Sleep Deprivation may Cause a Student Immense Limitation and Frustration.

Sleep deprivation’s impact and influence on the academic, athletic, and behavioral aspects of a student’s life at Chagrin Falls High School.

By: Jared Axelrod, Alex Goebel, and Ryan Jaskiel

Abstract

Sleep deprivation can affect and hinder the academic, athletic, and behavior of a student’s life. At less than eight hours of sleep a night, the human body and mind can undergo alteration. This alteration has the ability to impact the life of a student. The purpose of our project was to analyze and confirm the extent in which sleep deprivation affects a student in accordance with our variables: academics, athletics, and behavior.

In order to research sleep deprivation and fulfill the purpose of our research project, we conducted a survey and an experiment. We distributed 160 surveys to all grade levels as well as advanced placement, honors, and regular courses. Unfortunately we only received 83 surveys back. The survey requested students to provide their amount of sleep and answer questions that correspond to our variables. We then collected the data and compared sleep to academics, athletics, and behavior. In our experiment, a student purposely deprived himself of sleep. During a school day, he kept a journal and recorded his observations. His observations were then organized by the variables.

The survey and experiment provided data that consistently showed the correlation between sleep and our variables. The surveys illustrated that the amount of sleep a student receives is directly related to G.P.A., performance in athletics, and motivation. On average, students who answered low for the variable related questions indicated that they received less than the optimal amount of sleep. The experiment verified that sleep deprivation causes negative factors in a student’s life that can impede academic, athletic, and behavioral aspects of his/her life. The test subject noted negative changes in his sleep-deprived school day compared to an average day.
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Introduction

Statement of Problem

Jane is the average high school student. She plans to have a party at the end of the week, but her mom says she must maintain a 4.0. It is Thursday night, and she has no homework except to study for her English essay. After school, she goes home and begins her studying, but her friend Scott (who she loves) calls. She stays up till one in the morning talking to Scott about the party. The next day she goes into English class and is not motivated to do the essay. Her classmates can tell that she is exhausted, and she does not hear the teacher say that the essay is optional. She takes out a piece of notebook paper and begins to write her essay about a book she had read last semester. However, she cannot remember the end of the book and she becomes irritable and frustrated. Her frustration disables her from completing her essay. When the bell rings, she leaves the class knowing her perfect grades have disappeared. Her friend Jessie asks her about the exam, and Jane yells at her and then screams at every person who walks by. At the end of school, she forgot she had basketball practice. After arriving late, she was unable to make a single shot. Her arms were tired, and she was too drowsy to dribble straight. Unfortunately for her, her coach decided to have tryouts for Varsity at the end of practice. Although she was usually the best on the team, she was the worst at each competition. She did so poorly that she was not even given a junior-varsity position.

As depicted in the fictional story, sleep deprivation can affect a high school student’s life. It can greatly alter a student’s academics and ability in the classroom (Bergin 44; Black 33; Christian 913; Christie 376; Epstein; Gibson, Powles, and Thabane 116; Noland 224; School of Public Health 28). Likewise, sleep deprivation also causes a decrease in a student’s physical
ability and changes their normal behavior (Bergin 45; Black 34; Gibson 116; School of Public Health 19).

**Rationale and Focus of the Problem**

Sleep deprivation is a problem faced by many high school students. While sleep deprivation has been investigated and researched, there has been contradicting results (School of Public Health 24; Gibson 116). The aim of our study is to determine the effects of sleep deprivation on academics, athletics, and behavior. The first area of our research, a student’s academic ability, is a high priority for many students. It can be affected by a variety of issues, but we plan to study its relation to sleep deprivation. Sleep deprivation appears to have a direct correlation to an increase in stress and a decrease of focus. We plan to investigate to what extent, if any, stress and focus are impinged upon by sleep deprivation. Then, we can prove or disprove if a lack of sleep can lead to lower academic success. Hence, a student can plan their sleep in accordance to what is needed to achieve the academic level they desire. We also look to investigate the relationship of sleep deprivation and a student’s athletic ability. Sports and exercise play an immense role in many students’ lives. We will look into the physical consequence on the body from a lack of sleep. Our reasoning behind researching sleep deprivation and athletics is to inform students who want to achieve athletic success of how their amount of sleep can influence their athletic ability. Therefore, they can modify their original amount of sleep to be more in coherence to their athletic aspiration. Our final area of investigation is the behavioral affects from sleep deprivation. Behavior can contribute greatly to a student’s decision making and overall success in school. Our study will provide insight into a lightly researched topic and help high school students gain knowledge on an important aspect in their life. A student’s behavior will change if they suffer a lack of motivation and an increase in
anxiety. We plan to explicate how sleep deprivation plays a role in motivation and anxiety alterations or disprove the theory. Sleep deprivation may be very influential on a student’s life, and they must know what the possible effects are. In conclusion, sleep deprivation affects a student’s academics, athletics, and behavior and if students better understand the consequences of sleep deprivation, they can plan their sleep accordingly.

