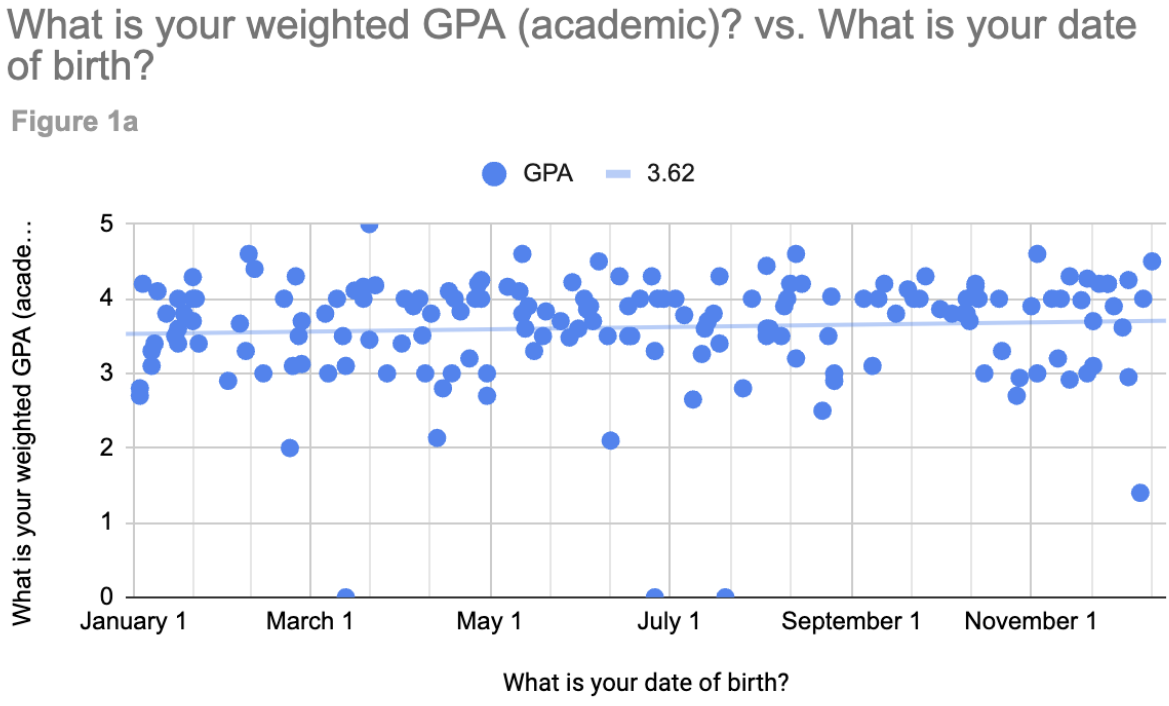
With the information obtained from the survey, data was collected on a Google Sheet after being automatically transferred from a Google Form. This data was then duplicated into several sub-spreadsheets within Google Sheets to allow for different tests and correlations to be run on multiple aspects of the survey. For example, a sub-spreadsheet included a correlation test between a student's weighted and unweighted GPA and how many hours a night they spent studying and another about the correlation between different Likert scale questions. Separate sub-spreadsheets were made for weighted and unweighted GPAs. Within each sub-spreadsheet in-

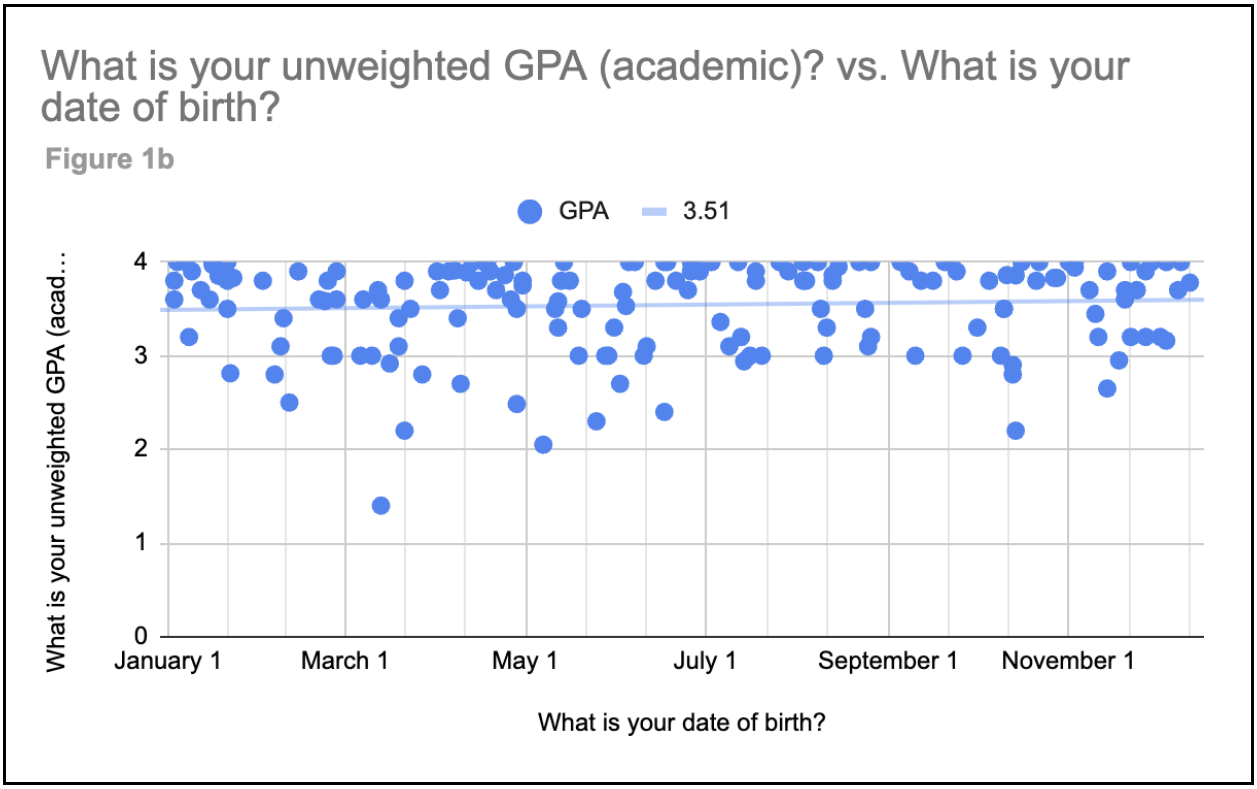
volving GPA scales, the total responses to all twelve questions were counted. Factors including, effort, achievement, and birth order were used to categorize responses similar to each other to display correlation. Then, cross-referenced histogram charts were created to compare survey results between the two domains (weighted and unweighted GPA). These analyses summarized the general correlations between birth month and GPA and also provided supplementary background information regarding other factors that can contribute to a student's GPA.

