



---

# AP<sup>®</sup> Research Academic Paper

## Sample Student Responses and Scoring Commentary

### **Inside:**

#### **Sample F**

- ☒ **Scoring Guidelines**
- ☒ **Student Samples**
- ☒ **Scoring Commentary**

# AP® Research Academic Paper 2023 Scoring Guidelines

The Response...				
<b>Score of 1</b> <b>Report on Existing Knowledge</b>	<b>Score of 2</b> <b>Report on Existing Knowledge with Simplistic Use of a Research Method</b>	<b>Score of 3</b> <b>Ineffectual Argument for a New Understanding</b>	<b>Score of 4</b> <b>Well-Supported, Articulate Argument Conveying a New Understanding</b>	<b>Score of 5</b> <b>Rich Analysis of a New Understanding Addressing a Gap in the Research Base</b>
Presents an overly broad topic of inquiry.	Presents a topic of inquiry with narrowing scope or focus, that is NOT carried through either in the method or in the overall line of reasoning.	Carries the focus or scope of a topic of inquiry through the method <b>AND</b> overall line of reasoning, even though the focus or scope might still be narrowing.	Focuses a topic of inquiry with clear and narrow parameters, which are addressed through the method and the conclusion.	Focuses a topic of inquiry with clear and narrow parameters, which are addressed through the method and the conclusion.
Situates a topic of inquiry within a single perspective derived from scholarly works <b>OR</b> through a variety of perspectives derived from mostly non-scholarly works.	Situates a topic of inquiry within a single perspective derived from scholarly works <b>OR</b> through a variety of perspectives derived from mostly non-scholarly works.	Situates a topic of inquiry within relevant scholarly works of varying perspectives, although connections to some works may be unclear.	Explicitly connects a topic of inquiry to relevant scholarly works of varying perspectives <b>AND</b> logically explains how the topic of inquiry addresses a gap.	Explicitly connects a topic of inquiry to relevant scholarly works of varying perspectives <b>AND</b> logically explains how the topic of inquiry addresses a gap.
Describes a search and report process.	Describes a nonreplicable research method <b>OR</b> provides an oversimplified description of a method, with questionable alignment to the purpose of the inquiry.	Describes a reasonably replicable research method, with questionable alignment to the purpose of the inquiry.	Logically defends the alignment of a detailed, replicable research method to the purpose of the inquiry.	Logically defends the alignment of a detailed, replicable research method to the purpose of the inquiry.
Summarizes or reports existing knowledge in the field of understanding pertaining to the topic of inquiry.	Summarizes or reports existing knowledge in the field of understanding pertaining to the topic of inquiry.	Conveys a new understanding or conclusion, with an underdeveloped line of reasoning <b>OR</b> insufficient evidence.	Supports a new understanding or conclusion through a logically organized line of reasoning <b>AND</b> sufficient evidence. The limitations and/or implications, if present, of the new understanding or conclusion are oversimplified.	Justifies a new understanding or conclusion through a logical progression of inquiry choices, sufficient evidence, explanation of the limitations of the conclusion, and an explanation of the implications to the community of practice.
Generally communicates the student's ideas, although errors in grammar, discipline-specific style, and organization distract or confuse the reader.	Generally communicates the student's ideas, although errors in grammar, discipline-specific style, and organization distract or confuse the reader.	Competently communicates the student's ideas, although there may be some errors in grammar, discipline-specific style, and organization.	Competently communicates the student's ideas, although there may be some errors in grammar, discipline-specific style, and organization.	Enhances the communication of the student's ideas through organization, use of design elements, conventions of grammar, style, mechanics, and word precision, with few to no errors.
Cites <b>AND/OR</b> attributes sources (in bibliography/ works cited and/or in-text), with multiple errors and/or an inconsistent use of a discipline-specific style.	Cites <b>AND/OR</b> attributes sources (in bibliography/ works cited and/or in-text), with multiple errors and/or an inconsistent use of a discipline-specific style.	Cites <b>AND</b> attributes sources, using a discipline-specific style (in both bibliography/works cited <b>AND</b> in-text), with few errors or inconsistencies.	Cites <b>AND</b> attributes sources, with a consistent use of an appropriate discipline-specific style (in both bibliography/works cited <b>AND</b> in-text), with few to no errors.	Cites <b>AND</b> attributes sources, with a consistent use of an appropriate discipline-specific style (in both bibliography/works cited <b>AND</b> in-text), with few to no errors.