Definition of Terms

Sleep Deprivation- A condition where a person stays awake for more than normal, and as a result may experience fatigue, lethargy, or other effects (Harvard Health Publications).

Partial Sleep Deprivation- A condition where a person sleeps, but for less than his/her personal normal for the day, resulting in effects less prominent than complete sleep deprivation. However, if one loses sleep time over an extended period of time, the effects accumulate with the duration, intensifying the symptoms (Harvard Health Publications).

Complete Sleep Deprivation- A condition where a person goes without sleep for a duration at or exceeding twenty-four hours, resulting in more extreme symptoms of lethargy and fatigue, and may be dangerous when the person has to undergo an activity where heightened vigilance is required (Harvard Health Publications).

Rapid Eye Movement (REM) - The normal stage in sleep characterized by the fast-paced and random movement of the eyes. About twenty percent of an average adult’s sleep takes place in this stage (Marzano 261)

Microsleep- An episode where a sleep deprived person falls into a brief period of sleep lasting a few to around fifteen seconds. During this time, the person affected will not respond to sensory impulses, resulting in a potentially dangerous scenario if the ailed person is performing an activity where heightened vigilance is required (Harvard Health Publications).
Purpose of the Study

The purpose of our research is to determine the effects on the cognitive, physical, and behavioral elements from sleep deprivation ailing high school adolescents.

Research Questions

1. To what extent is a student’s academics hindered by sleep deprivation?
2. How does sleep deprivation affect a student’s athletic ability and performance?
3. What influence does sleep deprivation have on a high school student’s behavior?
Literature Review

Definition and History

Sleep deprivation is a condition caused by lack of sleep. It can cause a person to experience fatigue, weight change, social changes, clumsiness, and daytime sleepiness (Epstein; Gibson, Powles, and Thabane 116). The optimal amount of sleep for a teenager is approximately nine hours (Noland 225; Epstein; School of Public Health 18). If a teenager sleeps less than nine hours then they may experience sleep deprivation (Bergin 45; School of Public Health 18). Therefore, a student’s academic ability, behavior, or physical potential can be affected by sleep deprivation (Bergin 45; Black 34; Gibson, Powles, and Thabane 116; School of Public Health 19). Hence, a student’s grades will drop if they continually miss sleep (Black 35; Epstein; Noland 224). Sleep deprivation could also cause health problems by increasing stress and obesity (Black 35; Epstein; Noland 224).

The effects and causes of sleep deprivation have been studied since the early twentieth century. Although sleep deprivation has affected people since the beginning of the human race, the beginning of modern sleep deprivation research began with the French. In 1913, Henri Pieron, a French scientist, studied sleep deprivation from view based on a physiological perspective. His work was followed by Nathaniel Kleitman who is known as the “Father of American sleep research.” He studied sleep and the effects of sleep deprivation and made many important discoveries including the landmark discovery of rapid eye movement during sleep. His students continued his research and many others have branched off what he found (Stanford University). Today, sleep deprivation research has grown exponentially (Black 36). Studies have taken place across the world studying students and sleep deprivation (Gibson, Powles, and Thabane; School of Public Health 26). Rats are also being used to test sleep deprivation effect
on organisms (Christie 377). Sleep deprivation and the symptoms of it have been study since the early nineteenth century, but the most prevalent and advance research is taking place in the modern era.