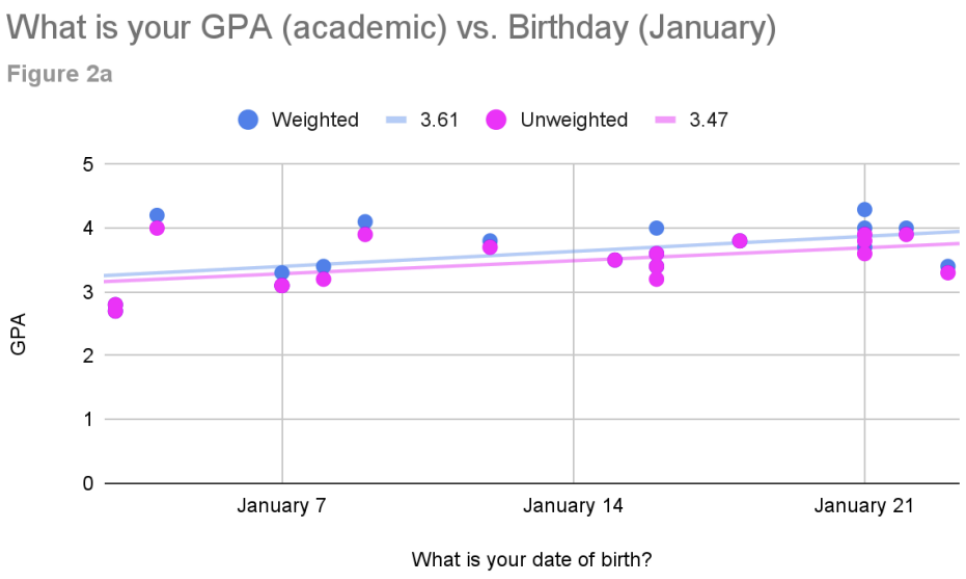
Findings

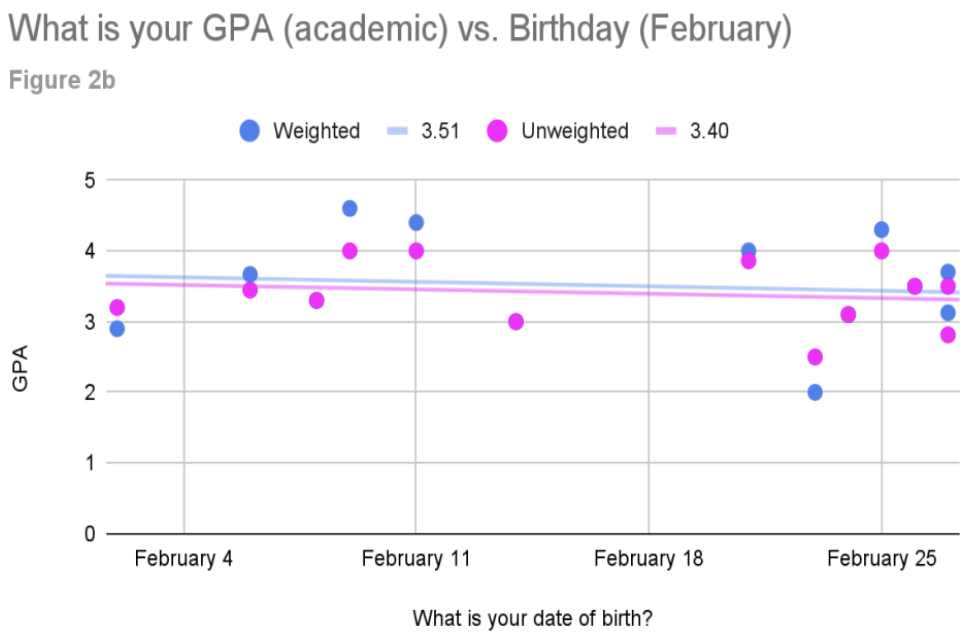
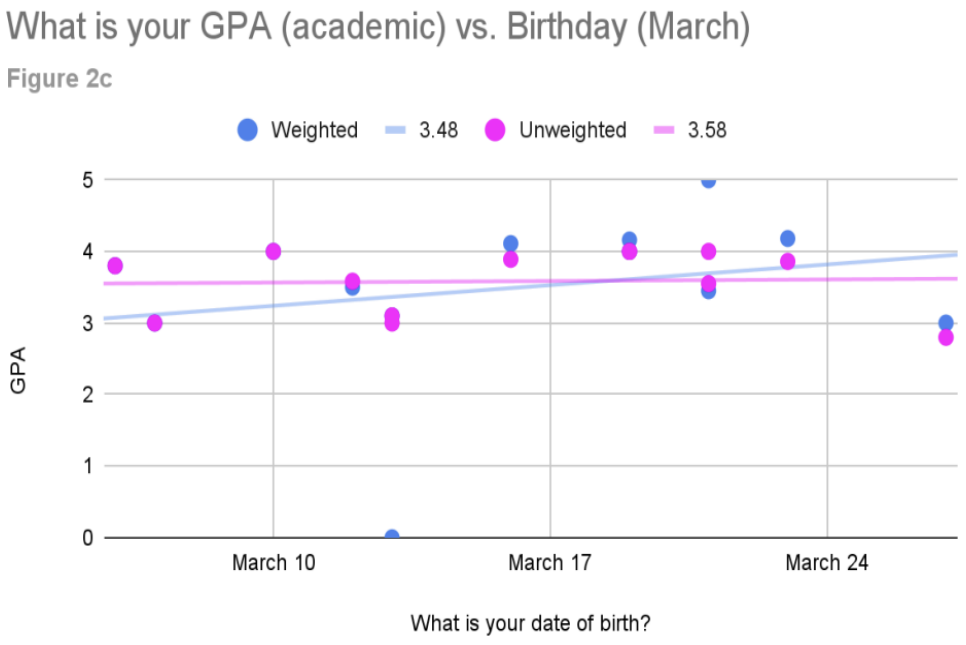
Following the guidance of the hypotheses, correlations were tested in correspondence to determine significance. The first overall correlation was tested between a student's birth month (labeled by number) and their GPA (both weighted and unweighted). Thus, the information obtained from the Google Form survey administered to students could be compared to tests for correlation as displayed in the graphs and P and T tests below. It was crucial to investigate how GPAs changed throughout the year as age cutoffs need to be reevaluated to give equal opportunities. This conflation results in some correlations between aspects of students and their GPAs making it necessary to address the issue of age cutoffs as a whole. Moreover, attitudes and GPA were then tested for CHS students to address the second and third hypotheses. Because a student's perception towards school and their work can change their motivation it can also become a powerful predictor of students' GPAs causing them to vary. Finally, correlations between uncontrollable background factors were tested such as birth order. This would allow students to inherently do better than others with no other external factors. To understand a student's perspective for each of these questions, the Google Form survey asked CHS students to select from a variety of choices that best helped identify themselves and their views.

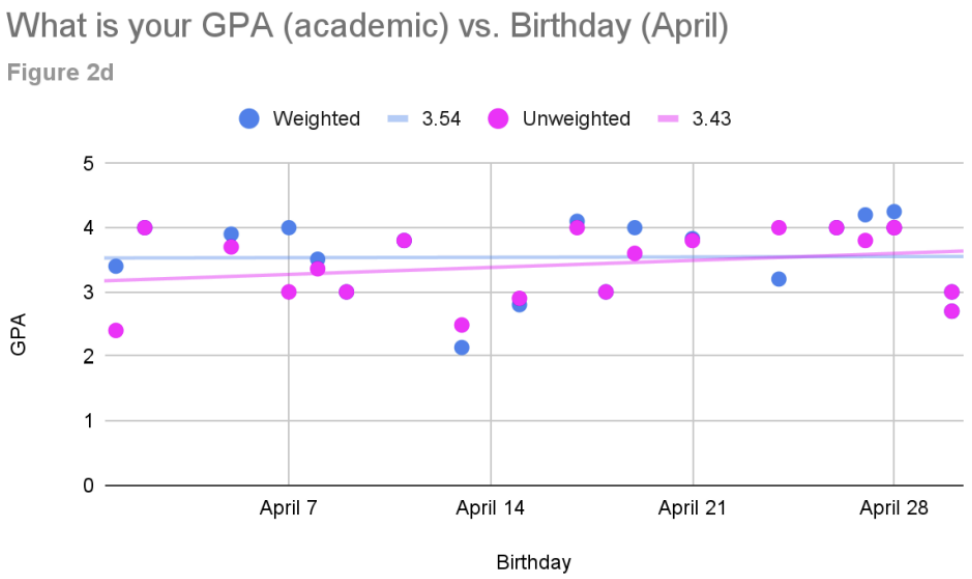
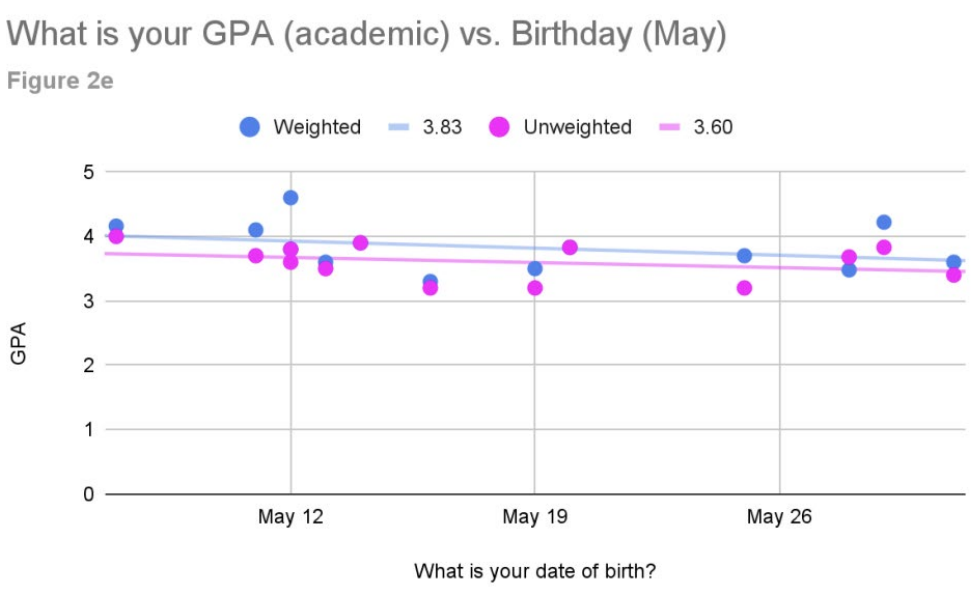
GPA and Birthdates