## Academic Paper

### Overview

This performance task was intended to assess students' ability to conduct scholarly and responsible research and articulate an evidence-based argument that clearly communicates the conclusion, solution, or answer to their stated research question. More specifically, this performance task was intended to assess students' ability to:

- Generate a focused research question that is situated within or connected to a larger scholarly context or community;
- Explore relationships between and among multiple works representing multiple perspectives within the scholarly literature related to the topic of inquiry;
- Articulate what approach, method, or process they have chosen to use to address their research question, why they have chosen that approach to answering their question, and how they employed it;
- Develop and present their own argument, conclusion, or new understanding while acknowledging its limitations and discussing implications;
- Support their conclusion through the compilation, use, and synthesis of relevant and significant evidence generated by their research;
- Use organizational and design elements to effectively convey the paper's message;
- Consistently and accurately cite, attribute, and integrate the knowledge and work of others, while distinguishing between the student's voice and that of others;
- Generate a paper in which word choice and syntax enhance communication by adhering to established conventions of grammar, usage, and mechanics.

## The Effects of Taekwondo on Sleep Patterns

Word Count: 4775

## **Introduction**

Taekwondo is a sport well known for self defense; however, it is not known for reducing stress and anxiety. Taekwondo incorporates techniques and skills to help bring tranquility to your body. It helps you develop skills such as self control, discipline, and the ability to have control over your breath. Having control over your breath is a common stress management technique and Taekwondo incorporates this skill into self defense and this helps reduce stress among individuals. From personal experience and research, Taekwondo does in fact help with stress due to its distinct ways. This aspect of Taekwondo was interesting and led me to think further into this topic. If Taekwondo reduces stress and anxiety, consequently, individuals' sleep patterns would also improve and benefit. Therefore, I wanted to conduct a correlational study determining whether Taekwondo has specific impacts on sleep patterns as compared to individuals who participate in other types of physical activities and individuals who do not participate in any physical activities. This experiment will help understand whether there is a correlation between performance in Taekwondo and sleep patterns. This will help determine whether participating in Taekwondo will actually make a difference in an individual's sleep pattern.

## **Literature Review**

Taekwondo is a sport used for self defense. Its common definition is: the art of empty hand and foot fighting. It is mostly known for self defense, but it is not very well known for handling stress. However, there have been studies done, proving that they do in fact help with stress. For example, Kimberly Petrovik, MA in medical sociology and PhD at University of Connecticut, conducted a research study determining whether Taekwondo benefits undergraduate students in handling stress. Her research produced results which showed that all students

benefited from Taekwondo because they were able to deal with stress and were able to overcome their difficult circumstances through the concepts they learned from Taekwondo (Petrovik, 2017). This research study shows that Taekwondo helps students with handling stress and provides you the opportunity to overcome this challenge. Reducing the amount of stress can even help an individual sleep better. If an individual has a lot of stress, they may have a hard time sleeping, and this could affect their whole sleeping schedule. The disruption can cause individuals to develop more health problems in the future. According to an article, “How Stress Can Affect Your Sleep,” published by *Baylor College of Medicine*, “Dr. Anise Wilson, assistant professor of neurology states, “for teens and young adults in school, this stress often focuses on exams and other important assignments. When one attempts to fall asleep, those thoughts continue and cause numerous disruptions in sleep patterns” (Dusang, 2019). This strongly suggests that stress makes it harder for individuals to fall asleep, therefore, causing them to have an imbalance in their sleep patterns.

There have been studies that show how Taekwondo can be used to handle stress, but there is a gap on whether Taekwondo can help with sleep patterns. There have been studies that find a correlation between sports and sleeping patterns, but there is no research done specifically on how Taekwondo could impact sleep patterns. For example, there has been research done to prove that exercise does indeed help with sleep. Charlene Gamaldo, medical director and professor of neurology at Johns Hopkins, states, “Slow wave sleep refers to deep sleep, where the brain and body have a chance to rejuvenate. Exercise can also help to stabilize your mood and decompress the mind, “a cognitive process that is important for naturally transitioning to sleep” (“Exercising for Better Sleep,” 2021). This shows that exercise helps an individual to fall asleep easier due to the cognitive process behind it. Exercise is an ideal option for helping with sleep patterns.

Psychological aspects show that exercise is beneficial for good sleep. There is some research on how exercise can help with sleep patterns, but not much research done on specific sports.

