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AN ANALYSIS OF THE AMOUNT OF SLEEP AND THE EFFECTS IT HAS ON
ATHLETIC CAPABILITIES AND ROUTINE TASKS IN COLLEGE ATHLETES

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College student athletes are under a lot of pressure to accomplish all that is expected of them which may lead to other areas of their lives being neglected, including sleep. The amount of

sleep a student athlete gets is crucial in their accomplishments both off and on the field. The researchers chose to investigate how the amount of sleep an athlete gets affects their day to day life. Specifically, the researchers explored the correlation between the amount of sleep an athlete got and how positively they rated their day through an online daily survey throughout a two week span of 10 days. Participants of the study hailed from a Lutheran, faith-based institution of higher education in an urban area of the Midwestern United States. The research showed that it did not matter the amount of sleep the athlete got the night prior that determined their performance the following day. The study thoroughly addressed the relationship between stresses on athletes that impaired their sleep schedules and the aftereffects in both their academic and athletic performances in school and on the field. ____

Introduction

College athletics is big business. Athletic programs stimulate enrollment and boost college reputations and branding. Students who participate in sports know the benefits of exercise, discipline from workouts, and creating lifelong friendships from being a part of a team which translates to future well-being in the workforce. However, there are disadvantages for athletes in college. Coaches may push athletes to practice more than they should, limiting their time for schoolwork, social life and sleep. Participating in athletics can produce physical and mental stress, especially with increased responsibilities and not enough sleep. Finding ways to make college athletes perform at their highest levels benefit the institutions they attend.

Most would agree that the demands of college athletes force them to change their sleeping patterns. They would probably believe that depriving themselves of proper sleep was justified. One universal fact is that sleep is important for overall health and something that can be individually rectified. Sleep is a natural set event for everyday life, not a random occurrence. Complete athletic health can only be achieved by taking care of sleep issues. Sleeping longer and better improves many aspects of athletic and physical performance.

Literature Review

_____The amount of sleep an athlete or student gets affects their injury prevention, amount of fatigue, memory and cognitive impairments, decreased attention, and shifts in response capabilities (Walters, 2002). It is extremely important that a student athlete gets a minimum of 8 hours of sleep per night (Walters, 2002), so they can be focused on their school work and daily activities, giving their best level of focus throughout the day. Sleep deprivation has been proven to decrease focus levels in students and also decrease performance and awareness in physical activity (Yusuf, 2016). Sleep is also crucial in the recovery process, and needed to make sure that athletes stay in tip top shape (Marshall, 2016). The memory process and cognitive thinking can also be impaired when it comes to not having enough sleep, and the ability to focus.

Importance of sleep in relation to performance

One of the most critical aspects of being an athlete is performing at the optimal level and staying healthy. Irimia (2016) specifically focused on measuring the correlation between overall performance in the classroom, and sleep deprivation in students. They wanted to figure out if it was harder and more demanding tasks within the classroom were more difficult to achieve when running on less sleep, or if performance was not affected by sleep. In their study, 64 students were analyzed, half of them running on full sleep, and half deprived of sleep for a night. They would then answer a series of online questions to determine their cognitive levels. They found that overall reaction time was significantly affected by sleep, students deprived being much slower and students on full sleep responding much faster.

The internal aspects of an athlete affected by sleep are important to study. The data found that sleep and exercise are interdependent and influenced by the athlete's body clock. Damien (2009) examined the importance of the sleep-wake biological rhythm in athletes. Changing one element ultimately affects the other. The quality and quantity of sleep affects athletic

performance. Exercise has an impact on sleep and athletes need more sleep and sleep longer for growth and repair of injuries. Although sleep is important, athletes often overlook it due to training and other commitments. Lack of sleep has consequences including memory and cognitive impairments, decreased attention, and shifts in response capabilities (Davenne, 2009). This will also affect fatigue and recovery processes. Human performance is dependent on this delicate biological process.

Understanding the specifics of sleep can also provide insight in understanding how sleep affects performance. Walters (2002) evaluated how college students are supposed to get anywhere between 8-9 hours of sleep a night on a regular week day, but at times do not get nearly close to that. The author's main goal of this article was to, "Help coaches and trainers gain a better understanding of what happens during sleep and how sleep can affect performance..", (Walters, 2002, p.17). They discussed the five stages of sleep and how each one has different meanings and effects when being in them for too long or too short periods of time. Stage one is a light sleep lasting from 10 seconds to 10 minutes, this is where muscular relaxation occurs. State two is the beginning of actual sleep, last 10 to 20 minutes. Stage three and four, known as slow-wave sleep, are the deepest levels of sleep. State five is rapid eye movement (REM) or referred to as active sleep or paradoxical sleep.