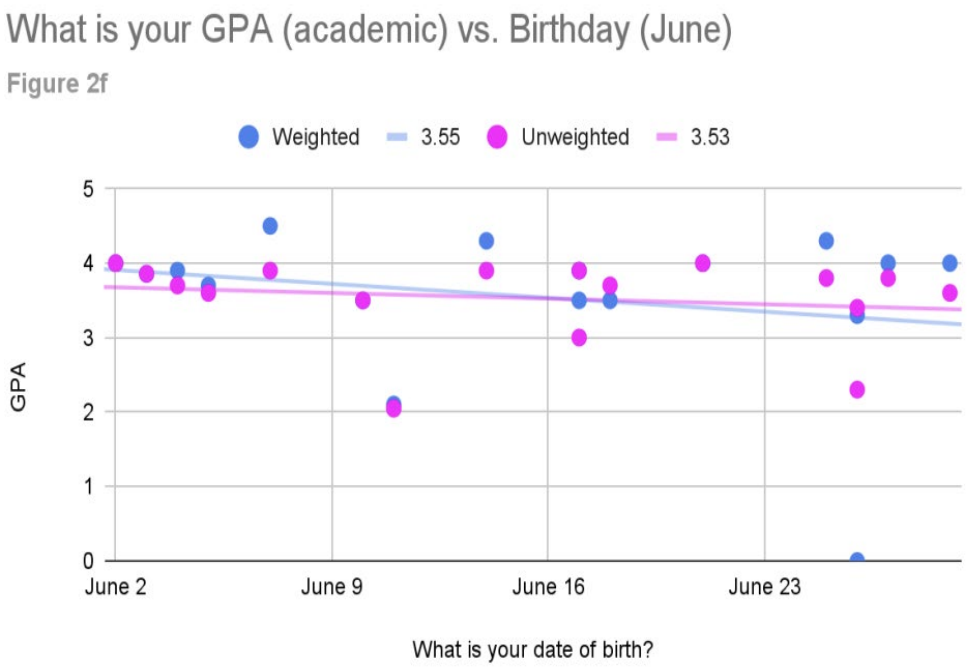
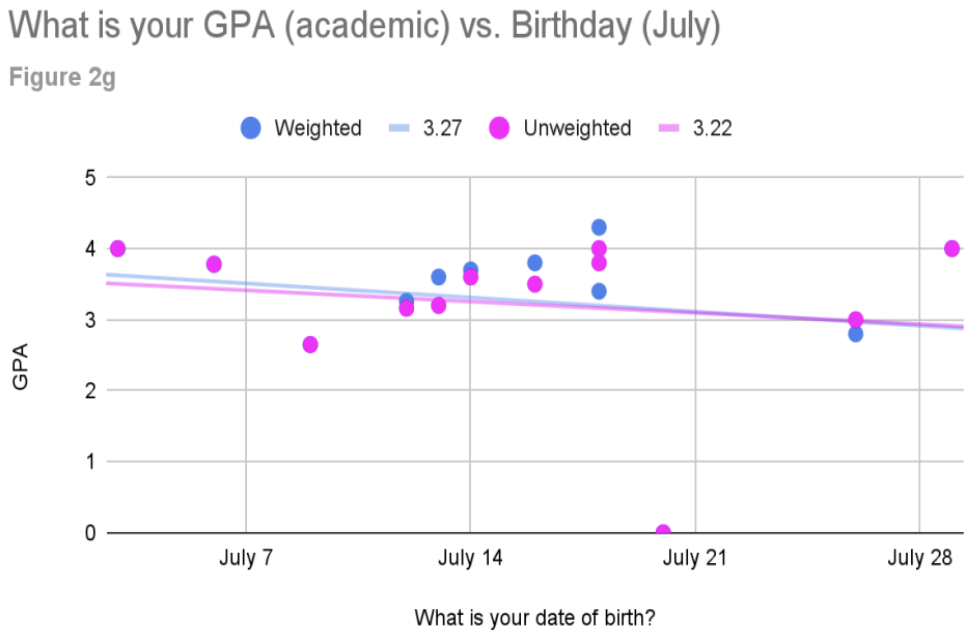


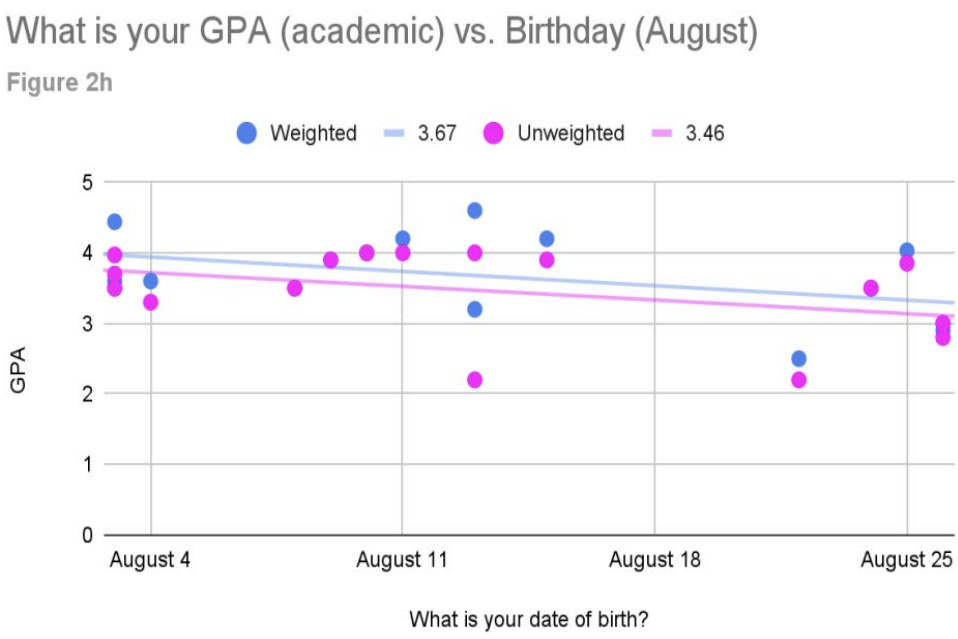
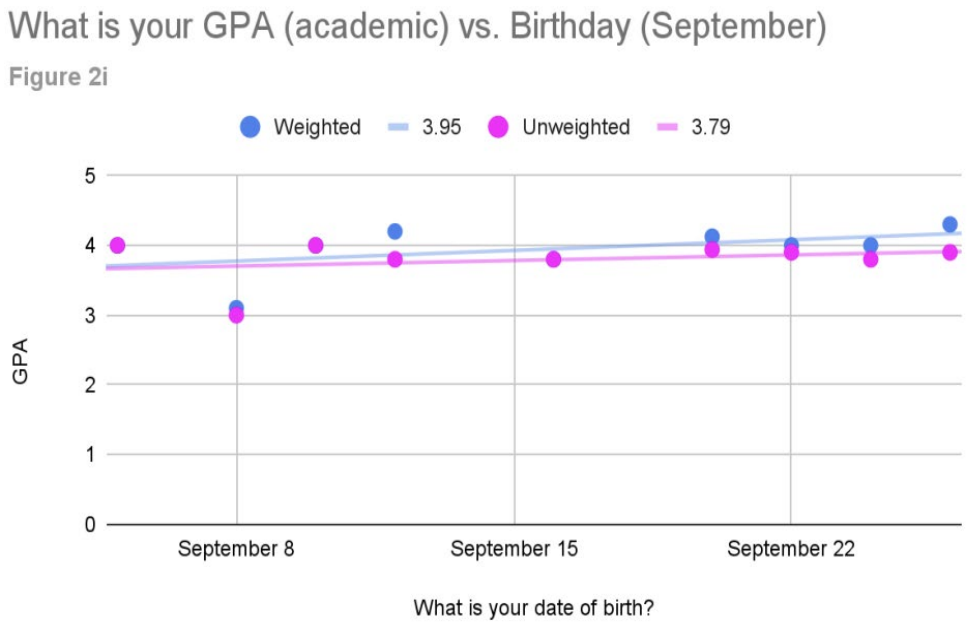


