

Analyzing Impact of Student Schedules on Academic Performance in Thousand Oaks High
School

AP Research

Word Count: 3909

ABSTRACT

Thousand Oaks High School students were surveyed and Conejo Valley Unified School District employees were interviewed to determine the best way to implement a program at Thousand Oaks High School that promotes a healthy balance between sleeping schedules and their academic studies. A study of existing literature reveals that the early start times of most US high schools leads to a detriment of the learning capability for students in their first few classes in the morning. Additionally, current research indicates that there have been increasing amounts of cases that students not just in High Schools but Colleges and Universities are suffering from greater amounts of sleep deprivation. This phenomenon is not isolated to the United States, and is even present in several Shanghai universities (Kerry L. and Chung, 2016). A gap is then defined to detail my own research into the balance of sleep sacrifice as compared to the academic performance of Thousand Oaks High School students, and of all grade levels . One hundred and twenty two students were surveyed to gauge the schedules of students throughout the week and asking for their GPA, as well as how they perceive their work. The survey results show that students received an average of 9 hours of sleep on weekends as compared to 6 hours on weekdays. Electronics use had proved to have little actual impact on academic performance, while impacting sleep schedules greatly, as reported by students. Balanced academic workload was found to be related to higher academic performance.

INTRODUCTION

For high school students in the United States, as academic workloads and expected performance increase and an increased amount of extracurriculars deemed necessary on average to attain college or university acceptance are placed upon students, there have been an increasing rise in the sleep deprivation among young adults. According to Mary Carskadon, a highly renowned researcher specializing in adolescent sleep medicine at Brown University, adolescents are in the greatest need of longer lengths of sleep time than any other time in their life, in order to attain the ideal developmental conditions. The combination of increased sleep deprivation which affects the development of young adults, along with a higher amount of stress placed upon the push for academic success. This combination results in a detriment on the overall academic ability for students and their retention of lessons taught during the school day.

I first began interest in the impact of student's nutritional intake upon their academic performance, particularly within colleges, which have a notoriety for their attendees to possess not insignificant amount of nutritional deficiencies. Before settling on this, I had to switch due to the previous topic being simultaneously too broad as well as very difficult to create a set of accurate methods in order to obtain feasible data. In addition, I had felt that I would not be able to provide any meaningful additions to current conversations on said problem of nutrition. In search for a new topic that I would be able to adequately contribute to the conversations within that certain subject, I began to parse through news writing and journalistic resources, as well as several prominent academic paper databases available to me as a student. On one of these resource websites I came across an article that explained how food access can have a huge

ANALYZING IMPACT OF STUDENT SCHEDULES ON ACADEMICS

4

impact on the grades and mental health of college students. I then shifted my personal topic to how sleep habits affect students' academic performance. I am personally interested in this topic because I have first hand experience of sleep deprivation caused by attention to school work, and I wish to find out for myself whether it is more important to maintain a more highly regimented sleep schedule or sacrifice for completion/higher quality of school work. Previous research has been conducted on very similar topics to mine, but it centered around whether early start times for schools, mainly high schools, were detrimental towards the physical development and mental health of students . I aim for my research to specifically handle the academic performance aspect rather than mental health, overall attendance, and physical development. Rather than most research being focused almost mostly on students within universities, or younger children in middle school or elementary grade levels, I will be solely using High School students.

LITERATURE REVIEW

Recommendations for literature databases by the librarian staff that work at California Lutheran University. These include the ERIC - Education Resources Information Center, EBSCOhost, and the NCBI - National Library of Medicine databases. From previous research, I have plenty of experience navigating and searching the EBSCOhost database, but due to the shift in topics, the ERIC has been my primary tool for literature searching. When making the queries themselves, mainly I used the search terms "Sleep habits" and "Academic performance" when browsing the databases and journals to find relevant literature. A major source of academic writing for this paper has been Mary Carskadon, a researcher from Brown University who has been dubbed "The Mother of Sleep" due to her enormous contributions to the discussion of the

effects of sleep upon the human body, throughout all demographics. Mary Carskadon has been a leading researcher, especially in the field of adolescent sleep cycles, a valuable asset for the construction of my research materials and instruments.

The most impactful study I relied on the most was Amy Wolfson and Mary Carskadon's "Sleep Schedules and Daytime Functioning in Adolescents" (1998). This paper describes the relationship between adolescents' sleeping and waking habits and their daytime functioning. They found in that the reported total sleep times from the subjects decreased from starting around 13 year old to 19 years old. It was determined that students who were struggling or failing in their studies obtained less sleep overall, went to bed later overall, and had greater 'deficits' of sleep on the weekends as compared to those with better grades. Students with shorter sleep durations reported increased tendencies of lethargy throughout the day, depressed moods, and problems with sleeping itself.

