

Exploring the Impact of Sleep on Reading Comprehension

By

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A Masters Paper

Submitted in Partial Fulfillment of

the Requirements for the degree of

Masters of Science in Education - Reading



Advisor's Name

5/21/2025

Date

Abstract

This study explored the relationship between sleep duration and reading comprehension among a small class of 5th and 6th-grade students at a Catholic School in the Midwest. The primary research question examined whether or not receiving fewer than eight hours of sleep negatively affected students' reading comprehension. Data was collected through students' self-reports of their nightly sleep hours, followed by administration of a single EasyCBM comprehension assessment the following morning. Findings indicated that there was no significant correlation between the amount of sleep and reading comprehension. Students' comprehension scores did not improve with adequate sleep, nor did it decrease with inadequate sleep. This study presented several limitations that may have influenced the results, which include the sample size, the assessment used, and the reliance/reliability of student-reported sleep data. Although there is adequate evidence that sleep influences overall well-being, social-emotional health, and student academic performance, the direct impact on reading comprehension may require additional and more comprehensive research to fully gain a clear understanding of the relationship between sleep and reading comprehension.

Introduction

Every day, I hear my students say things such as "I can't focus; I'm so exhausted," which highlights a recurring challenge in the classroom. My long-time fascination with the science of sleep health inspired my proposed research. Sleep plays a vital role in our health. It impacts nearly every area of life, including cognitive performance, physical development, social-emotional regulation, and overall quality of life (Hirshkowitz et al., 2015). Despite its importance, sleep occurs outside of the classroom, so teachers have little control over their students' sleep habits.

As students transition from elementary to middle school, they are often asked to comprehend much more complex information, and with increasing pressures outside of school, such as sports, family obligations, and technology use. Given these demands, sleep seems

imperative to their success both in and out of school, yet insufficient sleep among these students has become a growing concern. To this point, the National Sleep Foundation (2015) recommends children and adolescents in this age group obtain nine hours of sleep per night. Yet, Moore and Meltzer (2008) report that 45-47% of this population sleeps less than the recommended amount per night. This inquiry/research seeks to understand the impacts of sleep deprivation on our students' levels of comprehension. My proposed research question is "What effects does sleep have on 5th and 6th graders' reading comprehension?"

Background for the Study/Review of Current Literature

Sleep is critical in children's and early adolescents' cognitive and academic functioning, making it an increasingly pressing issue in today's classrooms. Adequate sleep supports the brain's ability to process and retain information, which is crucial for learning and academic success (Lim & Dinges, 2010). Recent research has sought to understand the links between sleep quality, duration, and academic achievement.

Factors That Influence Sleep

Several internal, external, socioeconomic, and environmental factors can all contribute to this lack of sleep in adolescents. During adolescence, there is a natural biological shift in circadian rhythms, causing adolescents to fall asleep later and wake up earlier (Hummer and Lee, 2016). With these shifts, coupled with early school start times, students are more likely to experience sleep deprivation, as they cannot sleep later in the morning. As a result, most adolescents get less sleep than their brains and bodies need. Additionally, with increasing age, heavy homework loads and extracurricular events, such as sports can also extend students' evening routines, reducing time for sleep. Maas highlights this phenomenon: "Almost all teenagers, as they reach puberty, become walking zombies because they are getting far too little sleep" (Carpenter, 2001).

Technology use has been one of the most significant barriers to sufficient sleep in adolescents, as highlighted in the book, *The Anxious Generation*. With constant access to

smartphones, “sleep deprivation is increased by the ease of access to other highly stimulating smartphone activities, including mobile gaming and video streaming” (pg. 124). Rather than going to sleep at night, children are up on their phones instead. Haidt (2024) goes on to explain that the impacts of ongoing sleep deprivation are far-reaching. It not only causes lower cognitive functioning and academic performance but can also lead to heightened levels of anxiety and mood instability, often in adolescents who are already susceptible to many social pressures.

Socioeconomic and environmental factors, such as living in noisy or crowded conditions, inconsistent routines due to parental work schedules, or lack of access to sleep resources like comfortable beds, can also hinder sleep. Together, these factors create significant barriers to achieving adequate sleep for many students, impacting their overall health and academic performance.