Theories and Approaches

Sleep deprivation can decrease academic performance by causing a person to have trouble concentrating and paying attention (Bergin 44; Black 33; Christian 913; Christie 376; Epstein; Gibson, Powles, and Thabane 116; School of Public Health 28; Noland 224). In recent studies, seventy to eighty three percent of students do not obtain the optimal level of sleep (Gibson, Powles, and Thabane 116; School of Public Health 27). This is due in part to students staying up late doing homework and studying, but caffeinated beverages and leisure time activities also lead to students staying up to late (Gibson, Powles, and Thabane 116). However, biological factors like stress and sleep problems add to sleep deprivation (Christian 919; School of Public Health 28). Stress can cause sleep deprivation which hurts academics. In turn, academic failure can lead to more stress (Bergin 44; Noland 224). Since students gain extra amounts of sleep on weekends to make up for their lack of sleep during the school week, their biological clock, which regulates sleep, is off balance causing students to have energy at night and to have an energy deficit while at school (Bergin 46; Black 34). This accumulative sleep deprivation leads to academic deficiency by causing a student to be irritable and impulsive which in turn leads to stress and lack of focus (Bergin 45). Recent studies show there is a direct relationship between sleep and academic success due to stress and lack of focus (Gibson, Powles, and Thabane 116; School of Public Health 23-26). In addition to falling asleep in class, sleep deprivation will lower a student’s motivation to learn and lower their will to get good grades.
Sleep deprivation drastically influences physical performance and ability. The optimal reaction time for high school students is not achieved when under the effects of sleep deprivation (Carlozzi 28; Christie 379; Harvard Health Publications 9). According to a recent study, the reaction time deficit caused by sleep deprivation can be related to the effect of one-tenth percent of blood alcohol content (Harvard Health Publications 9). The detriment of reaction time severely limits the ability of the brain and mind to function properly (Carlozzi 28; Christie 379; Harvard Health Publications 9). Sleep deprivation also has been shown to increase stress in students (School of Public Health 30; Noland 224). Insufficient sleep will cause a student to gain weight which in turn adds to stress at school. This stress then causes a student to continually struggle with sleep deprivation (Noland 226). This compounding stress can lead to serious health concerns like heart problems, reduction of immune system, and an overall decrease in energy levels (Harvard Health Publications 10; Marzano 264; Moldofsky). Student athletics is also affected by sleep deprivation. Students will not be able to excel at athletics if they lack the necessary amount of sleep (School of Public Health 25). If a student’s brain lacks a sufficient amount of sleep, its neural activity levels decrease, which impairs a student’s physical ability (Marzano 265; Noland 225). Overall, sleep deprivation has a direct effect on the physical aspects of a student’s life.

Along with affecting physical and academic factors in adolescent life, sleep deprivation also alters the behaviors of affected high school students. The most prominent characteristics of sleep deprived adolescents include changes in attitude, decreased motivation, and increased instances of depression and anxiety (Harvard Health Publication 12; Noland224). Also,
restlessness and low self esteem spurs from the lack of sleep in young adults (Bergin 45). In addition to several factors causing teenage sleep deprivation in teenagers, the symptoms in turn have been shown to cause various elements contributing to sleep deprivation (Bergin 45; Noland 226). Some intermediate behaviors spurring from sleep deprivation symptoms can also pose a serious threat to well being; one of dangerous behaviors includes "micro sleeps," which are brief episodes where the subject will succumb to extreme fatigue for around ten to fifteen seconds, dangerous in the case of operating a motor vehicle (Harvard Health Publications 12). Other influences in adolescent life that sleep deprivation reaches includes school sports, social activity, and concentration during times prompting mental application and flexibility, resulting in lower grades and rating for everyday activities (Bergin 46; Black 36). Due to the many negative effects of sleep deprivation, numerous studies focused on high school adolescents have been conducted to pinpoint the affect of the lack of sleep in today's youth (Gibson, Powles, and Thabane 4; Noland 227; Roberts 23). Additional tests also focus on the adult working class along with laboratory mice, yielding increased hostility, confusion and longer reaction times, following the same trends entailing the tests conducted toward high school students (Christian 919; Christie 379). Overall, in today's active society, sleep deprivation has grown to be a major scourge against health and wellness, especially against the high school populations, subject to both the demanding timetables of adult scheduling in conjunction with natural adolescent sleep patterns, colliding to create detrimental sleep deprivation in today's high school students.

Criticisms

The recommended amount of sleep for a teenager is approximately nine hours (Epstein; School of Public Health 18; Noland 225). However, recent studies indicate that a student can perform at close to optimal levels if they attain seven to eight hours. This change in time is
attributed to many factors such as gender, age, lifestyle, and body type (Gibson, Powles, and Thabane 116; School of Public Health 18). A high percentage of students do not attain the recommended amount of sleep because of the early hours of school and homework (Bergin 44; Black 34-36). On the other hand, students do not get their homework done during the day do to leisure activities and stay up late because of their unhealthy diet (Gibson, Powles, and Thabane 116). Also, a student’s biological clock causes a student not to get tired late at night due to sleeping in on the weekends (Bergin 46; Black 34). Although sleep deprivation is thought to create stress, stress may cause sleep deprivation and it may be an exponentially growing cycle (School of Public Health 30; Noland 224). The same is true with neural activity in the brain. It is unclear if sleep deprivation causes a decrease in neural activity or vice versa (Marzano 261). A Harvard study found that kids who experience anxiety and low self-esteem suffer from sleep deprivation (Harvard Health Publication 12; Noland 225). There is no evidence suggesting the impossibility of a student already having preexisting behavioral issues that cause or are not affected by sleep deprivation (Marzono 267).
Design and Methodology