Sleep is important not only to the physical body but to the mind as well. Harrison (2002) designed a cognitive study to determine if "linguistically, sleep loss appeared to interfere with novel responses and the ability to suppress routine answers." The test involved 20 adults, half were the control and half sleep deprived. Short and new language tests were administered. Even with short, new and invigorating tests, individuals who were sleep deprived had impaired results from the Haylings test (which measures the capacity to inhibit strong associations in favor of

new responses) and word fluency tasks. They were slower and less successful in inhibiting strong word associations, generated fewer words, and did not produce unique word associations but stuck with predictable words. Sleep loss interfered with new responses and that behavior becomes more typical (Harrison, 2002).

Performing can also mean relating to others. Holding (2019) designed a study to show the effects of sleep loss and its connection to communication. Although the study was not specifically designed to study athletes, its results would correlate to athletes as well. Following a night of sleep deprivation, participants were given building as well as word description tasks. The results showed that performance, accuracy, and efficiency was worse after sleep deprivation but there was no change in the word description tasks. Sleep deprivation leads to changes in communicative performance during instructive tasks while simpler word description tasks were unchanged (Holding, 2019). The verbal perception and linguistic comprehension that were decreased after sleep loss (Holding, 2019) would translate to problems with listening and understanding teammates and coaches at practices or competitions as well as performance in the sport itself.

Variables that impact sleep/performance

There are a multitude of factors that can affect the sleep patterns of athletes. Outside variables like rehabilitation access after performance, technology usage before sleep and social life conflicts as well as sleep deprivation affect sleep in athletes. The most significant recovery modalities were sleep, fluid replacement and socializing with friends. Vantor (2014) evaluated the perceptions that athletes had regarding specific athletic recovery modalities. 890 male and female elite athletes completed questionnaires designed using specific words and phrases related to recovery strategies and were rated by the athletes. Men rated supplements and ice baths as

more important than men, and women rated teammate and coach discussions after training more important than men. The results also showed that different sport codes and participation levels were viewed differently and could affect recovery of team sport players. Other variables that affect sleep would be activities prior to bedtime. Seventy male and female athletes from individual and team sports completed an online sleep diary for one week regarding prior to sleeping behaviors including caffeine and napping, usage of electronic device several hours before sleeping, and sleep behaviors such time in bed. Jones (2018) investigated what behaviors athletes participated in prior to sleep and the effect on sleep quantity. The results indicated that in order to resolve extreme sleeplessness, younger athletes might need a later start time or enhanced quality of sleep. Using the electronic devices was also seen to promote difficulty in falling asleep, but the other variables were not significant.

Not all variables are right before going to sleep. Romyn (2018) designed a study to see if athletes could benefit from naps during daytime hours. Using a polysomnography or sleep study, the total amount of sleep of twelve male soccer players was assessed in three separate sleep conditions- nine hours of sleep at night, eight hours with a one hour nap, and seven hours with a two hour nap. The results indicated that the total amount of sleep was similar and napping for the athletes during the daytime could be effective in reinforcing their sleep at night. The amount of sleep a person gets is important whether it be periodically, or throughout the night. Alhola (2007) focused on sleep deprivation and how it affected your cognitive focus and level of attention. “First and foremost, total sleep deprivation (SD) impairs attention and working memory, but it also affects other functions, such as long-term memory and decision-making. Partial SD is found to influence attention, especially vigilance. Studies on its effects on more demanding cognitive functions are lacking”, (Alhola, 2007, p.553). They focused on studying the way people are

affected by sleep deprivation, and what can change their patterns and how sleep affects this.

They made it very clear that SD can be very different between gender and age, but is not studied or taken seriously enough. ■■■

Finally, stress can be a factor in sleep patterns and is apparent in most student athletes. This can involve anxiety, overthinking and again, fatigue (Martin, 2018). Most individuals would describe stress in a negative way. Martin (2018) focused on determining stress levels of college students, including athletes, in their everyday lives focusing on intrinsic (including fatigue) and extrinsic (schoolwork and difficulties with coaches) factors that affect students stress levels. Watson (2017) found that stress could limit the chance for athletes to get enough sleep as well as inhibit the quality and quantity of their sleep before competition. Athletes had more perceived stressors due to time management, missing class due to team travel, burnout, fatigue, and dealing with team dynamics and the study found that athletes did not take advantage of emotional and community support for stress management (Martin, 2018).