Negative Impact of Sleepiness

Many adolescents report feeling sleepy throughout their school days, with insufficient sleep being identified as the most common cause of daytime sleepiness in this age group (Moore & Meltzer, 2008). Continued sleepiness can eventually lead to a range of negative outcomes, such as impaired attention, decreased motivation, and reduced academic achievement (Dewald et al., 2010). If sleep deprivation goes on long enough, it can even lead to weight gain, immune suppression, and other health problems (Owens et al, 2014). When students do not get enough sleep, their ability to concentrate, process information, and retain knowledge is compromised, often resulting in lower grades. Lim and Dinges (2023) found that short-term sleep deprivation significantly impairs attention, alertness, and overall cognitive performance.

Furthermore, early adolescents are more susceptible to the effects of sleepiness on academic achievement due to a “dynamic period of cognitive development characterized by developmental increases in processes important for learning and academic achievement” (Orihuela, 2023, p. 2). Piaget's theory of cognitive development echoes that students in this

phase are in a critical period marked by significant cognitive growth, including improved comprehension skills vital to academic success (Piaget, 1952). This is referred to as the operational stage of development. During this critical phase, the prefrontal cortex is still developing and maturing. The prefrontal cortex is responsible for more complex, higher-order cognitive processes such as decision-making, problem-solving, and self-regulation, and is highly sensitive to sleep loss.

Sleep Duration Versus Sleep Quality

It is also important to distinguish between sleep quantity and sleep quality. Sleep quantity refers to the total number of hours slept, while sleep quality refers to restfulness and uninterrupted sleep. While sleep quantity (total hours of sleep) is essential for physical and mental restoration, sleep quality determines how effectively the body and mind rest during those hours. Much of the research, specifically those seminal studies by Lim and Dinges (2023) and Orihuela (2023), focuses on sleep quantity. Lim and Dinges (2023) examine how inadequate sleep negatively affects cognitive processes, such as attention and memory. Orihuela examines and highlights the direct correlation between sleep duration and academic outcomes. However, the effects of sleep quality and duration should not be overlooked. Both domains of sleep have profound impacts on cognitive functioning, emotional regulation, and overall sleep health, making these components essential when examining overall sleep, well-being, and academic performance.

Social Emotional Effects

Sleepiness can also have detrimental effects on the social and emotional well-being of students. Orihuela (2023) examined the social and emotional effects of sleep deprivation, revealing that it can lead to increased anxiety, irritability, and difficulties in developing peer relationships. When students are tired, their ability to engage socially and emotionally is compromised.

Sleepiness and Academics

Several studies have examined the relationship between sleepiness and various academic subjects. For example, in a meta-analysis conducted by Dewald (2010), the findings showed that students who self-reported fewer than eight hours of sleep per night had significantly lower grades, especially in subjects like science and math. Similarly, Lim and Dinges (2023) found that sleepiness negatively impacts math performance, specifically in areas such as problem-solving and computation. Additionally, their continued research showed that even with one night of sleep deprivation, participants experienced a 30% decrease in tasks requiring focus and attention.

Concentration

The ability to concentrate allows students to retain information, engage in problem-solving, and actively participate in class discussions and activities. Without focus, students are less likely to succeed (Dewald et al., 2010; Lim & Dinges, 2010). Much of the existing literature has primarily focused on sustained attention and decision-making (Hirshkowitz et al., 2015; Moore & Meltzer, 2008), neglecting the implications for reading and writing, which are vital skills for academic success. Many studies analyze overall grade point averages, report cards, and standardized test scores to explore sleep patterns and sleep deprivation in adolescents. Research consistently shows that adolescents who experience sleep deprivation often score lower on tests, show slower cognitive processing, and have lower overall grades (Dewald et al., 2010; Orihuela et al., 2023). However, there has been limited research on the effect of sleepiness on literacy achievement and specific reading skills, such as comprehension.

Comprehension

Comprehension is a cognitive process of understanding and making meaning of information, whether it is read, heard, or observed. It does involve more than just decoding words and sentences, but is also about making connections, inferences, and connecting new knowledge to existing knowledge (synthesizing). Comprehension is a crucial process that allows

individuals to engage with material, follow directions, understand complex information, and apply new knowledge to effectively solve problems (Dewald et al., 2010; Gruber et al., 2016).