Setting

Our research studies and observations took place in the town of Chagrin Falls, Ohio, a small suburb east of Cleveland, Ohio. Chagrin Falls has a residential population of 4,113 people as of the 2010 Census. Chagrin Falls has a highly homogenous population consisting of 98.71% Caucasian residents, and is home to a large wealthy-middle class of residents. This township was established in 1845 by settlers from Connecticut (Ohio was formerly the Western reserve of Connecticut) as an industrial city. Chagrin Falls, spawning from early American heritage, reflects New England-Style architecture, most notably in downtown and in its vicinity through old housing and other structures. Chagrin Falls High School resides within the Chagrin Falls Exempted Village School System, which has received many honors reflecting the academic achievements of its students. Chagrin Falls Exempted Village Schools were ranked 97th in the country in Newsweek in 2006, and has been ranked “Excellent” or “Excellent with Distinction” for successive years based on AP and IB test scores. Chagrin Falls stands on a relatively secluded area that creates the atmosphere that many tourists name as “quaint”. Chagrin also has a tight-knit and active community relative to many other cities, contributed from and also contributing to a family-oriented atmosphere that drives much of the (contemporary) immigration to this town. Relatively higher safety, community interaction, and outstanding education attribute to Chagrin Falls as a desirable place to live, primarily to raise a family.

Participants/Selection of Participants

We conducted a survey throughout the English classes of Chagrin Falls High School. Our surveys were given to the English teachers and handed out to students in the classes. Since all grades must take an English course, we gained a wide spectrum of participants. Chagrin Falls
High School currently teaches 597 students, predominately Caucasian. However, only 160 surveys were distributed between the four grade levels. The freshmen, junior, and senior grades each received 50 surveys, while the sophomore grade received 10 surveys. In the survey, we ask many questions regarding sleep deprivation effects on the physical, behavioral, and academic aspects of the students’ lives. The questions include average hours of sleep, current GPA, number of sports played, and behavioral well-being throughout the school day. The surveys were kept anonymous to protect the results and participants. Throughout our survey, we created diverse and accurate participation in our research.

We also conducted an experiment to observe the effects of sleep deprivation on a student. For the experiment, Jared Axelrod, a student at CFHS, went a full night without sleep and attended school the next day. He kept a journal with him throughout the day to record his feelings and behaviors. Jared Axelrod maintains a GPA above 4.0 and plays basketball every day. These aspects were compared from a sleep-deprived day to a regular day. At the end of the day, the journal was collected and the results were observed and recorded.

Instruments/Methods

To carry out our research on sleep deprivation we used a compilation of primary and secondary sources. Our secondary sources included a variety of research located while using EBSCOhost. This research incorporated experiments conducted by Gibson, Powels, and Thabane, Noland, and Roberts. Their secondary research aided us with understanding sleep deprivation’s effects on students’ behavior, academics, and athletics. It also provided the basis for our survey and experiment. The experiments provided us a multitude of data which we used to reach conclusions for our Research project. The results of our data combined with these secondary sources influenced and enhanced our analysis. We also utilized a variety of academic
research by Black, Epstein, and Marzano. Their research provided information on sleep deprivation’s lasting influence on a student’s mind and how a student’s environment can contribute to sleep deprivation. Our secondary sources were compiled with our two primary sources. We used a survey to compare and contrast amount of sleep with a student’s academics, athletics, and behavior. We also used an experiment to test how a student’s life is changed by having limited to none sleep for one night.

Our survey was design to have the amount of sleep a student obtains match up to their academic, athletic, and behavior aspects of their lives. The surveys were anonymous and had only multiple choice questions in order to limit bias and inaccurate results. The surveys were approximately distributed to all grades equally. This would allow for us to measure all ages of high school students and not limit our data to one particular group. For each grade, we gave surveys out to English classes since every student takes an English class for all four years. In order to obtain data from both high and low ends of the academic spectrum we designated surveys for the most and least difficult class for each grade. Hence, Honors English for 11th and 12th grade did not receive surveys since there are advanced placement and regular English classes for each. Our surveys had seven questions. The first two asked the participant’s grade and average amount of sleep per night. These answers were compared to the next five questions which asked for the student to provide their G.P.A., to submit the amount of sports they participated in, and to rank their athletic performance and motivation during the day. We then collected and tallied the results of the surveys and listed the data. By comparing the students’ amount of sleep to their G.P.A., academic performance, and motivation, we were able to discover trends among the data and assess our three variables.
Along with the data collected with our survey, we conducted an experiment. Our experiment consisted of having a member of our group undergo severe sleep deprivation for one night and compare a normal day to a sleep deprived day. The member kept a journal and recorded his thoughts with a detailed analysis of his academic, athletic, and behavioral changes in his life. The other members examined and observed him during the day and compiled the data in order to learn the results of sleep deprivation. The changes in his life were recorded, and we were able to reach conclusions from sleep deprivation. This data was combined with our survey information and an assortment of secondary sources in order to carry out our research project.
Data Results