Sleep diary studies and/or questionnaires

It is important to understand someone's sleep schedule and why they may or may not be functioning at their optimal level as an athlete. With the help of sleep diaries and routine questionnaires, some of these questions can be studied and answered. Some general sleep questionnaires may not be valid with athletes, but diaries for longer periods of time with wrist monitors could be accurate and online questionnaires could determine cognitive levels (Milewski, 2014). There was a significant correlation between kids that got less than 8 hours of sleep a night and more injuries, and kids that got 8 or more hours a night and less injuries. Milewski (2014) focused on the correlation between athletes injuries and the amount of sleep they were getting per night. It concentrated on the correlation in sleep and injury as well as what

age the participants were.

Diaries on their own are effective but Sargent (2014) also used wrist activity monitors and sleep and a training diary for two weeks recording fatigue of the athletes which proved to be an accurate measure of determining pre-training fatigue.

There are different and varied questionnaires also used to determine sleep patterns in athletes. Researchers created an Athlete Sleep Screening Questionnaire made to find flaws in athletes' reliability. Bender (2018) determined that general sleep screening questionnaires are not valid nor reliable dealing with the athlete population. What they came up with was that the ASSQ gives an accurate method to determine which athletes would benefit from preventative measures and which ones would suffer from sleeping problems. Doing this would provide recommendations to help improve sleep. Yusuf (2016) used a sleep study where students answered a series of online questions to determine their cognitive levels which accurately determined their overall reaction time. Martin (2018) used the COPE questionnaires to identify intrinsic and extrinsic stressors in college students' lives, by asking questions including athletic status, academics studied, and average hours of sleep nightly.

Effect of training schedules /sleep affecting sports performances

The tougher and longer the training, the harder it is for athletes to get the best sleep which affects performance and athletes sleep less prior to competitions. The data showed the amount of sleep an athlete received was controlled by their training schedule. Sargent (2014) inspected what effect training schedules have on the amount of sleep elite athletes have. Seventy athletes from seven sports used wrist activity monitors and sleep and training diaries for two weeks recording fatigue. Their sleep behaviors were different than their awake behaviors on training and rest days. Durations of sleep were linked with increased pre-training fatigue. The results

suggested that coaches need to be aware of training schedules due to their importance in sleep and fatigue in their athletes, including encouraging naps and correct nightly sleep regiments (Sargent, 2014).

The training schedules could also show consistent results of fatigue even with different exercises. Baekeland (1996) tested 10 different college athletes doing three different conditions of exercises that were similar. The athletes have gotten the same amount of slow wave sleep the night before and same level of stress effect of exercise in the evening.

Marshall (2016) investigated how extremely important not only the sleep schedule for student athletes when it comes to strength and conditioning, but also the recovery process. There's many different factors that play a part in this study, but the strength and conditioning coach should be responsible for the athletes' education level on being well rested.

Research also showed that athlete's sleep patterns did not change before their games or contests. Sciencedirect (2015) showed that athletes have not gotten enough sleep the nights prior to important competitions. Knowing that they have to sleep early, the amount of sleep recommended still is not being reached. They wanted to identify sleep complaints of athletes prior to competitions and determine whether complaints were confined to competition periods.

In conclusion, it is important for university athletes to get an adequate amount of sleep each night (typically 8hrs) in order to perform at their best level during competition and also in the classroom. Effects such as reaction time, performance, thinking process, and injuries are all affected by lack of sleep in athletes. Studies show that athletes who do get the full 8 hours of sleep each night tend to have much better results and are more successful as well. Monitoring the amounts of sleep that these athletes get is very important because there are preventative measures that can be taken to increase better sleep, such as not using electronics before bed will help that

has seen to be a major problem. Lastly, the recovery process is one of the most important pieces. Athletes have to do their absolute best to prevent injuries and with lack of sleep the chances of injuries go up drastically.

Research Questions and Hypothesis

The amount of sleep a student athlete gets is crucial in their performance both on and off the field. Research shows that sleep is important for muscle development, maintaining strength and endurance, and lowering levels of stress hormones. Sleep is also needed for athletes to recover from practices and competitions to stay in top form. Not only is sleep important for an athlete physically, there are mental considerations and benefits as well. Memory retention and focus can be impaired from sleep deprivation. Sleep is also important for academic performance in the classroom. The benefits of sleep to keep an athlete in top competitive form on the field and in school provide reasons to study stresses that impair an athlete's sleep schedules.

RQ1: How are a student athlete's communication style and interpersonal skills with others impacted by their amount of sleep and that resulting stress?