My inclusion of questions within my research survey that were inquiring about the subjects' use of electronics throughout the day as well as before sleeping were based of of information retrieved by another 2009 study conducted by Mary Carskadon as well as Fernando Mazzilli Louzada, Carina Aparecida Tardelli Peixoto and Adeline Gisele Teixeira da Silva, titled "Adolescents Living in Homes Without Electric Lighting Have Earlier Sleep Times". The paper compared the circadian rhythms of a group of 37 adolescents from ages 11 to 16 in Brazil, some with electricity and some without electricity at home. Twenty of the students attended morning school classes, and 17 attended later evening school classes. Eleven of the children had no electric lighting at home, 5 of which attended morning classes and 6 attended evening classes. They completed a sleep log and wore a wrist bound device that measures human rest cycles.

ANALYZING IMPACT OF STUDENT SCHEDULES ON ACADEMICS

6

What the researchers found was that a more extended sleep period existed for those who attended the later classes. Those adolescents without electricity at home had significantly earlier times they went to sleep on school days. A delayed trend was observed in the groups who had electricity and home lighting.

A study, “Technology Trumping Sleep: Impact of Electronic Media and Sleep in Late Adolescent Students” by Kerry L. Moulin and Chia-Jung Chung from California State University Sacramento, similarly explores the uses of technology as compared to the use of electric lighting. The purpose of their research study was to explore with what impact evening media use interfered with either schoolwork and sufficient healthy sleep. In addition, the study examined with what impact there may be a compromise in students’ ability to achieve academic success, which was related to either lack of sleep or excessive electronic media use. The participants were 89 high school and college students, aged 16 through 25. Research was conducted using an online survey tool. Electronics use, internet and social networking usage, sleeping times, daytime drowsiness and other observations were examined. College students were randomly sampled to receive the survey. However, the high school students participated in a weeklong survey and journal each night. The entire data set was obtained from anonymous student responses and teacher surveys. The results of the study have suggested that adolescent sleep is greatly compromised, during a time when maintaining a good schedule is vitally important for developing adolescents. Of the students who were randomly sampled, all but one student owned a cell phone. In the group, a majority owned a smartphone. 72% of high school participants slept with a cell phone or tablet in their bed, and 86% of college participants regularly slept with cell phone, tablet, or laptop. Over half of these students continued to access and use their devices in

bed for significant amounts of time prior to sleeping. Many of the participants even woke up in the middle of the night after falling asleep to access or respond to electronic messaging. The paper indicates that unhealthy sleep habits may be creating a trend of sleep-deprived individuals who may not be functioning healthily. Their findings regarding a correlation between lack of sleep and an impact upon academic performance were inconclusive, however, student observations indicated that they believe there is a relationship between the two. On a side note, their findings also suggested that most instructors of students aged 16-25 may count on the fact of their students using mobile devices to access internet for social purposes. It was concluded that students allow their social and digital world to impede and compete with their academic time and biological circadian rhythm. They suggested that Instructors would benefit from a shift to adapt to the digital skills of the younger generation of students. Therefore it is strongly suggested that teachers, parents, and medical personnel adopt and provide healthy guidelines for parents to use with pre-teens and teens, to develop in the next generation of students more structure and means of protecting their health in the realms of electronics and sleep. This is what led to my proposal to develop a program with faculty at Thousand Oaks High School that will assist students with maintaining a healthy balance between school related work and their sleeping habits.

The consequences of consistently losing sleep were studied in a paper titled “Ad libitum Weekend Recovery Sleep Fails to Prevent Metabolic Dysregulation during a Repeating Pattern of Insufficient Sleep and Weekend Recovery Sleep” which was authored by Kenneth P. Wright, Jr. and other researchers located at the University of Colorado. The paper was centered around the trend of individuals increasing the duration they sleep for on weekends as compared to the

weekdays beforehand, as a method to ‘make up’ for the amount of sleep lost. The effects of this irregularity in circadian rhythms were the subject of this study, centered mostly around the metabolic patterns during sleep. The term for weekend ‘catchup’ sleep was dubbed *ad libitum*. The study measured metabolic dysregulation, circadian timing, energy intake, weight gain, and insulin sensitivity during sustained insufficient sleep. The subjects were defined as “healthy young adults” and were randomly placed into one of three groups. The first group being the control group received adequate amounts of sleep with no restriction, the second receiving restricted sleep with extra weekend recovery sleep, as well as a third group that received restricted sleep with no recovery times. In their findings, they concluded that weekend deficit recovery sleep was an ineffective way of maintaining health. With the second group, their metabolic rates only slightly improved (18% total difference) from the third group, which was overall a 27% deviation from the control group.