Purpose of the Study

The purpose of our research was to determine the effects on the cognitive, physical, and behavioral elements from sleep deprivation ailng high school adolescents.

Research Questions

4. To what extent is a student’s academics hindered by sleep deprivation?
5. How does sleep deprivation affect a student’s athletic ability and performance?
6. What influence does sleep deprivation have on a high school student’s behavior?

Coding of Data

For the purpose of comparing academics, behavior, and motivation, we passed out 160 surveys to the students of Chagrin Falls High School. Unfortunately, we only received 83 surveys back that were not obsolete or incomplete. We then proceeded to divide the surveys into nine separate categories: under four hours, four hours, six hours, seven hours, eight hours, nine hours, ten hours, and over ten hours (Appendix A). For each category, we individually tallied the answers for the questions of G.P.A., motivation, number of sports, and performance in those sports (Appendix A). Next, we made a series of stacked-bar graphs to show the relationship between the variables and the amount of sleep. Each graph compares amount of sleep to the answer of one question. The x-axis for each graph represents the scalar quantity of students who answered the surveys, and the y-axis shows our sleep-based categories in ascending order. The identical axes portrays the bar size for each sleep-based category to be the same across every graph. This allows the graphs to isolate the stated variables as the only alteration, hence, enabling accurate conclusions to be drawn. Each bar is divided into separate sections that are distinguishable by color. The colors correspond to the different possible answers for the
question the graph represents. A key was provided for each graph to define each color’s meaning. By comparing the location and length of a colored section in a bar, one can decipher the correlation between the stated amounts of sleep and the variables.

In order to analyze the effects of sleep deprivation on the academic, behavior, and athletic aspects of a student’s life, we conducted an experiment. Jared Axelrod, the participant in our experiment, purposely sleep deprived himself during the night of April third. During the following day, Jared kept track of his observations, and he wrote them haphazardly. He noted differences in his academics, behavior, and athletics. We then marked statements in his record that were in relation to one or more of the variables of the experiment. The statements were put in three separate paragraphs: academics, behavior, and athletics (Appendix B). We kept the statements original except for changing some verbs to past tense in order to keep the paragraphs logical and understandable. The originality causes the sentences to seem uneven; however, we believed it would allow the data to be more viable. In addition, we included an introductory paragraph written by the participant to validate the data and provide a basis for the information (Appendix B). By coding our data, we were able to define trends and themes among the data.

Overview of Overall Results

Overall, the results of our research support the thesis that sleep deprivation has a negative impact on a student’s physical, academic and emotional well being. As our surveys show, most students do not receive the recommended eight hours of sleep per night, and are susceptible to the effects of sleep deprivation (Appendix C). We also found that G.P.A. is directly proportional to the amount of sleep with more hours of sleep leading to a higher average G.P.A (Appendix D). Performance in academics also directly correlates with the experiment’s results (Appendix B). Similarly, students experience a decrease in motivation and overall behavior with less sleep
(Appendix B and Appendix E). In athletics, students with a higher average of sleep performed better than those with sleep deprivation (Appendix B, Appendix G). In conclusion, sleep deprivation was a very prevalent problem among students and very negatively affects academics, behavior and athletics.