Taekwondo is known for handling stress and since it is a sport it may also help with sleep patterns, so I want to determine whether taekwondo helps sleep patterns within individuals.

There have been previous studies done that investigated the impact of football on sleep patterns.

According to an article published by the *Journal of Health Psychology*, this study included 36 male football players and 34 controls. Participants were required to record in their sleeping log for seven days in a row. Results showed that the football players had fewer awakenings and higher scores of sleep quality compared to the controls (Brand et. al., 2009). Clearly, this shows that individuals that perform in football have better sleep patterns compared to those that don't play sports. This shows that there is some type of correlation between sleep and sports.

Therefore, I want to determine whether Taekwondo specifically has impacts on sleep patterns.

### **Overview on Sleep Patterns Among Children**

Sleep is a very important factor for children and adolescents. It is important for adolescents to lead a healthy life. It is significant for an adolescent's mental and physical health. There are numerous negative consequences that can occur if a child does not get adequate sleep. Based on the *Academy of Pediatrics*, 25 to 50 percent of children and 40 percent of adolescents get impacted by sleep problems (Pacheco 2022). This shows that a great number of children are getting impacted by sleep problems and this is a significant problem because it can cause a serious issue in their health. Furthermore, the same article states that lack of sleep among children can cause anxiety, problems with the immune system, depression, and long term effects on mental health and academic performance (Pacheco 2022). This clearly conveys that there are

many negative impacts that can be caused due to the lack of sleep among children, so this problem is an important issue to address.

Sleep problems among children have been increasing steadily in the United States. Based on an article published by *BMC Pediatrics*, an open access journal publishing peer-reviewed research articles in all aspects of health care, mentions that as a child gets older sleep durations reduce, bedtime resistances increase, and the inability to fall asleep increases (Lewien et. al., 2021). To further elaborate, when children start off with sleep problems, it causes this problem to increase as they get older. Due to this increase, the number of children with sleep problems is also increasing. Determining ways to help with sleep problems is an important aspect in the United States today. This problem is significant in the United States and is important to address. As mentioned before, there have been studies that have shown that exercise helps with sleep problems. It has been proven that exercise benefits individuals especially children and improves their sleeping patterns. Due to some studies done on this, I want to determine whether Taekwondo has a correlation with sleeping patterns among children.

### **Exercise and Sleep**

There have been few studies conducted proving that there is a correlation between sleep patterns and exercise. Studies have proved that exercise has actually helped reduce the problem of lack of sleep. For example, an article published by *Physiopedia*, a nonprofit organization that educates individuals, elaborates about a study done on individuals suffering from psychophysiologic insomnia. When these individuals started evening walks and started having some form of exercise there was an improvement of their sleep patterns that was observed (“Effects of Exercise on Sleep”). This shows that an individual who has sleep disorder can



overcome this by participating in some type of exercise. Exercise is beneficial for sleep and can help an individual who may have trouble sleeping.

Similarly, based on “Effect of physical exercise on sleep quality of college students,” college students with large amounts of physical exercise have better sleep quality” (Ye et. al., 2022). This study shows that college students who have more physical activity are able to sleep better and have better sleep patterns. College students who do not have much physical activity have a harder time falling asleep and have more disruptions in their sleep patterns. Both studies show that individuals who participate in some type of physical activity can overcome the challenge of the inability to sleep. Due to the correlation between sleep and physical activity, I wanted to determine whether Taekwondo specifically impacts sleep patterns among children.

## **Method**

### **Hypothesis**

Taekwondo has been proven to reduce stress among individuals with its unique techniques. Consequently, reducing stress helps with better sleep which leads to improvement in sleep patterns. Additionally, there have been a few studies done which prove that exercise and sleep quality have a major correlation. More physical activity equals better sleep patterns. Due to these studies and facts, I want to determine whether Taekwondo specifically impacts an individual's sleep patterns as compared to individuals who do not participate in any sports. Based on my preliminary research, I hypothesize that individuals who participate in Taekwondo will have better sleep patterns and quality compared to individuals who do not participate in any sports and individuals who participate in other physical activities. I hypothesize this because research suggests that exercise helps with better sleep quality, therefore improving sleep patterns.

Additionally, Taekwondo reduces stress among individuals and this also helps with better sleep quality.