Reading comprehension is typically assessed through many different methods, all designed to gauge how well a reader understands and engages with written texts. Traditionally, methods used to assess comprehension have included multiple choice questioning, cloze tests, and other recall tasks (Keenan et al., 2008). The assessments that utilize multiple-choice questions typically include literal, inferential, and evaluative questions to determine comprehension at different levels. Literal questions assess basic understanding by asking students to find the answer directly stated in the text. Inferential questions require students to dig deeper into the text and make inferences using their prior knowledge and experiences. Finally, evaluative questions are questions where students make judgments about the text using their reasoning (“Question-Answer Relationship”, n.d.).

However, scholars such as Timothy Shanahan (2023) argue that comprehension assessments should prioritize the quality and complexity of the texts themselves, not necessarily the questions being asked. He mentions that questions alone do not serve as a sufficient measure of a student’s comprehension (Shanahan, 2023). He also critically evaluates maze and cloze reading assessment types, as they typically do not capture the reader’s interaction with the entire text (Shanahan, 2018). Therefore, comprehension assessments should balance question types, text complexity, and context to gain a full understanding of a student’s comprehension level.

Understanding the relationship between sleepiness and comprehension can help inform educational interventions and practices, allowing for healthier students and overall, more conducive learning environments.

Factors that Influence Comprehension

Background knowledge is any information, knowledge, or experience that a reader has acquired and then uses that knowledge to connect and construct meaning from new content.

Research suggests that background knowledge significantly improves reading comprehension because students can reduce the cognitive load, as they are not processing as much new information (Hirshkowitz et al., 2015). When students are familiar with the content, they can use more energy to think deeply instead of trying to understand basic concepts.

In contrast, students who do not have background knowledge may struggle to understand new information because they do not have any existing knowledge to connect it to, meaning that they need to work harder to make sense of or build meaning from the content (Dewald, et al., 2010). This challenge can lead to lower comprehension as those with low background knowledge rely on the information as it is solely presented instead of connecting it to what they already know or have experienced.

As a result, students with high background knowledge tend to be better readers than those without background knowledge, highlighting its significance (Hirshkowitz et al., 2015; Moore & Meltzer, 2008). In a seminal study (Recht & Leslie, 1988), researchers assessed junior high school students' comprehension of a baseball passage. They found that students' background knowledge of baseball was the best predictor of their comprehension scores.

Another factor that largely impacts comprehension is mindset. Mindset is referred to as the underlying messages and beliefs that individuals hold about their abilities and knowledge (Dweck, 1998). This impacts comprehension as it shapes students' motivation, effort, and ability to persevere through challenging situations, particularly with texts and reading tasks. According to Stanley et al. (2023), individuals who have a growth mindset believe that abilities can be developed through effort. They are more likely to persist through difficult situations, apply strategies, and develop stronger comprehension. In contrast, those who believe that their abilities are fixed are more likely to avoid challenges and situations that are difficult and have lower reading performance and comprehension.

Despite being an essential component of daily life and academic contexts, there is a lack of literature and research on how sleepiness specifically affects this domain. As mentioned,

several studies have focused on attention and memory, but the oversight of the effects on comprehension is significant, as comprehension is essential for academic success.

Sleep Interventions

In the pilot study done by Davis (2022), an e-learning program was designed to improve student knowledge regarding sleep and, therefore, improve their sleep habits. This intervention was delivered by trained teachers during the regular curriculum for six weeks. It was reported that “adolescents need to know about sleep and how to improve it before they can change their behavior” (pg. 8). Results showed that sleep knowledge and healthy habits improved.

When educators make known the benefits of good, quality sleep and the consequences of sleep deprivation, we better equip adolescents with tools, allowing them to take an active role and prioritize their sleep hygiene, academic performance, and overall health. To establish effective, comprehensive interventions regarding sleep and academic performance, we must take into account the wider context, such as the external and internal factors that contribute to sleep deprivation.

Integrating these types of interventions into the larger school curriculum is highly beneficial. Gruber and his colleagues (2016) explored the impact of interventions by implementing a structured sleep education program containing four modules aimed at improving sleep duration and sleep quality. These modules included general education regarding sleep habits, staff modeling of healthy sleep habits, and conversations between children and parents about balancing daily activities and sleep. Gruber states, “The results of this present study suggest that sleep education programs can achieve measurable and significant improvements in children's daytime functioning by extending their sleep duration and improving their sleep efficiency. In terms of academic performance, participation in the intervention was associated with improved grades in English and mathematics” (pg. 97).