This study will focus primarily on both male and female athletes on the effect of the amount of sleep on communication and other skills with an athlete's teammates or coaches.

RQ2: What are the specific components in a student athlete's life affected daily by the amount of sleep acquired per night? How is this affecting them psychically and mentally?

This study will focus primarily on both male and female athletes on what determines their sleeping habits and any perceived issues.

RQ3: How does the amount of sleep correlate with physical performance and injury restoration in college athletes?

This study will focus primarily on both male and female athletes on the effect of the amount of sleep with performances at practice and competitions as well as how quickly one responds to treatment for injuries.

Methods

For our research, we will be conducting a study to determine if student athletes sleep patterns affect their communicative competence, along with their physical and mental health characteristics. Our plan is to select 12 athletes from 3 different sports teams at a faith based institution in the midwest, and then determine if they have the necessities for our study. The necessities needed include being an athlete at the institution, as well as having an apple watch or fitbit in order to track their sleeping patterns. Considering our specific requirements for the participants, we will be conducting non-probability sampling.

We will do this study over 2 weeks, that way it will give us an idea of the general amount of sleep that each athlete gets per night. Our study will be field independent because their watches will measure their sleep in their own rooms, and they will then be taking a survey to determine how they felt after every day. We will then be able to find out if there is a direct correlation between hours of sleep the athlete gets per night and their communicative competence and physical and mental health. Once the information is recorded and compiled, we will get an accurate representation of how the student athlete functions on (x) hours of sleep.

Our study will be self administered, given that we will give each participant 10 surveys through email that connect them to survey monkey (one to fill out each day), and the results will be collected at the end of those 2 weeks. As the hypothesis for our study, we predict that the

student athletes getting a consistent and healthy amount of sleep per night, (7 hours or more), will report feeling better overall about their communicative competence each day, and with factors relating to their physical and mental health. With this said, we predict that students getting less amounts of sleep per night, (6 hours or less), will report major struggles with these. This will be two tailed because we are interested in both directions, meaning we are testing the effects on athletes to see if and how getting more or less sleep will affect them overall. Our questions will be closed ended on a semantic differential scale, meaning they will be asked a question and told to circle a number, 1-5, to determine how they felt that day. For this specific study, we will be using the randomized block design. We are taking college kids ranging from ages 17-22, from only sports teams, in order to maximize the accuracy of our testing. This will maximize the accuracy of our testing because we will be taking a group of students with different sexual orientations, racial backgrounds, sports teams, and ages. With this being said, we will get a good representation of how a typical college athlete functions on different amounts of sleep.

This study will be quantitative because each student will answer 10 questions per day on a closed ended scale. Each participant will go about their daily routine normally, then they will report through the survey how they felt after each day. When the 2 weeks are complete, we will collect our surveys and determine the results. Although there will be no need for a post-interview, we will sit down with each student and share our results to compare them with how they reported being affected by sleep in our pre-interview.

Results

Twelve undergraduate student athletes from Concordia St. Paul were surveyed once a day over a 10 day span of time to determine if a correlation exists between the amount of sleep each athlete gets per night and their mental health, physical health, as well as their communicative

competence. The researchers also wanted to determine what aspects of daily life for a student athlete were most affected by lack of sleep. Of the 12 participants that received the survey, all 12 completed 1 survey per day giving a 100% response rate.

Over the 10 days that the researchers analyzed the participants sleep patterns, 5.63% reported getting less than 4 hours of sleep nightly, 40.85% reported getting between 4-6 hours of sleep nightly, and 53.52% reported getting 7 hours of sleep or more nightly, (see figure 1.2). To test our first hypothesis, the participants were asked a series of questions related to stress to determine if their sleep patterns had an effect on their stress levels. A chi square contingency (or chi square test with association) indicated no significant correlation ($P > .05$.) between stress and how much sleep participants got, (see figure 2.1).

Although no statistical association was found, when answering the questions related to stress only 35.53% of participants that got 7 or more hours of sleep reported being more stressed. With that, 58.62% of participants that got 4-6 hours of sleep reported being more stressed than not, while 50% of participants that got less than 4 hours of sleep reported the same, (see figures 1.1 and 1.3). These results lead the researchers to accept the null hypothesis.

To determine if each athlete's sleep patterns had an effect on their physical and mental health, the participants answered a series of questions relating to the topic. These questions included asking about how sore the athlete felt, and how emotional they were throughout the day, (see figures 1.4 and 1.5). A chi square contingency (or chi square test with association) indicated no significant correlation ($P > .05$.) between mental and physical health and the amount of sleep the participant got per night, (see figure 2.2).