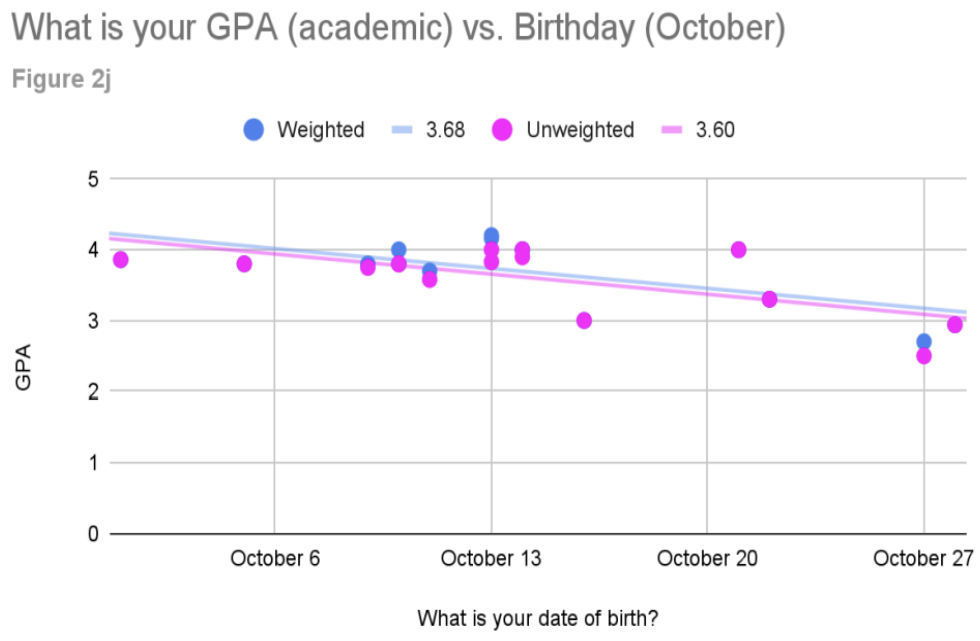
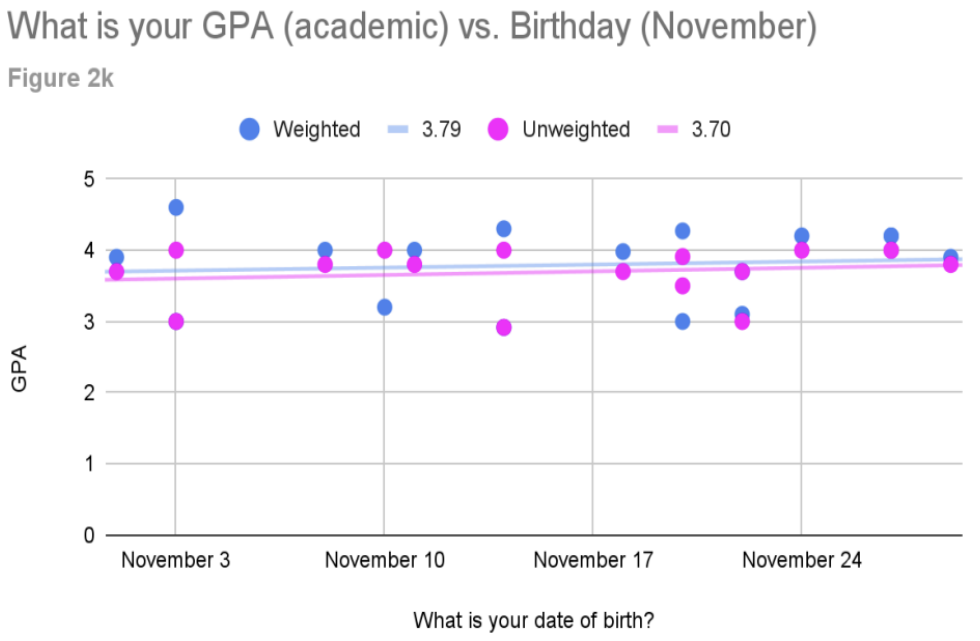
Month	Weighted GPA (PINK) v. Unweighted GPA (BLUE)
January	

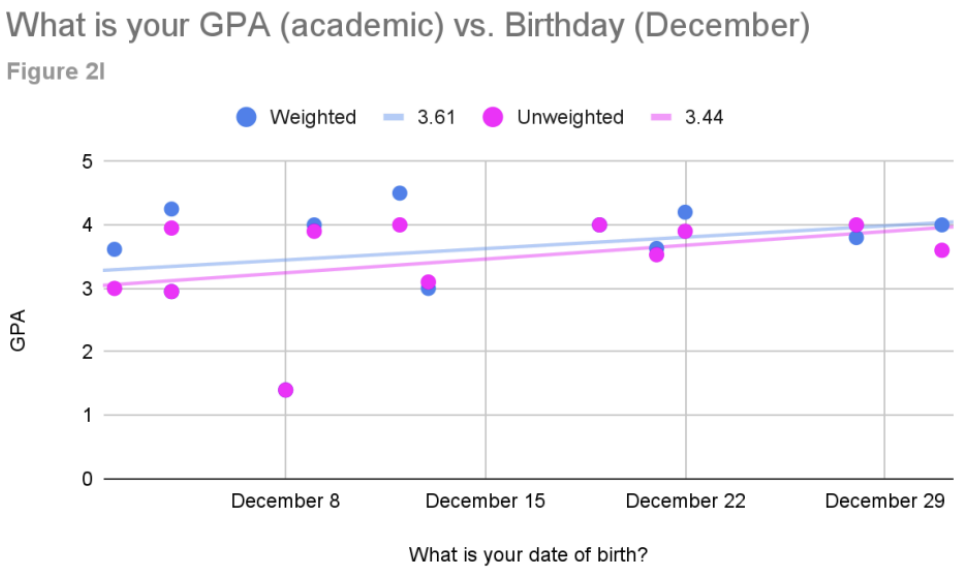
February	
March	

April	 What is your GPA (academic) vs. Birthday (April) Figure 2d Weighted 3.54 Unweighted 3.43 GPA 5 4 3 2 1 0 April 7 April 14 April 21 April 28 Birthday
May	 What is your GPA (academic) vs. Birthday (May) Figure 2e Weighted 3.83 Unweighted 3.60 GPA 5 4 3 2 1 0 May 12 May 19 May 26 What is your date of birth?

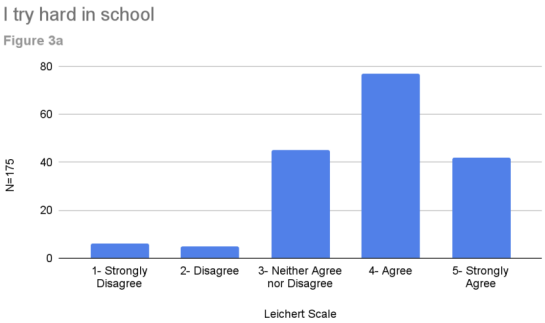
June	 What is your GPA (academic) vs. Birthday (June) Figure 2f Weighted 3.55 Unweighted 3.53 GPA 5 4 3 2 1 0 June 2 June 9 June 16 June 23 What is your date of birth?
July	 What is your GPA (academic) vs. Birthday (July) Figure 2g Weighted 3.27 Unweighted 3.22 GPA 5 4 3 2 1 0 July 7 July 14 July 21 July 28 What is your date of birth?