### **Participants**

In this correlational study, I will be conducting the experiment on individuals between the ages 13-19 because this is the best fit age group for adolescents. I am using this specific age group because there has been research done that shows that lack of sleep among adolescents and this significantly impacts their mental and physical health. To address this problem I have decided to use this age group as participants in my study. I will be using three different groups to determine the correlation and these groups include: Taekwondo participants, individuals who participate in other physical activities, and individuals who do not participate in any sport. I distributed the survey through the use of social media. I sent out the link of the survey through all social media platforms. This allowed all individuals to have access to the survey; however, I received responses from individuals who did not fit in with the participant category. Additionally, these participants were random in order to eliminate as much bias as possible. The participants will be both male and female; I am not narrowing it down to a specific gender. Overall, there will not be any restrictions for test subjects other than their age group.

### **Materials & Design**

I will be using surveys and sleep logs to gather my results and to determine a correlation. I will be providing all participants in my study with surveys asking them questions about their sleep patterns to help me get a better understanding of their sleep pattern. After the participants have completed the surveys I will use the responses which will contribute to the study's conclusion. Additionally, I handed out sleep logs created by Loughborough Sleep Research Centre, to individuals who completed the survey. The sleep log asks specific questions about an

individual's sleep and it provides eight questions for participants to answer for a whole week ("Daily Sleep Diary"). These responses can help me get a better understanding of their sleep patterns, allowing me to have more data to determine a correlation. An example of a question that the sleep log asks is whether the individual wakes up in the middle of the night and how often they wake up. This will help me determine whether this participant had a sound sleep or if their sleep is often disrupted. I will also be asking them to rate their sleep between 1-5; 1 being not good sleep and 5 being great sleep.

Furthermore, some questions that the survey will be asking are whether the individual feels refreshed after their sleep or whether they want to sleep more after they wake up. These types of questions will also help determine whether they had a good sleep without any disturbances. The sleep log goes deeper into studying the sleep patterns of the individual. It asks the

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
	Enter the Weekday (Mon, Tues, Wed, etc.)							
1	At what time did you go to bed last night?							
2	After settling down, how long did it take you to fall asleep?							
3	After falling asleep, about how many times did you wake up in the night?							
4	After falling asleep, for how long were you awake during the night <u>in total</u> ?							
5	At what time did you finally wake up?							
6	At what time did you get up?							
7	How long did you spend in bed last night (from first getting in, to finally getting up)							
8	How would you rate the <u>quality</u> of your sleep last night?							
	1    2    3    4    5							
	V. Poor                      V. Good							

participants to log what time they go to sleep, how long it takes them to fall asleep, how many times they woke up in the middle of the night, and what time they ended up waking up. These timings will help me record how long each individual slept for and whether their sleep quality was affected due to the amount they slept or if their sleep was affected due to other reasons such as physical activity. In this study I will be studying the test subject's sleep quality based on the answers of their surveys. I will have a control group to help me determine whether Taekwondo

even has an impact on sleep patterns. Below is the sleep log that I handed out to the individuals who completed the survey.

## Survey

I will be using a Sleep Quality Scale created by Korea's Department of Internal Medicine to determine the quality of an individual's sleep.

Based on the sleep quality scale that received a psychometric evaluation, this scale will help me evaluate whether the individual is having proper sleep or whether their sleeping patterns are lacking. The data from this scale can be used to see whether an individual is going through sleeping problems (Shahid et al., 2012). This scale asks 28 questions, but I removed some questions and replaced some with my own to better fit the needs of my experiment. I used a total of 17 questions

that will best help me analyze the participant's sleep patterns. The data from this survey will help me determine whether Taekwondo impacted the quality of sleep in individuals. These questions will ask specific questions about their sleep. For example, it will ask if the individual has difficulty falling asleep and the answer choices will be: rarely, sometimes, often, almost always. Rarely is never or 1-3 times a month, sometimes: 1-2 times a week, often: 3-5 times a week, and almost always is 6-7 times a week.

Rarely : None or 1-3 times a month  
 Sometimes : 1-2 times a week  
 Often : 3-5 times a week  
 Almost always : 6-7 times a week

		Rarely	Sometimes	Often	Almost always
1	I have difficulty falling asleep.				
2	I fall into a deep sleep.				
3	I wake up while sleeping.				
4	I have difficulty getting back to sleep once I wake up in middle of the night.				
5	I wake up easily because of noise.				
6	I toss and turn.				
7	I never go back to sleep after awakening during sleep.				
8	I feel refreshed after sleep.				
9	I feel unlikely to sleep after sleep.				
10	Poor sleep gives me headaches.				
11	Poor sleep makes me irritated.				
12	I would like to sleep more after waking up.				
13	My sleep hours are enough.				
14	Poor sleep makes me lose my appetite.				
15	Poor sleep makes hard for me to think.				
16	I feel vigorous after sleep.				
17	Poor sleep makes me lose interest in work or others.				
18	My fatigue is relieved after sleep.				