Discussion of Methods

We conducted an experiment involving one group member attending a normal high school day under the effects of sleep deprivation. To execute this experiment, we chose a school day where the facets of the subject’s life, the physical, emotional, and social elements were observable. After careful consideration, we scheduled the experiment on Wednesday, April 4, 2012. During the experiment, the subject purposely deprived himself completely of sleep on the night preceding the experiment, clocking well in excess of 24 hours staying awake and obtaining the level of complete sleep deprivation. The following day, the subject attended a regular school day at CFHS, and kept notes of various instances of his encounters. At the end of his day, including both school and basketball practice, he then recorded his results in a journal. The nature of what he wrote reflected the elements we wished to test: effects on physical well being, academic and mental well being, and social well being. The results we received after the experiment on April 4 confirmed our hypothesis; the subject experienced overall deterioration in life quality in all three major categories pertaining to health and well being. The subject stated that during the day of the experiment, he experienced extreme fatigue, which caused him to lose focus very frequently during his commute (by car), during class time, and during basketball practice (Appendix B). The subject also stated that he had a hard time recalling the material that he learned during his classes (Appendix B). In addition to the mental and cognitive field, the subject also described himself to be less socially interactive and cooperative and found himself in
multiple arguments with his peers (Appendix B). Lastly, after the initial school day and onto basketball practice, the subject records that he still feels the effects of sleep deprivation, and that it greatly affects his performance on the court with a staggeringly low free-throw percentage in conjunction with only twenty minutes of play time (Appendix B). After the conclusion of the experiment, we have postulated that sleep deprivation, does in fact; affect all facets of a student’s well being the following period of time after passing the threshold of sleep deprivation. We distributed 160 surveys amongst English classes of all grades and levels (College Preparation 9 to AP 12). Out of 160 surveys distributed, we received 118 back, and used 83 of them excluding 35 due to questionable validity. Contained within the survey are seven questions pertaining to grade level, average sleep duration, grade point average, overall mood during the school day, number of sports, performance in sports (if participating), and the element most affected by lack of sleep (Appendix A). At the conclusion of counting all of the valid surveys, we noticed a trend amongst the student population with regards to hours of sleep per night. We found that three students have less than four hours of sleep per night, six having four hours, eight having five hours, one having six hours, twenty-three having seven hours, eighteen having eight hours, twelve having nine hours, one sleeping ten hours, and one sleeping over ten hours (Appendix C). We took the results from the hour number prompt and incorporated the results with the results from the GPA prompt and found a trend with regards to hours and academic performance: the number of hours slept is directly proportional to the level of performance (Appendix D). In addition we preformed the same method to the (quantitative measure) motivation scale results with those from the hour prompt, and found that the number of hours students sleep per night is also directly proportional to the sense of positive well being during the day (Appendix E). Once again, our group applied the findings from the number of hours slept
with the number of sports a student performs, against our prediction, found that the mean number of people play one to two sports while receiving seven to eight hours of sleep (Appendix F). However, when applied to physical performance during sports, the number of hours slept is directly proportional to a higher level of performance (Appendix G). Although trends are prevalent in sleep time duration and various levels of performance (in school and in athletics), the results found when applying the hour number prompt with the prompt regarding the element in daily life most affected by sleep deprivation, the following results reflected no major trends at all (Appendix H). From this survey, our group can conclude that a direct relationship exists between the numerical values of hours slept per night, to GPA, quantitative representation to well being, and physical performance. In addition, our group can postulate that the number of hours slept has little relation with number of sports. Along with that, our group cannot derive a pattern when applying the number of hours to any qualitative (rather than quantitative) value (such as what sleep deprivation affects), reinforcing the thesis that the quantitative number of hours slept by a student directly correlates to other quantitative measures of well being in high school students.
Conclusion

Summary

In the execution of our research project regarding the effects of sleep deprivation on students in the United States, we honed in on the academic, behavioral, and physical elements of various lifestyles of students attending Chagrin Falls High School. As stated in the Literature Review, sleep deprivation creates a wide assortment of problems revolving around overall performance and actions, whether it is problems concentrating, learning and retaining material, interacting with peers, or poor athletic performance. Tailing those ailments to young adults, numerous researchers have conducted experiments following the effects partial and complete sleep deprivation since the early twentieth century; although some deviation in results do exist, the overall trend amongst the results show that less than nine to ten hours of sleep hinders adolescent well being in many facets of life. When developing our experimentations, we took all of the qualitative trends proportionate to sleep time from our research, and devised modes of testing those very elements in order to find a similar trend. The resulting information we received following the conclusion of our survey collection and qualitative experiment fit very much into the conventional thesis. Firstly, sleep deprivation negatively affects mental/cognitive performance. This is evident in the experiment subject’s remarks on his ability to focus and remember the material he learned in class, coupled with the directly proportional relationship of sleep hours and GPA reflected from the survey we distributed. Secondly, student behavior and overall disposition during the day was also proven to have a relationship to hours of sleep, once again outlined within our survey but also reflected by the experiment subject’s negative description of his mood during his experiment. Lastly, a student’s athletic performance has proven to be hindered after undergoing a sleep deprived schedule, once again, reflected by the
experiment subject in conjunction with trends from our survey. As a result of these findings, we have come to conclude that partial and complete sleep deprivation deteriorates the quality of life in all facets of the people who are affected by it, paralleling the conventional thesis and its surrounding theories.