The current research suggests that academic performance can be affected by sleep schedule irregularity if the irregularity continues for extended periods of time. However, there is an aspect that had not been adequately discussed and is where I hope to contribute to the discussion of. That aspect relates to the only discussion of academics and sleep, but does not consider the additional factors that contribute to the lack of sleep causing a detriment to a student’s academic performance or a lack of sleep caused *by* poor academic performance. These additional factors that can affect sleep habits and academic performance, such as extracurricular activities participation, sports participation, and weekly working hours are what I intend to the answer with the question, “What aspect of a student’s daily schedule affects their academics the most?”

METHODS

Due to the nature of the research being centered around how a typical student's schedule in terms of sleep, wake, and non-school activities would affect their grade point averages, and by extension a look at their overall academic performance, the instrument implemented to gather data about the research deemed most effective was a voluntary survey taken by students at Thousand Oaks High School. The survey was built taking notes from Amy R. Wolfson, Mary A. Carskadon, Christine Acebo, and others' *School Sleep Habits Survey*, which used data retrieved from high school students' self reported sleep times, wake times, and sleep durations, in addition to having them wear an actigraph for a single week period. Their data was recorded using a survey taken by students prior to the study as well as in combination with a diary filled out by students each day of sleep and wake times, and the students wore an actigraph, a biometric data sensor measuring amounts of rest a person gets. An example of a question from the survey that these researchers used includes: ("Figure out how long you usually sleep on a school night and fill it in here," which was answered as specific hours and minutes such as 7 hours, 30 minutes) and ("What time do you usually go to bed on school days?") which was answered with a specific time such as 11:30 PM. My instruments do not include something similar to the actigraph, because as a single researcher, I do not possess the funding to purchase several dozen instruments that on average cost eighty dollars a piece or more. As well, a sleep diary was not implemented, because as a single researcher, I would be unable to adequately administer the data collection at a degree of accuracy required to produce viable results if distributed to the entire sample population, which is 122 students.

Several other questions in my survey were modeled after the paper by Kerry L. Moulin & Chia-Jung Chung's "*Technology Trumping Sleep: Impact of Electronic Media and Sleep in Late Adolescent Students*" which was a study that examined with what impact there may be a compromise in students' ability for academic success, related to either lack of sleep or electronic media use. The participants were 89 high school and college students. These researchers conducted data collection using a secured online survey tool. Questions inquiring about the subjects' electronic habits, internet and social networking usage, sleep and rise times, daily sleepiness and perceptions were asked. An example of their survey is included. "Estimate total hours per "day" (24 hrs.) "USUALLY" spent on electronic device(s) for ANY reason." as well as "If you use electronic device(s) after going to bed at night about how much longer do you use them?" The difference between Moulin and Chung's research implements and the ones used in this research paper are that their study was entirely focused upon the impact of electronics use on their sleep only, where my focus is wider, and looks at the entire schedule including sleep schedules of the participants and how that affects their academic performance.

As for my own survey instrument the questions asked and their reasons for inclusion will follow. "What grade are you in?" where responses vary from 9, 10 11, and 12 because these are the only grade range of the student subjects. This question was modeled after the *Student Sleep Habits Survey*. The questions "On average, how many hours of sleep do you get on a school night?" and "On average, how many hours of sleep do you get on a weekend? (Or any night without school the next day)" were asked to gather a necessary data point required to construct a major part of any given person's daily schedule, as sleeping takes up anywhere from a sixth to a third of the day depending on the respondent. This question was modeled after the *Student Sleep*

Habits Survey. The question “What time do you typically go to sleep?” (With an example answer being 11:00 PM) was asked so that when combined in tandem with the response to the previous two questions a typical sleep time, wake time, and sleep duration can be constructed. The question “Rate the quality of your sleep.” with responses coming in a range of 1 to 5 with one being “I cannot sleep at all” and five being “I sleep without interruption” was asked so a qualification can be made about the quality of sleep a respondent gets. This question was modeled after the *Student Sleep Habits Survey*. The next question is another qualification for quality of sleep. Please list which, if any, of the following affect your sleep the most. Responses include: “Sports”, “Work”, “Extracurriculars”, “Academic studies”, “Procrastination/Distractions”, “My sleep is unaffected by all of the others listed”, or “Other” (where respondents fill in an unlisted response). This question was modeled after the *Technology Trumping Sleep* survey, as the reasons for an individual’s variance in sleep may end up being something entirely different than a potential conclusion made by the researcher, as what happened in the *Technology Trumping Sleep* paper.