Although no statistical association was found, when answering the questions related to physical and mental health, only 17.1% of participants that got 7 or more hours of sleep reported

being more sore and emotional. With that, 25.86% of participants that got 4-6 hours of sleep reported being very sore and emotional, while 25% of participants that got less than 4 hours of sleep reported the same, (see figures 1.4 and 1.5). These results lead the researchers to accept the null hypothesis.

The next questions that were asked regarding the participants overall communicative competence during the day supported our hypothesis. When participants were asked how productive they were throughout the day along with their participation during classes, an average of 15 people that slept 7 or more hours per night said that they were very productive and participative, while an average of 8 people that slept 4-6 hours a night said they felt that way. Only 2 participants reporting less than 4 hours of sleep said that they felt productive and participative in class, (see figures 1.6 and 1.7).

A chi square contingency (or chi square test with association) indicated a significant correlation at ($P < .05$.) between communicative competence and the amount of sleep the participant got per night, (see figure 2.3). The researchers reject the null hypothesis and conclude that athletes getting less sleep nightly show higher levels of communicative competence throughout the day, and vice versa.

Discussion

Self Efficacy Theory

Developed in 1977 by Albert Bandura, Self Efficacy theory is the central part of social cognitive theory and is one's belief in one's ability to succeed in specific situations or accomplish a task (Bandura, 1977). Most people identify goals that they want to accomplish, like things they want to achieve or change. That is not a simple thing to do. A person's self efficacy

plays a part in how those challenges are approached (Feltz, 2001). You either have a strong sense or a weak sense when approaching these obstacles. People with a strong sense of self efficacy have a deep interest in the activities that they participate in and a strong sense of commitment to those activities and interests (Pajares, 2007). People with this strong sense also look at the obstacles for the goals they want as something they want to learn from and master. If there is a problem that arises, these individuals learn from their mistakes quickly and move on from it (Pajares, 2007). In a weak sense, individuals will avoid the task because they lack the ability to believe in themselves. They also think that trying to find solutions and work on challenges is beyond their capability (Pajares, 2007). Weak sensed people spend more of their time on their failures and disappointments. This causes them to lose confidence. There are four sources of self efficacy. One of these sources is mastery experiences and it is completing a task successfully. This means that the more you perform, and complete the task successfully, will strengthen your personal sense of self efficacy. Another source of self efficacy is social modeling. This sense is seeing other people successfully complete a task and then makes another individually want to complete a task as well. Another source is social persuasion, which is encouragement from others. The last source is psychological responses which is your own mood, emotions, and stress levels that impact how an individual feels about certain situations (Cherry, 2019). If you have a general sense of self efficacy, it can play a big role in how an individual can manage their health and mental well being (Feltz, 2001).

Based on the theory of self efficiency, and the theory and/or the experiment performed, it would seem that most of the athletes we interviewed have high self efficiency. Fletz (2001, p.7) said in *Self-Efficacy in Sport* that “people’s perceptions of their performance capability significantly affect their motivation and performance”. This statement is evident in the

experiment because when the survey asked the athletes the question “How many hours of sleep did you get last night?”, the results showed that 53.52% of the twelve student athletes got 7 hours of sleep nightly which resulted in less amounts of stress. These individuals also resulted in being less sore and more productive throughout their day. The athletes performance capability seems to be reliant on the amount of sleep they are getting each night. Pajares (2007, para.1) in *Self-Efficacy Beliefs of Adolescents* stated that “it is simply not possible to explain phenomena such as human motivation, learning, self-regulation, and accomplishment without discussing the role played by self-efficacy beliefs”. This relates to the experiment because self-efficacy is a learned process starting in childhood and athletes at a Division II level have usually learned behaviors, motivations and traits that would continue to keep them healthy and productive in their perspective fields. As the athletes in our experiment were on the higher spectrum of performance, including sleep, it demonstrated that most had a high self-efficacy. The author Kendra Cherry argued Bandura’s theory saying that “self-efficacy is the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations” (Cherry, 2019, para. 5). This is evident within the experiment when the athletes were asked if they were productive during the day and they mostly agreed (15 people sleeping 7 or more hours nightly and 8 people sleeping 4-6 hours nightly opposed to the 2 people sleeping less than 4 hours nightly). Most of the athletes had the belief that having enough sleep (at least 4 hours and up to 7 plus hours) would make them more productive during the day. Most seemed to organize their days and nights around schoolwork, friends, sports activities, and sleep in predictable and profitable routines. These actions would help them maintain their athletic and academic goals.