**Procedure**

Initially, I will gather the randomly selected test subjects who participate in Taekwondo and hand them the survey and will explain the instructions in detail. I will tell them to fill out the questions regarding their sleep and also to fill out the sleep log for a week. After one week, I will gather their surveys. I will perform these same steps with my other two groups: individuals who do not participate in any sport and individuals who participate in other types of physical activities.

After getting back everyone's surveys, I will determine whether each group's answers were similar to each other. If they are, I will compare the other two group's results to each other group's result to see whether they differ at all. I will use the answers from everyone's surveys to determine the conclusion of my study. The answers will also help me determine whether there is a correlation between Taekwondo having an impact on sleep patterns or whether there is actually no correlation at all. I will be determining whether the answers were similar between each group by calculating the average percentage of how often the individuals use each response. I calculated this percentage by counting how many times each response was used by how many participants in total from that group. For example, from the group of Taekwondo participants I had a total of 53 participants and I had 12 of those individuals choose the response rarely. So, I divided 12 by 53 to determine the average percentage for that response. I did this for each response among the three groups. This data will also help me understand whether individuals who participate in Taekwondo have better sleep than those who participate in other sports or no sports at all. Based on the responses, I will also be determining whether Taekowndo has its own unique impact on sleep patterns as compared to individuals who participate in other physical

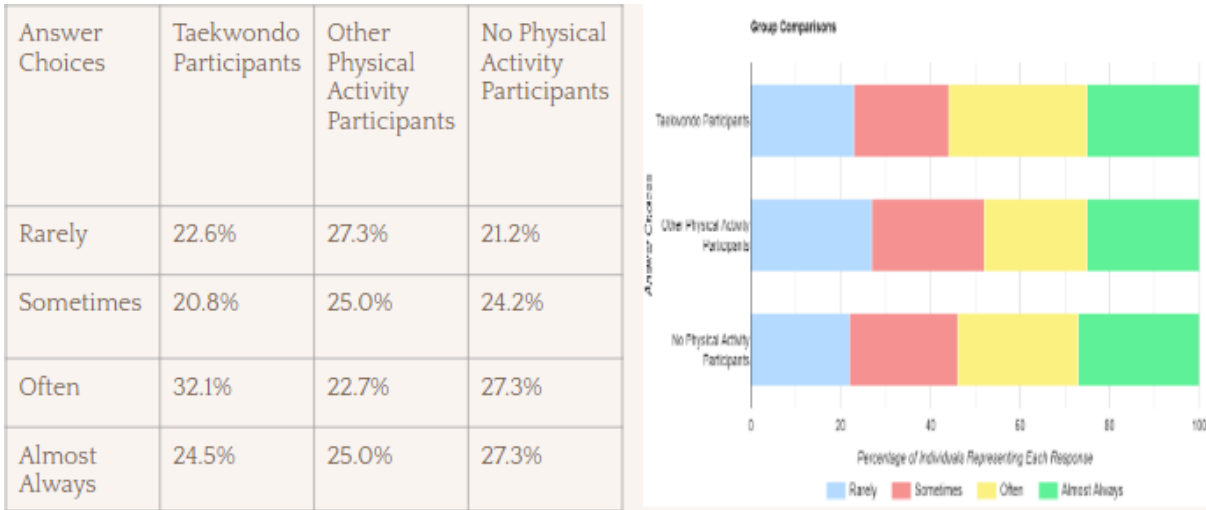
activities. There will be some bias in the surveys and this cannot be prevented, but I will conclude the results with the least amount of error as possible.

### **Data Analysis**

The data collected from the surveys and sleep logs helped me determine whether there is a correlation between participation in Taekwondo and sleep patterns/quality among individuals. It allowed me to compare the individuals who participated in Taekwondo, individuals who participated in a different physical activity, and individuals who did not participate in any physical activity. The results from my study allowed me to draw conclusions about the correlation between taekwondo and sleep. The data from the survey allowed me to get a better understanding of an individual's overall sleep quality, while the data collected from the 7 day sleep log allowed me to track the amount of sleep they got in total.