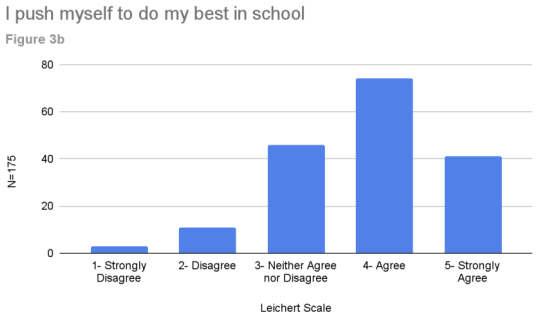
August	
September	

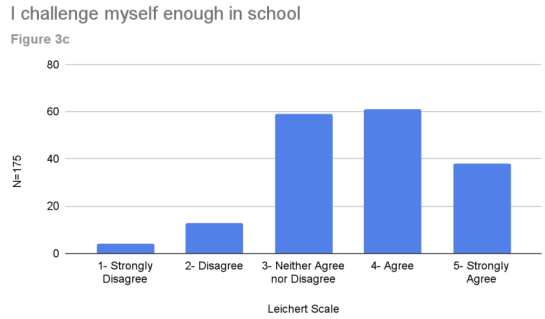
October	
November	

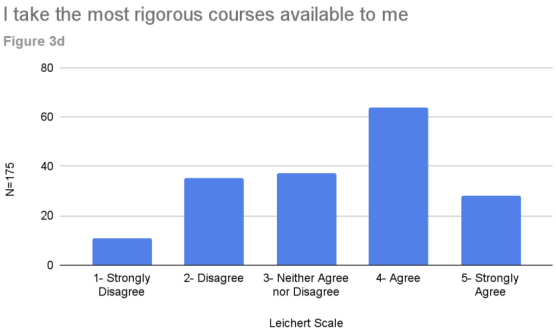
December	

Likert Scale Questions



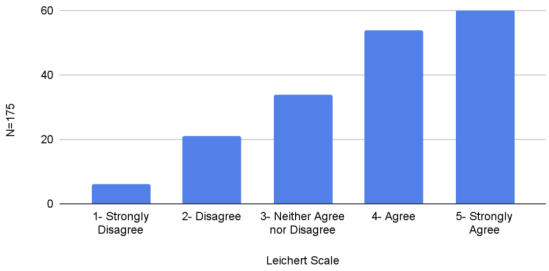






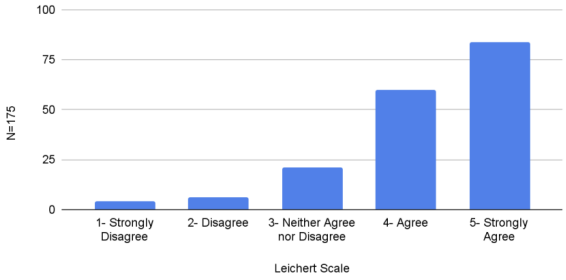
I strive for academic validation

Figure 3e



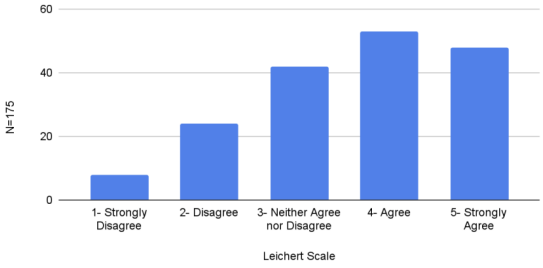
My parents/parental figures push me to do well in school