Self-Worth Theory

The Self-Worth Theory also known as The Self-Worth Theory of achievement motivation, developed by Martin V. Covington, is the view that one's achievement behavior is conceptualized in terms of their self-perception and motivation to approach success and to avoid failure (Covington & Beery 1976). Individuals naturally strive to succeed not only for the personal and social benefits but because the success builds a reputation. According to Covington, "One's first priority is to act in ways that minimize the implications of failure-- namely, that one lacks ability" (Covington p. 8). We are built to stray away from exposing our weaknesses by displaying our strengths, the drive that pushes one to want success is fueled by one not wanting to fail. It is believed that the highest human priority is self-acceptance and it is shown (in schools) that being able to achieve goals through competition goes hand in hand with self-acceptance (Covington 1992). Students that are Success-Oriented tend to score higher when aiming for success and lower on failure avoidance, more of the focus is placed on succeeding which leaves the thought of failure out of the picture. These also lead the student athletes to have a stronger academic history and this reinforces their self-worth which boosts their confidence in their ability to succeed academically (Covington & Omelich 1991).

Self-worth theory, based on the information researched and data collected from the athletes that completed the survey, seems to be present within the success that the athletes are striving for. In figure 2.3 it shows that the athletes that had gotten more sleep (7 hours or more) were more participative in their classes. This leads to the athletes wanting to be the best they can whether that is academically or competing in their games, because preparation is a very important factor in success. While being conscious of the fact that the athletes who had gotten 7 or more hours of sleep had the highest percentage of class participation, this increases the chances of those athletes to be more successful in their academics than the athletes who didn't

get the same amount of sleep. This shows that those student athletes are more Success-oriented. According to *Academic Motivation and the Student Athlete*, Herbert D. Simons stated, “They [Success-Oriented students] have a strong sense of self-worth, believe they have the ability to compete academically, have good study skills, are able to accurately judge the difficulty of tasks, and therefore expect to succeed and take pride in their academic achievements.” Being a collegiate level athlete is a full time job when in season with the responsibility of being on top of your grades, so every bit of preparation from day to day has to be taken seriously and that starts by getting the proper amounts of sleep each night.

Restoration Theory and Communicative Competence

Sleeping is an important function in order to restore the body and the mind from the day prior. The stages of non-rem sleep (NREM) are crucial for their restorative physical and cognitive properties. Stage 2, accounting for around 50% of a night of sleep aides in the restoration for cognitive and bodily functions (Grandner, 2018). The mind transfers into a more relaxed state when entering the second stage of NREM sleep. This relaxed state shows a higher frequency of brain wave sequences that aid in both memory and learning (Grandner, 2018). Stages 3 and 4 have much lower wave frequencies where the heart rate and brain activity lower dramatically. These stages are crucial for cell repair and rebuilding. REM, similar to NREM, has shown to be important for the restoration and improving one’s learning abilities and memory; all important things for student athletes to have restored after a day of classes and practices or games (Grandner, 2018).

Not much prior research has been found on the overall communicative competence of college athletes relating to the amount or the quality of sleep they have gotten in a night. The chi-squared chart in figure 2.3 shows that there was a significant correlation between the amount of

sleep students got and their communicative competence throughout their days academically. There was a study done by *the Department of Clinical Neuroscience and the Stress Research Institute* in Stockholm, Sweden on whether or not total sleep deprivation will affect an individual while completing collaborative tasks, (Holding, B. C., Sundelin, T., Lekander, M., & Axelsson, J., 2019, p. 1). The researchers here did find through observation that the participants overall communicative competence was impaired showing most in their tone and inflect. Those who were sleep deprived were more likely to slur more words and had less energy in the tone of their voice when speaking to the groups they were working with, (Holding, B. C., Sundelin, T., Lekander, M., & Axelsson, J., 2019, p. 2). By being deprived of the necessary amount of sleep, these participants were not as alert and ready as those who got a full night.

The restorative properties of sleep can be related back to a person's communicative competence through both the physical restoration and the learning and memory restoration. College athletes are constantly communicating; whether it be with their peers, their professors, coaches, or teammates. If their communication competence is impaired by lack of sleep in 1 night, any of these interactions can be thrown off more than if they were to get a full night of sleep.