From my survey I was able to gain 130 participants: 53 who participated in Taekwondo, 44 who participate in other physical activities, and 33 who do not participate in any sport. The data collected from my survey does not show any correlation between Taekwondo and sleep patterns. I determined this by comparing the answers of individuals who do not participate in Taekwondo to individuals who do. Their responses varied and some of their responses even matched up. There was no significant pattern between their responses. There were no specific patterns in the responses that distinguished participants in Taekwondo from individuals that participate in a different physical activity and individuals who do not participate in any sports. All groups had similar responses and did not have any correlation. For example, a statement in the survey was, "I wake up while sleeping." To this the responses varied. When I compared the responses of participants in Taekwondo with each other, I found that all the responses were mixed. For instance, some said sometimes, some said often, and some even said, rarely. Since

their responses were so varied, it shows that Taekwondo did not have its own specific impacts as compared to the other two groups. I then compared the percentages of the frequency of each response between the three groups. This comparison showed how all three groups answered similarly; therefore, showing that Taekwondo did not have its specific impacts and that there is no correlation.



Above is the chart I created to determine whether there is a correlation between the three groups and whether Taekwondo has its own specific impacts as compared to the other two groups. When you look at the percentages of the frequency of each response and you compare it among the three groups you can see that the percentages are around the same for each response between the three groups, showing that all three groups had similar responses and that there is no correlation. On the right of the chart is a visual representation of the chart. You can see that the colors of the segmented bar graph are pretty evenly distributed showing that the answer choices among the three groups were similar.

After comparing all the survey responses to the different groups, I compared my data that I have received from the sleeping logs. From my sleep log I was able to gain 50 participants: 23 Taekwondo participants, 15 participants who participate in other physical activities, and 12 who

participate in no sport. From this, I averaged all three group's ratings of sleep quality. When I compared the averages between the three groups, I found that the average sleep quality of individuals who do Taekwondo is higher than the individual's who participate in a different physical activity or no sport at all. From the sleep logs I was able to conclude that individuals who participate in Taekwondo have a better sleep quality than those who do not. Additionally, I had to take an individual's amount of sleep into consideration when it came to my conclusion. This is an important aspect to consider because if someone only has 4 hours of sleep in total, they're sleep quality will definitely be lower than the ones who have a longer duration of sleep. Therefore, it is important to take the amount of sleep into consideration. In my data, I had one individual who had only 2 hours of sleep in total for that day. This could've impacted their sleep quality since that is a very minimal amount of sleep. This affects my results because Taekwondo is not the only aspect impacting sleep quality, but also the sleep duration.

Furthermore, from the sleep logs I was able to collect how many times an individual woke up in the middle of the night. This allowed me to determine the consistency in their sleep. I averaged each group's numbers of how many times they wake up in the middle of the night. From the comparison of these averages, I was able to determine that individuals who participate in Taekwondo have a more consistent sleep as compared to the other two groups. This allowed me to conclude that Taekwondo participants have more consistent sleep and less disruptions in their sleep patterns. In addition, I compared the average times of how long each took to fall asleep. When I compared the two averages, I realized that the numbers are around the same and this allowed me that there is no specific correlation to whether Taekwondo helps and individuals sleep faster.



Overall, my data analysis included the comparison of the responses from the survey and the data collected from the sleep logs. The data from both of these sources allowed me to determine whether there is a correlation between sleep patterns and Taekwondo. I was able to take various aspects into consideration when concluding my results. My data did have outliers that impacted my results, but most responses were similar and reliable.

## **Conclusion**

My hypothesis, Taekwondo has positive impacts on sleep patterns as compared to other physical activities and individuals who do not participate in any physical activity, has been proven to be somewhat. From my survey I was able to conclude that there was actually no correlation between Taekwondo and its specific impacts on sleep quality and sleep patterns. Initially, I thought Taekwondo has its own specific impacts on sleep and that these impacts are better compared to other types of physical activity. However, my study disproved my hypothesis partially. I say partially because from my sleep log I was able to determine a slight correlation. The average sleep quality among Taekwondo participants was higher than the individuals who do not participate in Taekwondo. Additionally, from the sleep log I was also able to conclude that Taekwondo participants have a more consistent sleep as compared to the other groups. Individuals who do not participate in Taekwondo or any physical activity at all have a higher number of times that they wake up in the middle of their sleep as compared to the Taekwondo participants. This shows that Taekwondo participants' sleep is more consistent. However, this does not completely prove that there is a significant correlation between Taekwondo and sleep patterns. I was able to conclude that Taekwondo may have small impacts on sleep patterns and there is no significant correlation on whether Taekwondo itself has specific impacts compared to other physical activities. There is not a strong enough correlation to conclude that Taekwondo

has specific impacts on sleep patterns among individuals and whether it could be a potential solution to sleep problems among adolescents.