Figure 3f



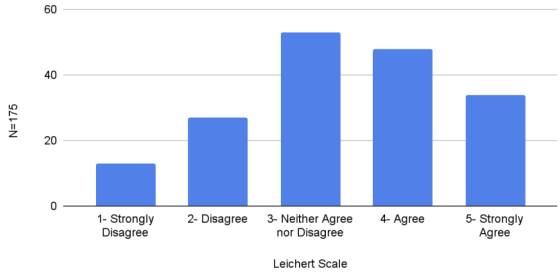
I procrastinate my work often

Figure 3g



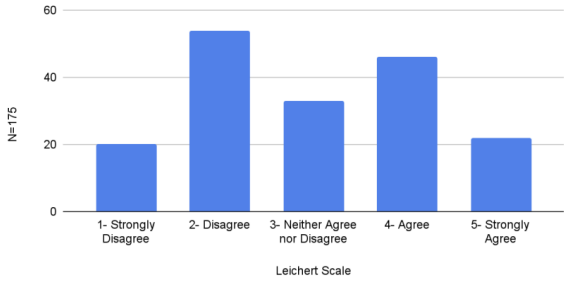
I have a lot of extracurriculars

Figure 3h

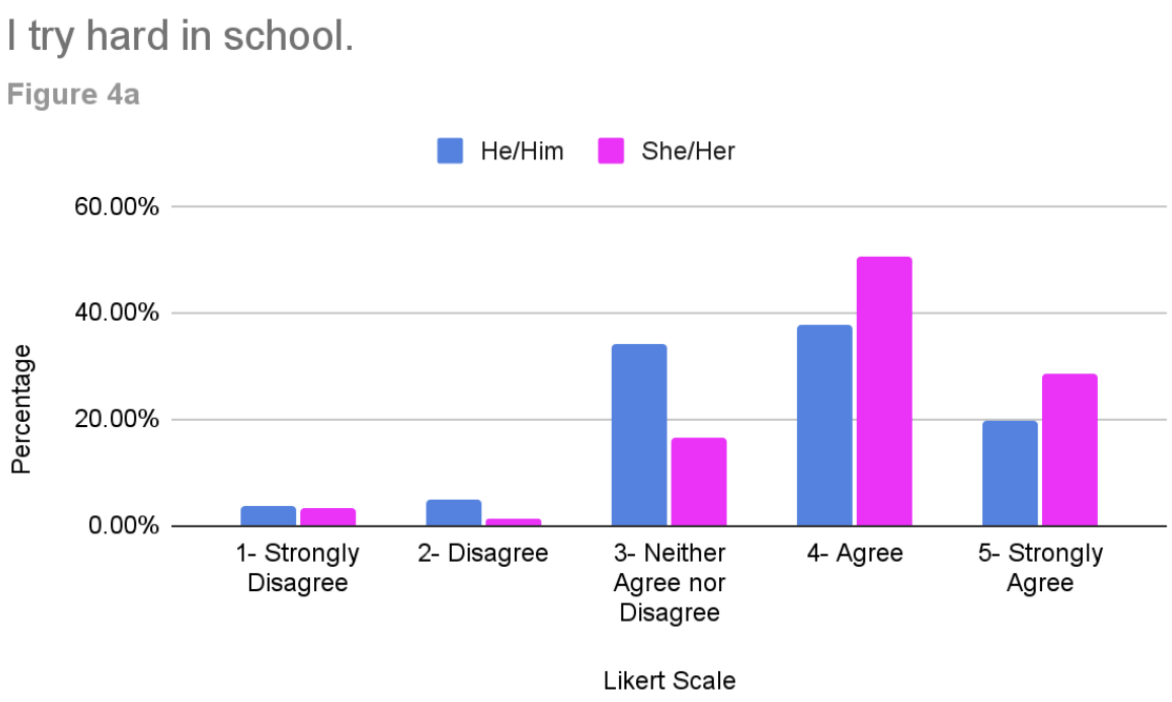


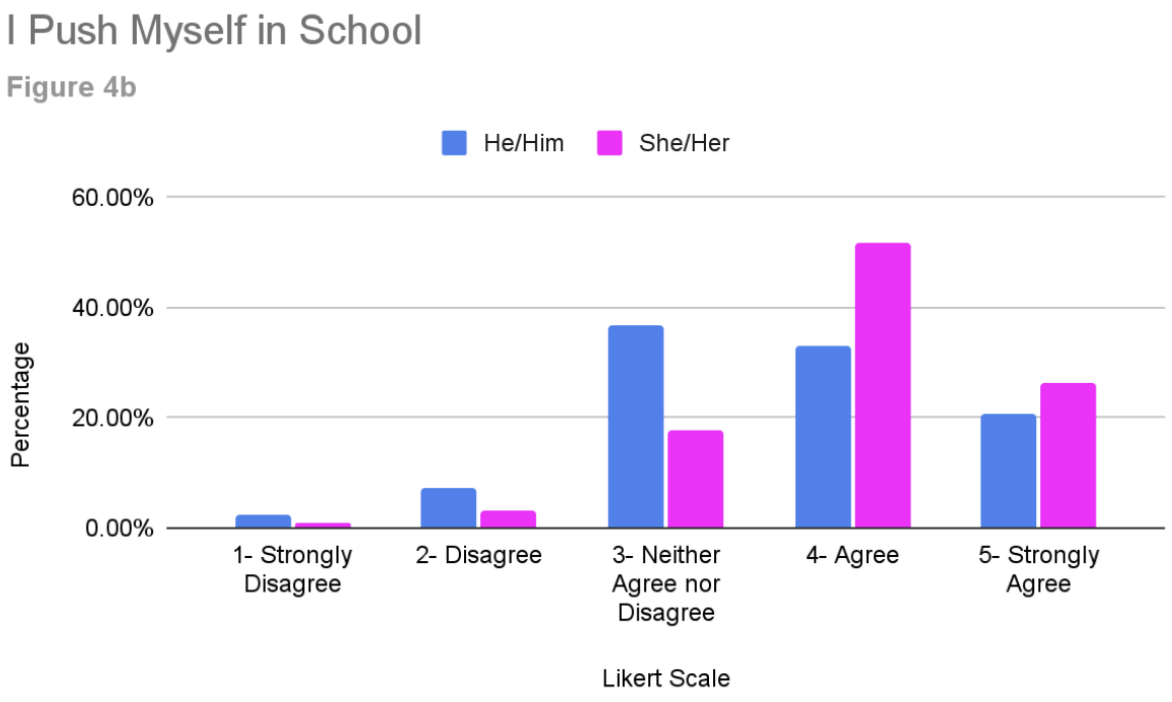
I feel that I get enough sleep

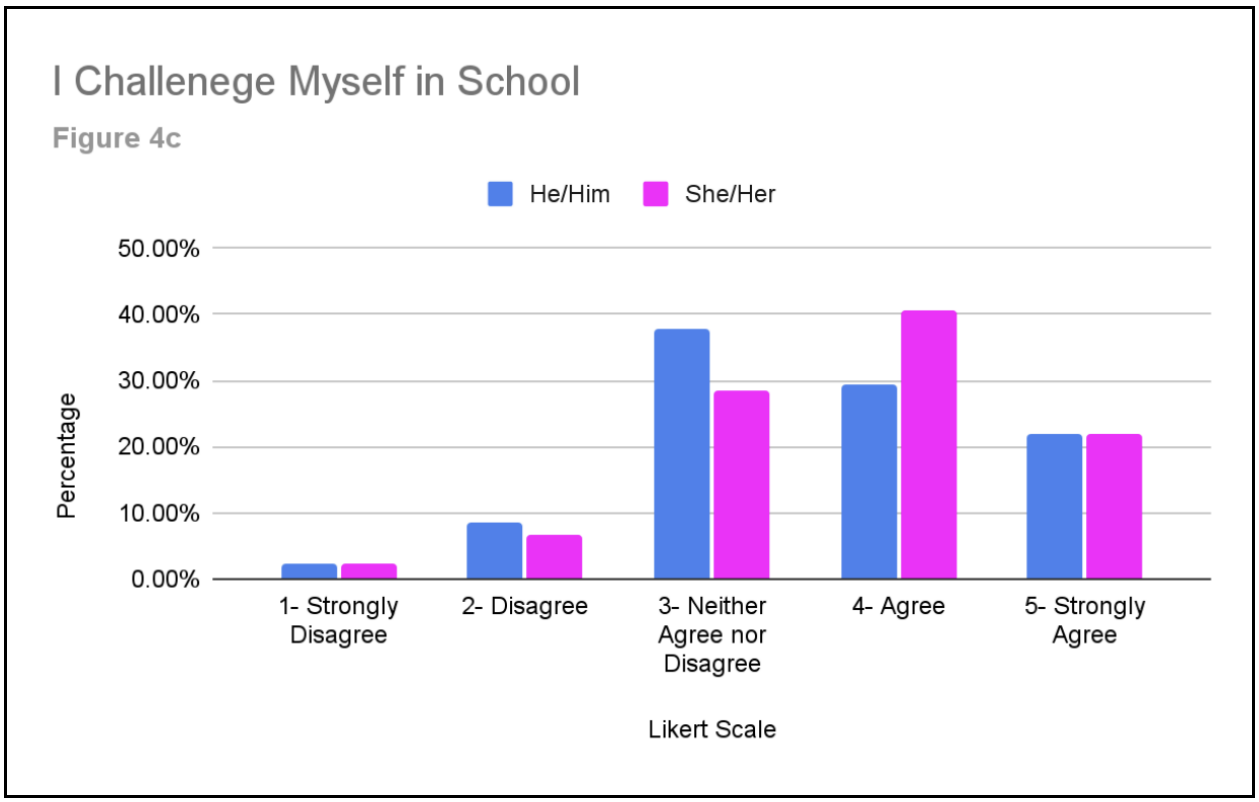
Figure 3i

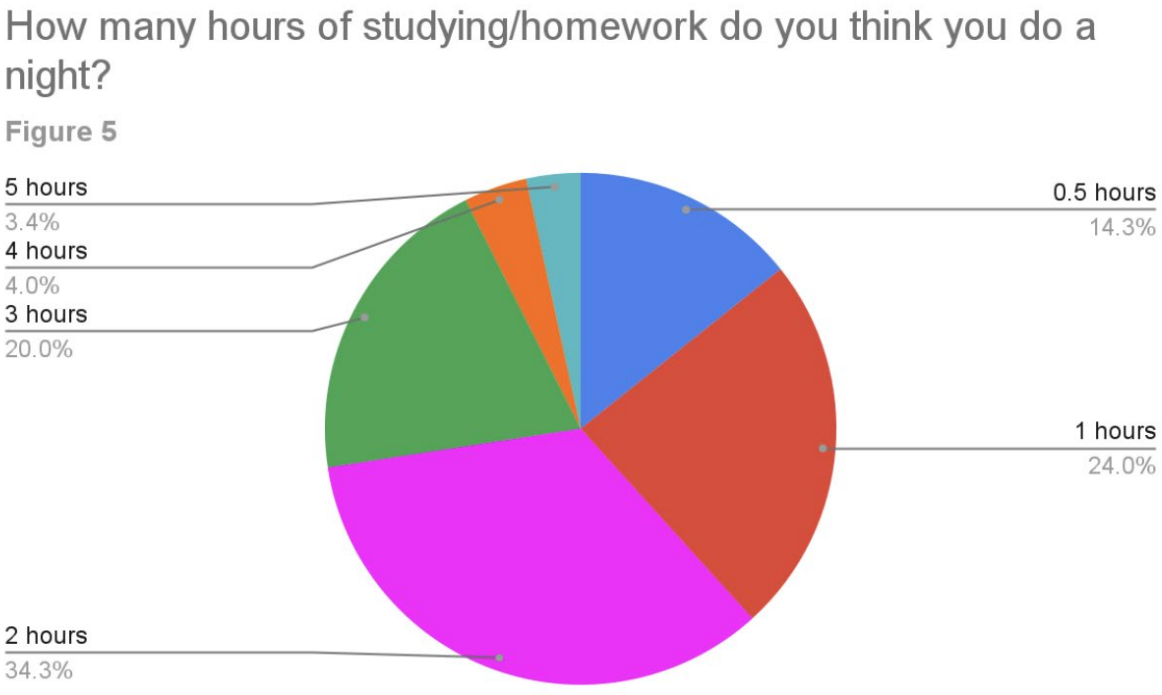


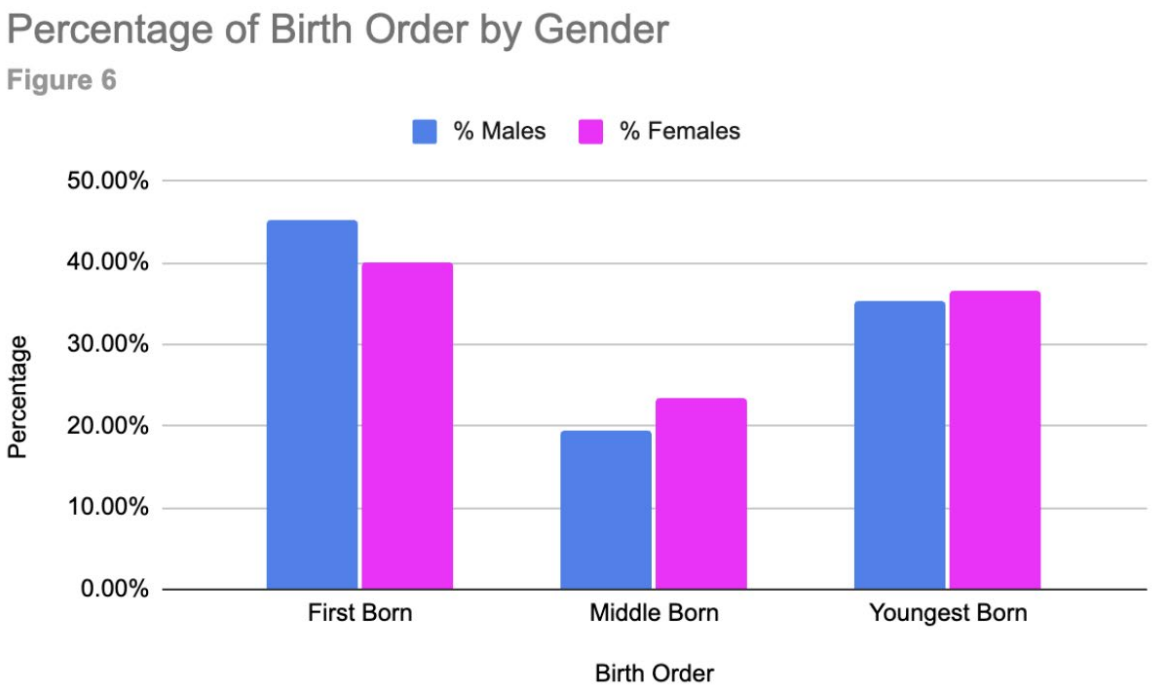
Deeper Dive Into the Likert Scale Questions with Correlation






I Challenege Myself in School
Figure 4c
He/Him
She/Her
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Percentage
1- Strongly Disagree
2- Disagree
3- Neither Agree nor Disagree
4- Agree
5- Strongly Agree
Likert Scale


How many hours of studying/homework do you think you do a night?
Figure 5
5 hours
3.4%
4 hours
4.0%
3 hours
20.0%
0.5 hours
14.3%
1 hours
24.0%
2 hours
34.3%



Weighted GPA vs. Birth month?		Unweighted GPA vs. Birth month?	
R	0.0813	R	0.0806
P	0.284816	P	0.288998

Male weighted GPA vs. Birth month?		Male unweighted GPA vs. Birth month?	
R	0.0061	R	0.0029
P	0.956624	P	0.979371

Female weighted GPA vs. Birth month?		Female unweighted GPA vs. Birth month?	
R	0.1361	R	0.1193
P	0.203801	P	0.265474

Weighted GPA & 1. I try hard in school.		Unweighted GPA & 1. I try hard in school.	
R	0.3839441306	R	0.387183541
P	< .00001*	P	< .00001*

Weighted GPA & 2. I push myself to do my best in school.		Unweighted GPA & 2. I push myself to do my best in school.	
R	0.3850536998	R	0.3787691528
P	< .00001*	P	< .00001*
Weighted GPA & 3. I challenge myself enough in school.		Unweighted GPA & 3. I challenge myself enough in school.	
R	0.4179871372	R	0.4015145256
P	< .00001*	P	< .00001*
Weighted GPA & 4. I take the most rigorous classes		Unweighted GPA & 4. I take the most rigorous classes	
R	0.4671372328	R	0.3651530028
P	< .00001*	P	< .00001*
Weighted GPA & 5. I strive for validation through my academic achievement.		Unweighted GPA & 5. I strive for validation through my academic achievement.	
R	0.3925713035	R	0.4226159556
P	< .00001*	P	< .00001*
Weighted GPA vs. How many hours of studying/homework do you think you do a night?		Unweighted GPA vs. How many hours of studying/homework do you think you do a night?	
R	0.1312	R	0.2167
P	0.083512	P	0.003971*
Weighted GPA vs. What child are you?		Unweighted GPA vs. What child are you?	
R	-0.0931	R	-0.0725
P	0.236231	P	0.343703

* shows significance for all test

Analysis of Findings

Ultimately, through correlational tests, all parts of Figures 1-5 and the P and T-tests demonstrate correlations between CHS students' GPAs and different survey responses. To better understand these correlations, they can be analyzed in accordance to the hypotheses posed in the methods section.

The first hypothesis predicted that students born closer to the beginning of the school year would have a higher GPA than those born toward the end of the school year. Although no mathematical correlations were found to demonstrate hypothesis one, a simple comparison of the data found some correlation. Using a chi-square test, the correlations were able to be determined with their p-values found. The values tested were the

number of respondents for the survey (175) and their birthday compared to the respondent's weighted GPA and then unweighted GPA. The comparison between a student's weighted GPA and their month of birth (labeled 1-12 with January being 1 and December being 12) had a p-value of 0.284816, between unweighted GPA and birth month, was 0.288998 showing virtually no correlation as they are significantly under 0.05. This was then analyzed further by breaking it down by gender with the p-values being as follows: males and weighted GPA 0.956624, males and unweighted GPA 0.979371, females and weighted GPA 0.203801, and females and unweighted GPA 0.265474. Although the content was related, the statistics were not reflective of a trend between GPA and birth month as seen in all parts of Figure 2 depicting the average weighted and unweighted GPAs of students by month. However, as can be seen in Figure 2i, September, the month