Limitations

_____ There were three major limitations experienced while conducting the research and reviewing the results. The first being the sample size. There are fifteen different sports teams at Concordia St. Paul and we only took four athletes from three of these teams to conduct our research. Had the sample size been larger, there would be potential for a bigger disparity between the number of hours athletes sleep at night and their communicative abilities. The second limitation we experienced was the amount of time given to complete the study. If the data

collection period were longer than the 10 day study, the results could have been different and more accurate to the ever changing schedules of a college athlete. Finally, the third limitation was found in our method. Our survey was not necessarily time sensitive. While everyone completed theirs once a day, we are not sure what time of day each athlete was completing them. Had the survey been more time sensitive, having the athletes answer them promptly at the end of each day, the results for how they felt their communicative competence was overall would have been in real time therefore more accurate.

Suggestions for Future Research

Some suggestions for our future research that could potentially make our study better would be extending our period of data collection for longer than 10 days to get more accurate numbers. Another one would be to have more participants from all sports across campus and not just three sports, that way we could get a wider variety on the sports spectrum, having athletes being tested from contact sports where they use tons of energy to E sports where they don't have to use much of their energy as much as some sports may use. Finally, screenings with each participant before and after data collection that way we can monitor how much sleep the athletes are getting in their off season when they aren't putting as much time into their sport as they are when they are in season.

Conclusion

Overall, our study done by the researchers gave us a good idea of the correlation between an athletes sleep schedule every night, and their physical and mental health, along with their communicative competence. Although there was not a significant correlation between the athletes physical and mental health and their sleep schedules, there was a significant correlation between their communicative competence and their sleep schedule. The information gathered by

the researchers were all very useful because we found out that athletes are in fact affected by the number of hours of sleep that they get, and that it would be very useful for them to get 7 or more per night. We appreciate the time taken by each participant to be in our study.

Appendix

Figure 1.1:

Q3 Rate your stress level involving school today.(5 being the highest)

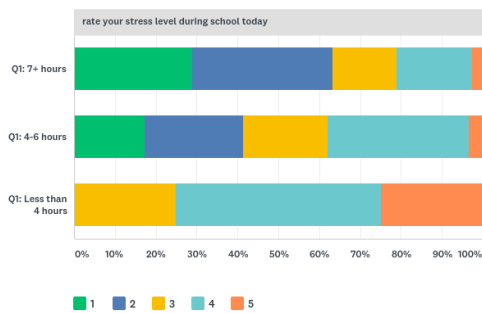


Figure 1.2:

Q1 How many hours of sleep did you get last night?

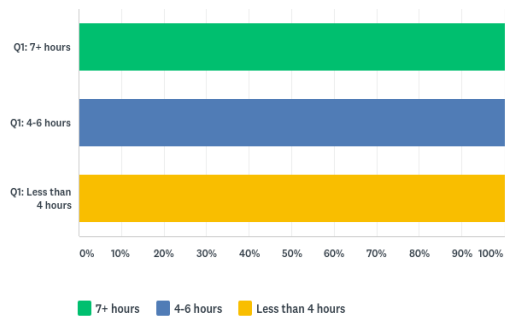


Figure 1.3:

Q2 Rate your stress level during your practice or game today.(5 being the highest)

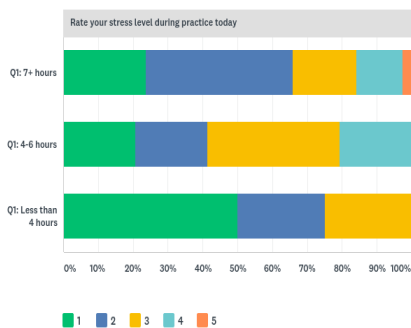


Figure 1.4:

Q6 How sore and/or injured did you feel today?(5 being the highest)

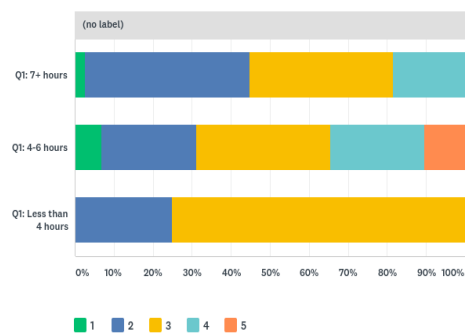


Figure 1.5:

Figure 1.6

Q10 How emotional did you feel throughout the day today?(5 being the highest) Q5 Rate your overall participation during class today.(5 being the highest)