Overview of Research and Findings

Our research, in its entirety, shows that various elements of a student’s life in Chagrin Falls High School are negatively affected from the effect of sleep deprivation. We distributed a survey to all levels of English classes querying each student on average hours of sleep, GPA, numerical representation of motivation during school, number and numerical representation of athletic activities, lifestyle impact of sleep deprivation (if any). What we found after receiving all legitimate entries, after compiling them all against the number of hours slept, was that most of the trends we expected to see came into being. We found that hours slept directly correlates to academic performance reflected by the students’ GPA; scholastic high-performers (GPA 4.0 and above) tend to sleep around the eight-hour mark, whereas low-performers (GPA 1.0-2.0) tend to sleep four hours or under. The same trend can also be found when interpreting the numerical representation of disposition versus number of hours slept, with high-ranking students sleeping more hours than low-ranking students. The numerical representation of athletic performance, following our predictions, follows the same directly proportional trend as the previously stated comparisons; students who perform athletically at the best level get the optimal number, if not more than the optimal number of hours slept per night to attribute to their physical well being. However, some deviations from our thesis did occur within the results; the variables of number of sports played at a time and what sleep deprivation affects most versus hours of sleep reflected no detectable trend. The average number of sports played by Chagrin students is one to two, and
all of the responses regarding what sleep deprivation affects came back a tossup of answers. Nonetheless, the majority of the results outline a correlation of the number of hours slept per night, with the integrity of different elements of student life. These results also correlate with the conventional thesis on which the topic of sleep deprivation is based.

As the second part of our research, and in conjunction with the survey we have distributed, we have decided to test specific traits, affected by sleep deprivation, of a fellow group member. We were able to test those traits by having the test subject completely deprive himself of sleep for a full twenty-four hours, achieving complete sleep deprivation. The subject was then to attend a normal school day at CFHS, along with his regular basketball practice afterwards, all while keeping track of his instances in a journal. At the conclusion of the experiment, we assessed the results and postulated that sleep deprivation does and has affected the test subject negatively in all facets of his well being, results parallel to numerous results of conventional experiments. In the field of academics, the subject had a very difficult time paying attention to his classes and lectures, contrary to his high performance in the classroom under normal circumstances. In the instances reflecting the test subject’s social life, the same deteriorating trend is seen; the test subject, under the effects of sleep deprivation, stated that he had a difficult time cooperating with his peers, along with remarks of a very poor attitude and instances of rage contrary to life under normal circumstances. Lastly and predictably, the test subject’s physical performance hindered with the onset of sleep deprivation. The test subject stated that he had relatively poor performance at his basketball practice session, reflected by a low percentage of shots made during warm-up and free throws, low motivation, and low performance during his short play time. The results of this experiments are very clear, sleep deprivation, especially in its complete stage, deteriorate the quality of life of an individual in the
cognitive, social, and physical fields of well being, once again reflecting the conventional thesis of sleep deprivation effects.

Weaknesses

We encountered several weaknesses throughout our study. First, Chagrin Falls lacks diversity, as most of the kids are Caucasian. Our survey may lack the input of a diverse population. Also, our survey was made with an error and some surveys were distributed with it. On the question about average amount of sleep, there was no option for six hours of sleep. This could have potentially affected the results. Another problem we encountered was our valid survey amount. We handed out 160 surveys, but we only used 83 due to obsolete results or simply not receiving them back. This deficiency in surveys may have skewed the results because more results leads to a more accurate study. We also only had one subject for the experiment, which may have affected the results. Finally, there was a small issue with communication between the members of the study, which may have affected the paper negatively. Overall, the weaknesses we faced did not significantly affect the results.

Implications

We have several recommendations for researchers who wish to replicate our study. First, a much larger and more diverse study for the survey would produce more accurate results. A larger sample would also reduce the effect of faulty or unreturned surveys. We also recommend for future research to thoroughly examine the surveys to eliminate any errors. Future studies should also make sure all study members keep adequate communication with the group to benefit the quality of the paper. Researchers should also perform an experiment with multiple subjects to analyze a plethora of results. Following these guidelines should produce a high quality study.
High Schools should try to reduce the amount of work at home to allow maximum hours of sleep for students. Schools could also move their schedule an hour forward so students receive more time to sleep, but still receive their full hours of education. Students and parents should also be further educated on the harmful effects of sleep deprivation to help them try to reduce the prevalence of sleep deprivation. Students must plan to receive adequate sleep and possibly reduce their daily schedule to provide that time. Sports can also be planned to provide as much sleeping time as possible. In conclusion, if slight changes were made to schools and students’ lives, the harmful effects of sleep deprivation would be minimized.
### Sleep Deprivation Survey

Thank you for taking our survey on sleep deprivation. We plan to compile the results you give us with other answers from around the school. If you cannot focus on the questions long enough to answer, you may be sleep-deprived, and we need your results.