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ANALYZING IMPACT OF STUDENT SCHEDULES ON ACADEMICS

12

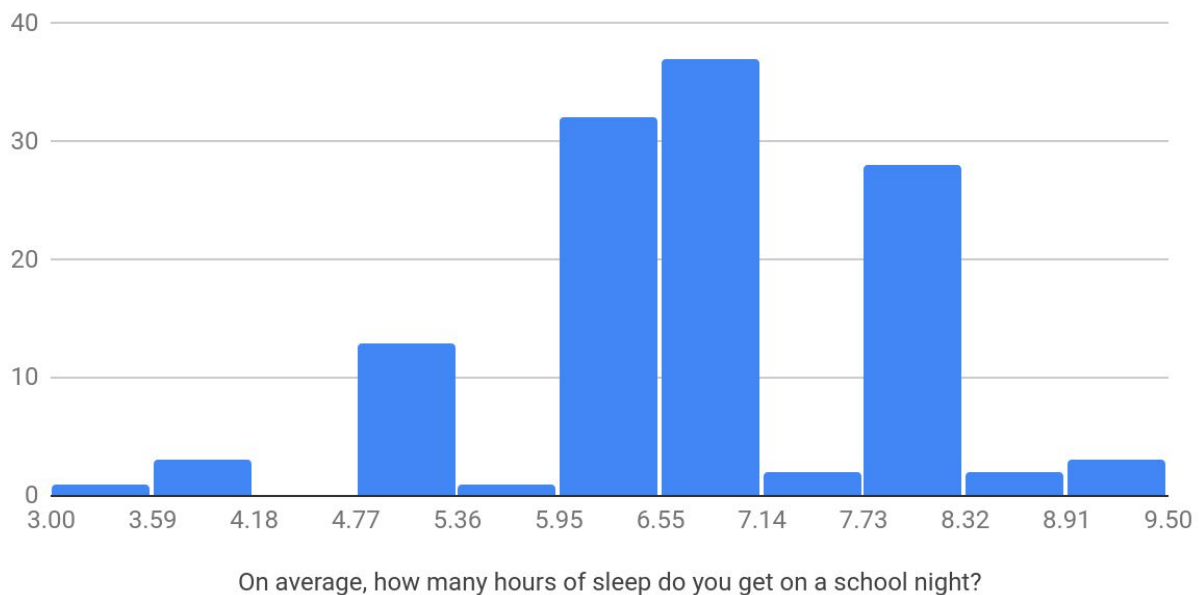
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RESULTS

Of the one hundred and twenty two students were surveyed, 51.3% were in the 12th grade, 23% were in the 11th grade, a 18.9% were in 10th grade, and 6.6% were in 9th grade

Histogram of On average, how many hours of sleep do you get on a school night?