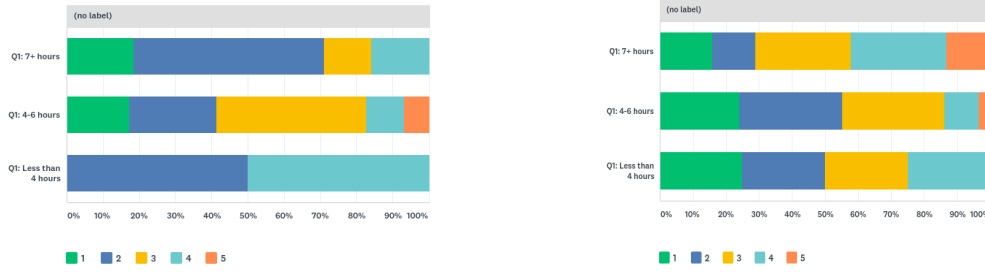
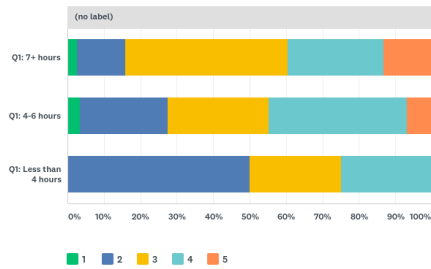


Figure 1.7

Q7 Rate your overall productivity today.(5 being the highest)



Chi Squares:

Figure 2.1 (Stress Questions)

Results						
	1	2	3	4	5	Row Totals
7+ hours	20 (17.66) [0.31]	29 (23.01) [1.56]	13 (17.13) [0.99]	12 (16.06) [1.02]	2 (2.14) [0.01]	76
4-6 hours	11 (13.48) [0.46]	13 (17.56) [1.19]	17 (13.07) [1.18]	16 (12.25) [1.15]	1 (1.63) [0.25]	58
less than 4 hours	2 (1.86) [0.01]	1 (2.42) [0.84]	2 (1.80) [0.02]	2 (1.69) [0.06]	1 (0.23) [2.66]	8

Column Totals	33	43	32	30	4	142 (Grand Total)
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The chi-square statistics is 11.6964. The *p*-value is .165275. The result is *not* significant at $p < .05$.

Figure 2.2 (Mental & Physical Health Questions)

Results						
	1	2	3	4	5	Row Totals
7+ hours	9 (9.93) [0.09]	37 (28.22) [2.73]	20 (24.04) [0.68]	14 (14.11) [0.00]	1 (4.70) [2.92]	81
4-6 hours	8 (7.48) [0.04]	14 (21.25) [2.47]	22 (18.10) [0.84]	11 (10.63) [0.01]	6 (3.54) [1.71]	61
less than 4 hours	2 (1.59) [0.10]	3 (4.53) [0.52]	4 (3.86) [0.01]	2 (2.26) [0.03]	2 (0.75) [2.05]	13
Column Totals	19	54	46	27	9	155 (Grand Total)

The chi-square statistics is 14.1931. The *p*-value is .076869. The result is *not* significant at $p < .05$.

Results						
	1	2	3	4	5	Row Totals
7+ hours	7 (9.00) [0.44]	10 (16.88) [2.80]	28 (25.88) [0.17]	21 (19.12) [0.18]	15 (10.12) [2.35]	81
4-6 hours	8 (6.11) [0.58]	16 (11.46) [1.80]	17 (17.57) [0.02]	12 (12.99) [0.07]	2 (6.88) [3.46]	55
less than 4 hours	1 (0.89) [0.01]	4 (1.67) [3.27]	1 (2.56) [0.95]	1 (1.89) [0.42]	1 (1.00) [0.00]	8
Column Totals	16	30	46	34	18	144 (Grand Total)

The chi-square statistics is 16.5308. The *p*-value is .035383. The result is significant at $p < .05$.

Survey Questions

Directions: Take this survey at the end of each day and answer each question on a scale of 1-10, 1 being not at all, and 10 being extremely. Answer each question completely honestly and pertaining to the day you are taking each survey!

1. How many hours of sleep did you get last night?
 - a. 7+ hours
 - b. 4-6 hours
 - c. Less than 4 hours
2. Rate your stress level during your practice or game today.
1 2 3 4 5
3. Rate your stress level involving school today.
1 2 3 4 5
4. Rate your overall energy level during your practice or game today.
1 2 3 4 5
5. Rate your overall participation during class today.
1 2 3 4 5
6. How sore and/or injured did you feel today?
1 2 3 4 5
7. Rate your overall productivity today.
1 2 3 4 5
8. How difficult was it waking up this morning?
1 2 3 4 5
9. Rate how awake you felt throughout the day today.
1 2 3 4 5
10. How emotional did you feel throughout the day today?
1 2 3 4 5

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