1. **What grade are you currently in?**
   
<table>
<thead>
<tr>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
</table>

2. **Approximately, how many hours of sleep do you receive per night?**
   
   | <4 | 4 | 5 | 7 | 8 | 9 | 10 | >10 |

3. **What is your G.P.A.?**
   
   | <1.0 | 1.0-2.0 | 2.0-3.0 | 3.0-4.0 | >4.0 |

4. **On scale 1-10 how do you feel during the school day? (1 being worst)**
   
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

5. **How many sports do you play?**
   
   | 0 | 1 | 2 | 3 | 4 | 5 | >6 |

6. **Rank your performance in your sports from 1-10?**
   
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | None |

7. **Which is most affected by your lack of sleep?**
   
   - Academics
   - Athletics
   - Behavior
   - Motivation
   - I do not have a lack of sleep
Appendix B

I arrived at school on Wednesday April 4 after staying up all night. I feel awful and extremely tired. My eyes feel heavy and I had a hard time staying awake when I was driving to school.

**Academics:** Throughout the day, I had a very hard time focusing. I fell asleep in two of my classes, including a test. I didn’t take notes in my classes because I was too tired. I am normally a great student, but I had a lot of trouble paying any attention. I struggled through the whole day and barely remember anything I learned. Staying up all night definitely affected my academics in a negative way.

**Behavior:** I was very moody and didn’t talk to people a lot. I am usually a very social person, but I did not have the energy to have conversations. The bad feeling I felt physically kept me in a bad mood all day. I got into numerous arguments with my friends and even my mom. I was very sensitive to comments and exploded with anger multiple times. I also felt unmotivated to try hard at school and sports. Sleep deprivation put me in a horrible mood and definitely affected my behavior throughout the day.

**Athletics:** After school I had basketball practice. I felt unmotivated to play or work hard. During warm-ups, I missed all of my shots. I just could not focus on the basketball. I got benched during the scrimmage and ended up only playing 20 minutes of the scrimmage because of my poor play. During free throws, I missed sixteen of my twenty free throws. I am an 85% shooter regularly. I could not hit anything because I was so tired. The sleep deprivation really hurt my game and basically eliminated my energy and strength.
Appendix C

Survey Results Chagrin Falls High School

AMOUNT OF SLEEP

Grade
- Freshman
- Sophomore
- Junior
- Senior

AMOUNT OF STUDENTS

over hours
10 hours
9 hours
8 hours
7 hours
6 hours
5 hours
4 hours
under 4 hours
Appendix D

G.P.A. and Amount of Sleep

Students

GPA
- 1.0-2.0
- 2.0-3.0
- 3.0-4.0
- over 4.0
Appendix E
Appendix F

Ranking of Motivation (10 is high motivation)

Students

Motivation Ranking
- 1 Ranking
- 2 Ranking
- 3 Ranking
- 4 Ranking
- 5 Ranking
- 6 Ranking
- 7 Ranking
- 8 Ranking
- 9 Ranking
- 10 Ranking
Appendix G

Amount of Sports for Amount of Sleep

<table>
<thead>
<tr>
<th>Sleep</th>
<th>Amount of Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 4 hours</td>
<td>0, 1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>4 hours</td>
<td>0, 1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>5 hours</td>
<td>0, 1, 2, 3, 4, 5</td>
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<tr>
<td>6 hours</td>
<td>0, 1, 2, 3, 4, 5</td>
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<tr>
<td>7 hours</td>
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<tr>
<td>8 hours</td>
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<tr>
<td>9 hours</td>
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<td>10 hours</td>
<td>0, 1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>over 10</td>
<td>0, 1, 2, 3, 4, 5</td>
</tr>
</tbody>
</table>

Students
Appendix H

Ranking of Performance in Sports for Amount of Sleep

Students

Axelrod, Goebel, and Jaskiel 33
What is Most Effect

Sleep

Over hours

10 hours

9 hours

8 hours

7 hours

6 hours

5 hours

4 hours

Under 4 hours

Students

Catagories

Academics
Athletics
Behavior
Motivation
none

Works Cited


Gibson, Edward S., Peter Powles, and Lehana Thabane. “‘Sleepiness’ is serious in adolescence: Two surveys of 3235 Canadian students.” 2 May 2006. PDF file.