at the beginning of the school year had the highest averages for GPA with a weighted 3.95 and an unweighted 3.79. Conversely, as seen in Figure 2g, July had the lowest average GPA with a weighted 3.27 and an unweighted 3.22. Through a direct comparison of these findings it is evident that although no correlation trend was found throughout the school year, there was a correlation for the birth months closest and furthest from the school-age cutoff at LVUSD, the high schools' district. These correlations for CHS students' birth month and GPA, therefore, prove hypothesis one that students born closer to the start of the school year perform better academically than those born furthest from the start of the school year.

Moving to hypothesis two, predicted that the more positive attitudes towards school will result in higher GPAs. Figures 3a, 3b, and 3c depict how students dare to do well in school, (also broken down further by gender in Figures 4a, 4b, and 4c). In Figures 3a and 4a, 68% of students, 57.32% of males, and 79.12% of females felt they tried hard in school. Similarly in Figures 3b and 4b, 65.71%, or 53.66% of males and 78.02% of females, felt they pushed themselves in school. Additionally, in Figures 3c and 4c, 56.57% of students, 48.78% males, and 64.84% females, answered that they challenge themselves in school. Through a direct comparison of these values, it is evident that there is a correlation between how CHS students answered these questions and their GPA as seen by their p-values of less than 0.00001 for the correlation between questions and between questions and GPA. Moreover, in Figures 3d and 3e correlation was tested to be significant between the Likert scale question and GPA. 26.29% of students disagreed that they take the most rigorous courses available to them well 52.57% of respondents agreed that they did according to Figure 3d. From Figure 3e, 15.43% of respondents disagreed that they strove for academic validation and 65.14% answered that they agreed that they did strive for academic validation. For CHS respondents, more answered that they strive for validation through their academics, despite the fact that not as many students answered that they take the most rigorous courses. Ultimately, although there was no correlation between these questions, they were proven significant between Figure 3d and GPA, and Figure 3e and GPA with a p-value of less than 0.00001. Finally, in charts 3f, 3g, 3h, and 3i there were no significant correlations to be found. These figures differ from the rest as they are contributors to correlation but are not based on solely an individual's perception. Thus, in creating Figure 3f, parental influence can be accounted for. As seen in Figure 3f, the most frequent answer was that students "Strongly Agree" that their parents push them to do well in school with 48% of CHS respondents indicating this and only 2.29% indicating the exact opposite ("Strongly Disagree"). Additionally, in Figure 3g, 57.71% of students answered that they do procrastinate their school work while only 18.29% believed that they do not, though this did not prove to be significant. Similarly in Figure 3h, 22.86% of students answered they do not have a lot of extracurriculars while 46.86% answered that they do, yet this also did not affect their GPA. Finally, the most distributed answers were seen in Figure 3i: I feel I get enough sleep. Overall 42.29% of people answered they felt they did not, well 38.86% of people answered that they did, however, there was still no significance found. Although within the breakdown of the correlation between Likert scale questions and GPA, it can be concluded that some factors prove significant in determining GPA, they are all perception-based, while those that are not significant are not based solely on an individual's ideas. This could potentially be attributed to the other unaccounted-for background factors of respondents. The surveys administered only asked surface-level questions which can further assume that a gap exists between other background factors and a student's GPA.