### **Limitations**

This correlational study is not completely conclusive because there were a few limitations to this study. To begin with, the method that was used to collect the data was from surveys and logs. Surveys collect individual's opinions and this may not always be reliable because respondents may feel like their opinion is wrong and may not provide an honest response. They may not feel comfortable providing answers that may seem like they are an outlier, causing them to change their answer. In addition, the surveys may have created courtesy bias, meaning that participants may have answered the questions based on what my expectations are and how I believe their sleep patterns should be and this could have greatly influenced my data. Similarly, the sleep log may not have been accurate because individuals may have been inaccurate about their sleep times if they forgot to do it one day. The times they included may not be the exact times which could impact my results. If an individual has no interest to complete the log they may have just made up everything in their log, making their data not accurate. There is no way for me to determine whether the individuals are being honest, so this is a disadvantage to my results and conclusions.

Furthermore, when I handed out the sleep logs, not everyone gave them back to me; I only got back fifty percent of what I handed out; therefore, reducing the number of individuals I was able to analyze. Another limitation I had was that I did not have many individuals who do not participate in any physical activity. I think this was the hardest part of study because there are so many individuals that have some type of physical activities and finding individuals who do not have any was challenging to find. I did find a small number of individuals, but I would have

preferred more in order to make my conclusions as accurate as possible. Not being able to find many individuals who do not participate in any sport was a limitation to my study.

In addition, I believe that the time we are given to conduct our studies is very limited, making our studies more cramped and making us shorten our methods in order to fit in with the schedule. For example, I was able to only have individuals to record their sleep for a week. I would rather have had them record it for a month because it would have been more ideal for my conclusions. However, the limited time restricted the amount of time I was able to provide for the participants. The limited time may have also impacted my result and my results may have been different if I was able to have individuals record their sleep for a longer amount of time.

Overall, I had a few limitations that may have impacted my results and correlational studies, but I was able to reduce the limitations as much as possible to produce the best results possible. Even with some of these limitations, I was able to use the data and responses I received to make valid conclusions. Reducing the limitations as much as possible is the best way to produce the most accurate results and it is nearly impossible for a correlational study to not have any limitations.

### **Implications**

Based on my results and the data collected from the surveys and sleep logs, I was able to conclude that Taekwondo has a slight correlation to sleep patterns among adolescents. This physical activity does not have any unique effects on sleep quality as compared to other sports. A slight correlation that I was able to find was that individuals who participate in Taekwondo wake up less in the middle of their sleep as compared to individuals who participate in a different physical activity or no physical activity at all. However, this information may be biased since there are limitations to surveys and sleep logs. You cannot fully conclude that there is a

correlation and whether Taekwondo could be a potential solution to sleep problems among adolescents, but it is safe to say that there is a very minimal correlation. From this conclusion, I found that my hypothesis was somewhat correct and that in fact there may be a slight correlation.

### **Further Research**

If I were to conduct further research on the topic of Taekwondo's specific impacts on sleep patterns, I would narrow down my control groups to specific sports. For example, I would compare Taekwondo to two other specific sports such as tennis or football rather than physical activities in general. This allows me to focus more on the impacts of these particular sports individually, allowing me to determine if Taekwondo has its own unique effects on sleep patterns. Additionally, I would make the sleep log for a longer period of time. Rather than having individuals record their sleep for a week, I would have them record it for a month. I think this will allow more accurate and more in depth results. Focusing more on specific sports rather than physical activity in general may make this research more in depth and reliable. To conclude, for further research on this topic I would narrow down the sports to specific sports in order for more in depth and accurate results.