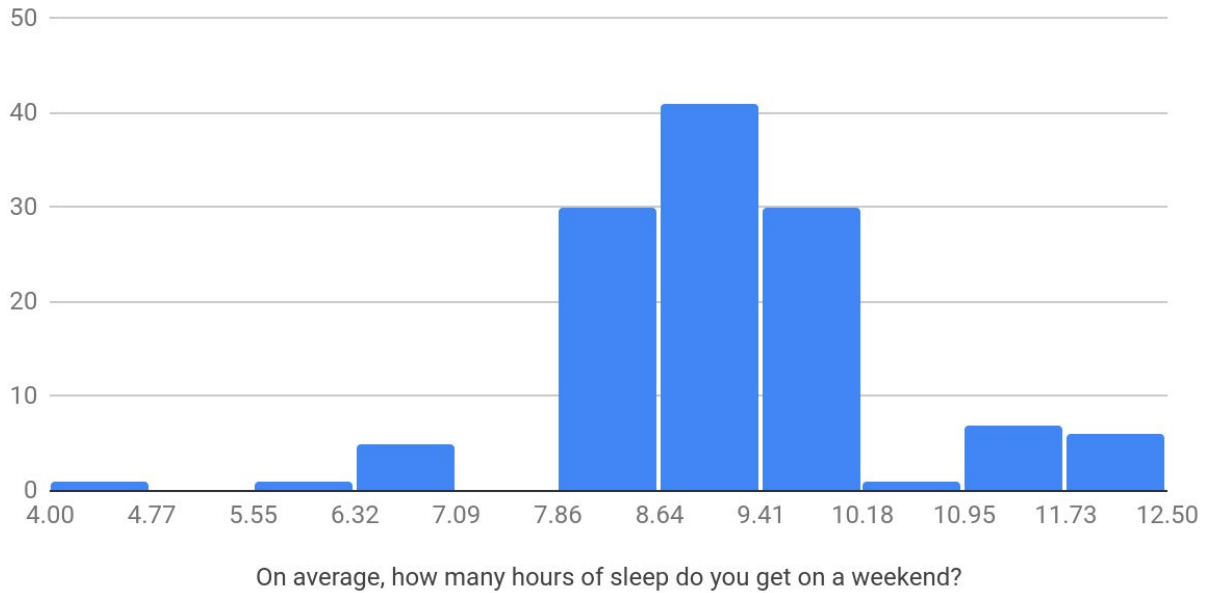
Histogram of On average, how many hours of sleep do you get on a school night?



Ranges from 3 hours (February 26, 2019, 10:17:08) to 9 hours (February 25, 2019, 16:10:06, February 26, 2019, 7:27:18, and March 11, 2019, 11:01:17), but most values are around 6.75 hours, plus or minus 1.25 hours.

Histogram of On average, how many hours of sleep do you get on a weekend? (Or any night without school the next day)

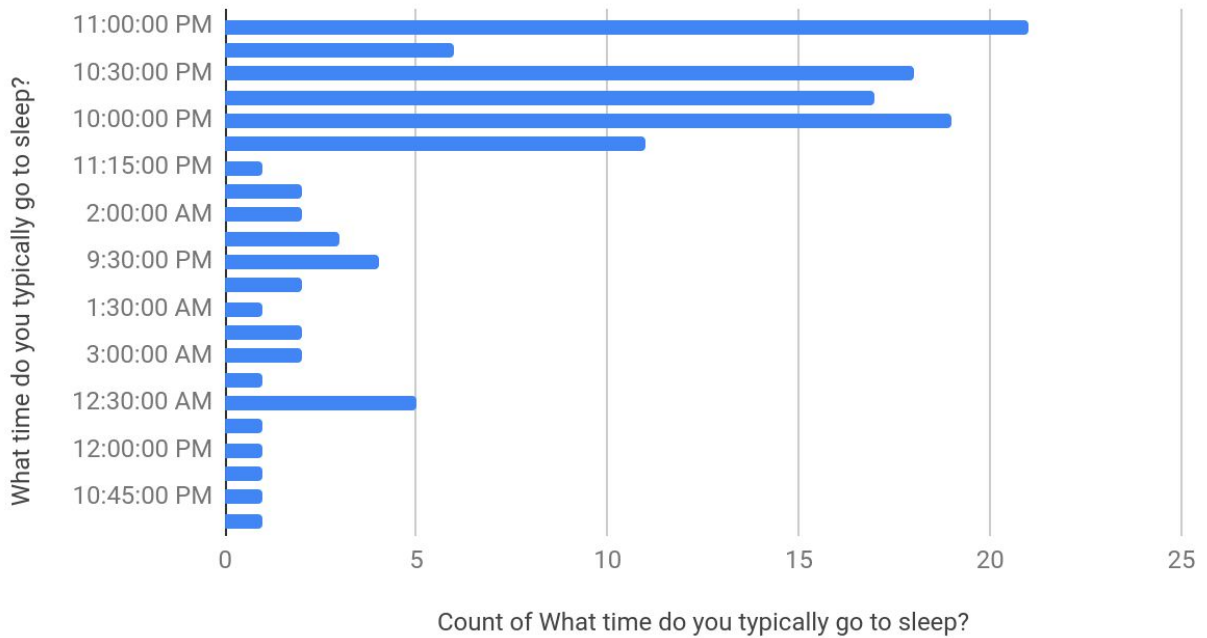
Histogram of On average, how many hours of sleep do you get on a weekend? (Or any night without school the next day)



Ranges from 4 (February 26, 2019, 8:29:19) to 12 (February 26, 2019, 10:27:23, February 26, 2019, 10:28:50, February 26, 2019, 10:28:58, and 3 others), but most values are around 9.139, plus or minus 0.861.