Ultimately, hypothesis two was verified by Figures 3a-3c and 4a-4c, however, Figures 3d-3i suggest a background gap that disproves hypothesis two.

The third hypothesis focused on the correlation between GPA and how much a student studies. According to Figure 5, the most common answer was 2 hours a night with 34.3% of students answering so. Once determined a correlation was tested between hours spent studying and weighted GPA and the same for hours spent studying and unweighted GPA. Ultimately it was found that there was no correlation for weighted GPA with a p-value of 0.083512 but there was a significant correlation for unweighted GPA with its p-value being 0.003971, thus somewhat proving hypothesis three.

Finally, the fourth hypothesis addressed birth order and GPA correlations. In Figure 6 the distribution of birth order by gender is exemplified but when P and T tests were run no significance was found between weighted GPA and birth order and unweighted GPA and birth order, therefore, disproving hypothesis four.

Ultimately, these hypotheses connect in their investigation of correlations leading to GPA. Due to different variables for CHS students, hypotheses 1, 2, and 3 were proved in some aspects, showing there is a correlation between birth month and GPA, perceptions towards school and GPA, and the amount of time spent studying and GPA. However, hypothesis 4 was disproved and showed that for CHS students there was no correlation between their birth order and their GPA. These findings quantify factors that contribute to a student's GPA trends.

Discussion

Tying back to the foundational sources of the literature review, Gladwell's study proved that those born closer to the beginning of the school year had higher GPAs as seen for NHL players born closer to their age cutoff, and the same for soccer players born closest to their age cutoffs. Additionally, Bjerke's commentary on the phenomenon of students being born closer to the age cutoff having higher GPAs when they are six can also be seen in Los Angeles high schoolers. For example, there was a correlation found that students born closest to the age cutoff, in September, had a higher GPA than those born further, in July, as also presented in Bjerke's study of six-year-olds. This can contribute to students being born closer to age cutoffs having a better chance at success.

From Givord's and Solli's respective study, it is evident that there are gaps in the correlation between GPA and birth month. The same gaps can also be seen at CHS, with the months neither the furthest nor the closest to the age cutoff having no relative correlation. Due to no correlation for these months, it only mattered if a student was born at the furthest or closest possible month from the age cutoff. Thus, the correlations between birth month and GPA for CHS respondents result in some significance.

As Bernardi and Graetz acknowledge the importance of understanding additional background factors that play into a student's GPA, the same can be seen for CHS students. Both studies analyzed 16 year olds background factors while Bernardi and Graetz focused on personal background and this study focused on perceptive background, but both found correlations. While their study analyzed cultural, racial, and socioeconomic factors, this study analyzed students' stances which both contributed to significant correlations for a student's GPA.

Conclusions

Limitations

Although the study was conducted to maximize accurate results without sacrificing respondents' animosity, some limitations did occur. Many of the respondents were lower classmen (ninth and tenth graders) as their

teachers were more likely to administer the survey and had more control over the students to do the survey. These students therefore have not had as much of an opportunity to take honors and AP-level classes that are weighted causing their weighted and unweighted GPAs to be the same. This, therefore, can cause discrepancies in the correlational tests run since the difference was minimal between weighted and unweighted GPAs. Additionally, the upperclassmen (eleventh and twelfth graders) who took the survey, were more responsive and likely caused any outliers found in the data. They also are more likely to answer questions about efforts more positively creating further outliers to be found.

Furthermore, because of the limited sample size, the survey's respondents were from a single school rather than being typical of all high school students in the country. This sample size was selected due to its easy accessibility. However, despite only using one school as a sample size, the results can be biased based on this school's grading system, academic levels, and the path its school district, LVUSD, puts kids on upon entering it, revealing different correlations that are dependent on populations surveyed.

Implications

This allows future researchers to match possible investigations with the framework of this study, despite the research's limited scope. Expanding beyond the population of CHS, future research could test correlations in similarly performing schools in districts like LAUSD, Oak Park, Conejo USD, and Simi Valley USD. Moreover, containing a larger sample of students from one school could also indicate if correlations vary by grade level.

Beyond the potential for future research, the findings of this study indicate the importance of resolving gaps in GPA and birth month correlation such as taking a further look into students' backgrounds. In this study students' perceptions were looked into but not their race, culture, or socioeconomic background. By further looking into uncontrollable factors of students at CHS other correlations can be tested to see if some students are truly given better chances at success than others.

To fix gaps within these correlations actions must be taken. Implementing cohorts for students when they enter the educational system is needed so that judgments about a student's educational attainment are not made at too young of an age, starting students on a perpetual path. The first step is making different cohorts based on new age cutoffs to ensure no students are given a better opportunity to attain higher grades. This could set a future precedent encouraging students to try harder in school since they have not been deemed not as smart at a young age. Some countries such as the United Kingdom have already implemented three cohorts to start school following their fifth birthday which minimizes some students having a better chance to perform better.

An additional method that can then be accomplished is allowing students at an older age to determine their academic level for different subjects. Rather than have students test their academic ability at a young age and set them on a path, this ability should be tested at an older age to ensure that everyone's brains have begun maturing on a more equal level before determining their academic capabilities. Ultimately, this would allow for the academic playing field to be more equal allowing for all students to have a better opportunity to succeed academically, thereby generating more positive perceptions towards school and higher GPAs as well as GPAs not predetermined by birth month.

Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

References

Bernardi, & Graetz. (n.d.). *Compensatory advantage » fabrizio bernardi*. Fabrizio Bernardi. Retrieved April 3, 2024, from https://www.fabriziobernardi.net/research-sections/compensatory-advantage/

Bjerke, A. H., Smestad, B., Eriksen, E., & Rognes, A. (2021). Relationship between Birth Month and Mathematics Performance in Norway. *Scandinavian Journal of Educational Research*, *6*, 1038–1048. https://doi.org/10.1080/00313831.2021.1958371

California School Dashboard (CA Dept of Education). (n.d.). California School Dashboard (CA Dept of Education). Retrieved April 24, 2024, from https://www.caschooldashboard.org/reports/19646831931781/2023

Givord, P. (n.d.). *How a student's month of birth is linked to performance at school : New evidence from PISA | OECD Education Working Papers | OECD iLibrary*. Home Page. Retrieved April 2, 2024, from https://doi.org/10.1787/822ea6ce-en

Gladwell, M. (2008). *Outliers*. Little, Brown.

Has your birth month affected your career? | Open thread | The Guardian. (2011, September 5). The Guardian; The Guardian. https://www.theguardian.com/commentisfree/2011/sep/05/brith-month-career-research

Nash, L., & Stevenson, H. (2004, February 1). *Success That Lasts*. Harvard Business Review; https://www.facebook.com/HBR. https://hbr.org/2004/02/success-that-lasts

Solli, I. F. (2017). Left behind by birth month. *Education Economics*, *4*, 323–346. https://doi.org/10.1080/09645292.2017.1287881