## References

- Brand, S., Beck, J., Gerber, M., Hatzinger, M., & Holsboer-Trachsler, E. (2009). “Football Is Good for Your Sleep”: Favorable Sleep Patterns and Psychological Functioning of Adolescent Male Intense Football Players Compared to Controls. *Journal of Health Psychology, 14*(8), 1144–1155. <https://doi.org/10.1177/1359105309342602>
- Daily Sleep Diary*. (n.d.). The NHS website - NHS.  
<https://www.nhs.uk/livewell/insomnia/documents/sleepdiary.pdf>
- Dusang, K. (2019, May 9). How stress can affect your sleep. Baylor College of Medicine.  
<https://www.bcm.edu/news/how-stress-can-affect-your-sleep#>
- Effects of exercise on sleep*. (n.d.). Physiopedia.  
[https://www.physio-pedia.com/Effects\\_of\\_Exercise\\_on\\_Sleep](https://www.physio-pedia.com/Effects_of_Exercise_on_Sleep)
- Exercising for better sleep*. (2021, August 8). Johns Hopkins Medicine, based in Baltimore, Maryland.  
<https://www.hopkinsmedicine.org/health/wellness-and-prevention/exercising-for-better-sleep>
- Lewien, C., Genuneit, J., Kiess, W., & Poulain, T. (2021, February 16). *Sleep-related difficulties in healthy children and adolescents*. BioMed Central.  
<https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-021-02529-y>
- Pacheco, D. (2022, September 19). *Children and sleep*. Sleep Foundation.  
<https://www.sleepfoundation.org/children-and-sleep>
- Petrovik, K. (2017, September 18). The benefits of Taekwondo training for undergraduate students: A phenomenological study. MDPI.  
<https://www.mdpi.com/2075-4698/7/3/27/htm>

Shahid, A., Wilkinson, K., Marcu, S., & Shapiro, C. (2012). *Sleep Quality Scale (SQS)*. Perelman

School of Medicine | Perelman School of Medicine at the University of Pennsylvania.

[https://www.med.upenn.edu/cbti/assets/user-content/documents/Sleep%20Quality%20Scale%20\(SQS\).pdf](https://www.med.upenn.edu/cbti/assets/user-content/documents/Sleep%20Quality%20Scale%20(SQS).pdf)

Ye, J., Jia, X., Zhang, J., & Guo, K. (2022, September 26). *Effect of physical exercise on sleep*

*quality of college students: Chain intermediary effect of mindfulness and ruminative*

*thinking*. Frontiers. <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.987537/full>

## Academic Paper

**Note:** Student samples are quoted verbatim and may contain spelling and grammatical errors.

**Sample: F**

**Score: 3**

This paper earned a score of 3. The topic of inquiry on page 2, “to conduct a correlational study determining whether Taekwondo has specific impacts on sleep patterns as compared to individuals who participate in other types of physical activities and individuals who do not participate in any physical activities,” is carried throughout the paper. The paper identifies a gap on page 3: “There have been studies that find a correlation between sports and sleeping patterns, but there is no research done specifically on how Taekwondo could impact sleep patterns.” The gap is stated rather than logically explained through the analysis of scholarly works.

The method is reasonably replicable. The research relies on surveys and sleep logs, which “[c]ollect individual’s opinions and this may not always be reliable because respondents may feel like their opinion is wrong and may not provide an honest response” (page 15). The survey questions can be determined from the image on page 8 but are not defended. Student-generated data which gather self-perception cannot be used to establish a correlation as indicated in the topic of inquiry, which is why the method is questionably aligned. The paper presents data charts, shown on page 12, to arrive at the new understanding. The new understanding is found on page 14: “From my survey I was able to conclude that there was actually no correlation between Taekwondo and its specific impacts on sleep quality and sleep patterns.” Because of the questionable alignment of method to topic of inquiry, there is insufficient evidence to support the new understanding.

This paper did not earn a score of 2 because the student does engage in big R research, using student-generated data to arrive at a new understanding.

This paper did not earn a score of 4 because the gap on page 3 is stated rather than synthesized through the literature review: “There have been studies that show how Taekwondo can be used to handle stress, but there is a gap on whether Taekwondo can help with sleep patterns.” Method choices (pages 6–8) are not defended, and it is unclear how individuals from the three groups were selected for this study (page 7). The method is questionably aligned to the purpose of the inquiry. Because the student is working with a protected class of mostly minors, “I will be conducting the experiment on individuals between the ages 13–19,” there are no indications of ethical consideration such as maintaining participant confidentiality or informed consent. Therefore, the research method is not logically defended and is only reasonably replicable.