Count of What time do you typically go to sleep?

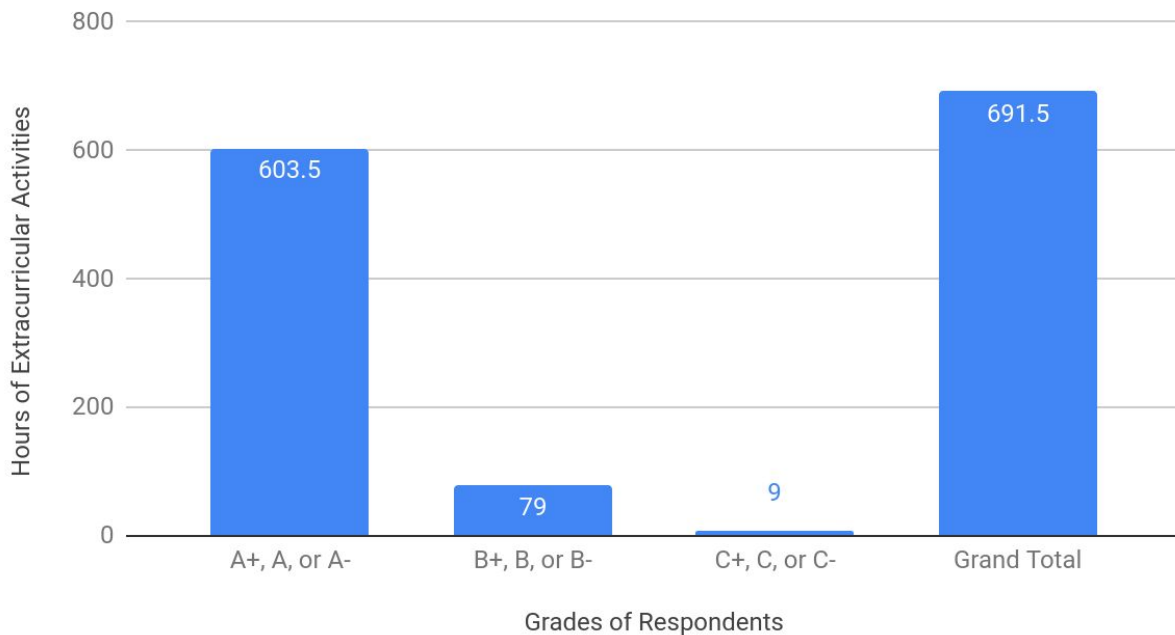
Count of What time do you typically go to sleep?



Ranges from 9:30:00 PM to 3:00:00 AM. Most common value is 11:00:00 PM. The average time varied from 10:30:00 PM to 11:30:00 PM.

Hours of Extracurricular Activities as compared to Grades.

Hours of Extracurricular Activities compared to Grades



Students within the grade range of “A+, A or A-” completed 603.5 hours of extracurricular activities. Students within the grade range of “B+, B or B-” completed 79 hours of extracurricular activities. Students within the grade range of “C+, C or C-” completed 9 hours of extracurricular activities.

DISCUSSION

Overall, what I found was that students who participated in more extracurricular activities on a weekly basis, such as volunteering, organizing clubs, internships and other non-academic related activities, received much higher grades overall than students who did not participate. The students who receive “A Range” grades who were surveyed, overall completed six hundred three and one half hours worth of extracurriculars in a given week, which when compared to the seventy nine hours of the “B Range” students, and the nine hours of the “C Range” clearly show

a relationship between how much a student commits to activities outside of one's own school mandated curriculums. Electronics use had proved to have little actual impact on academic performance, while impacting sleep schedules greatly, as reported by students. Balanced academic workload leads to higher academic performance, as students who reported the highest grades were not in the very highest percentile of class difficulty (AP and Honors level classes). In addition, it was found that on weekends students received on average, 3 hours less of sleep than compared to the weekend, which over 80% of respondents claimed affected their academic performance.

CONCLUSION

Some of the many limitations for my study revolve mainly around the Survey Tool that I had used to collect data. Grade level distribution, schools sampled, and the relatively small percentage of the school sample all contributed to very few of the actual questions asked being statistically significant. In the future to overcome these hurdles, consolidate survey questions, conduct supplementary interviews, and widen sampled population to get a much better overall picture of what the exact cause of academic shortcomings are.

CITATIONS

Moulin, Kerry L., and Chia-Jung Chung. "Technology Trumping Sleep: Impact of Electronic

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