Summary

In conclusion, insufficient sleep not only impairs cognitive functions but is also associated with social-emotional well-being and lower academic outcomes, specifically in math. However, research on the impacts of insufficient sleep on comprehension scores is sparse. Exploring sleep education programs allows a framework for possible solutions to equip schools, educators, parents, and adolescents with tools to prioritize sleep hygiene and health, and then, in turn, improve academic success. Given the impact of daytime sleepiness and sleep deprivation on adolescent academics, it is crucial to explore sleep interventions to help mitigate the effects of sleep loss and enhance overall academic achievement. By bringing awareness to the sleep-related challenges that are facing today's adolescents and exploring the relationship between sleep and its effects on comprehension, we can foster healthier learning environments and improve our students' academic success.

Methods

Context

This study took place at a Kindergarten through sixth-grade private Catholic school in the Midwest. This school enrolls approximately 50-60 students per year. Enrollment for the 2024-2025 school year is currently 53 students. Due to its small population and rural atmosphere, the school has an average student-to-teacher ratio of 12:1. There is one teacher for every two grade levels, as classrooms, excluding Kindergarten, are combined (1/2, 3/4th, 5th/6th). The student body identifies as Caucasian. The student body is characterized by close-knit, community-based demographics, often reflecting the cultural and socio-economic profile of the Midwest. The majority of the student population comes from families with strong ties to the Catholic faith and rural community values. The school serves zero ELL students, zero immigrant students, three students with an IEP, zero students with a 504 plan, nine students receiving free lunches, and only one student who is receiving price-reduced lunch. Several students also qualify for tuition assistance.

Participants

Due to small class sizes, there will be only nine participants in this study, ages 10-11. Of the nine participants, there are six females and three males. The fifth-grade students consist of three males and four females, and the sixth-grade students are all females. One of the students is on an IEP. The rest of the students do not have formalized educational plans, but do reflect a variety of personal and academic backgrounds. See Table 1 for a list of participants included in this study.

These students were a part of my 5th and 6th-grade classroom, during the 2024-2025 academic year. I had an existing relationship with participants as their teacher, which helped to create trust and reliability. I obtained informed consent from the parents of all participants, as well as assent from the participants themselves. Both parents and participants were informed that participation was voluntary, and they could withdraw from the study at any time without penalty. Any identifiable information was removed to protect student privacy. Pseudonyms were assigned to students and kept separate from the corresponding data. All data and files were securely stored in a designated, protected location.

Table 1

Description of Study Participants

<u>Student Pseudonym</u>	<u>Grade</u>	<u>Gender</u>	<u>Other Notes</u>
Irma	6	Female	
Rachel	6	Female	
Kylie	5	Female	
Larry	5	Male	
Joel	5	Male	
Bree	5	Female	Struggles with Comprehension/LA tasks,

			Possible LD
Leon	5	Male	
Sky	5	Female	
Jamie	5	Female	Has been on an IEP for a while, just recently exited this year, still below comprehension benchmarks

Data Collection Plan

Data was collected using a variety of methods to gain insight into students' sleep habits and comprehension performance. The data collected consisted of student-recorded sleep journals and a performance-based comprehension assessment. Each student maintained a sleep journal where they recorded their nightly sleep duration. Journal entries were conducted on Mondays, Wednesdays, and Fridays for three weeks.

Students completed an easy CBM (Alanzo, 2006) comprehension assessment on the days they recorded a sleep journal entry. EasyCBM is an assessment tool that measures reading comprehension using age-appropriate, standardized reading passages. EasyCBM is a widely used tool for classroom progress monitoring. Its assessments are generally reliable; however, since comprehension is complex and consists of several factors, these short assessments are more reliable for screening rather than diagnostic tools. The reliability of any assessment can be influenced by factors such as the number of items, the range of text difficulty, and consistency in administration.

Students independently read a grade-level passage silently that is based on their reading ability. Passages range in topic and length. For example, the text *The Grass Monster* is a 6th-grade level passage about two students who are investigating items that are mysteriously disappearing from their school's playing field and runs about 2,545 words. A sample of this passage can be seen in Appendix A. Students then independently took a written assessment containing 20 multiple-choice comprehension questions about the passage that was just read.

These questions consist of both literal and inferential questions. Students were instructed to circle the correct answer out of three possible options. An example of a literal question includes: “What did Mona lose while playing soccer?” while an example of an inferential question includes: “Why did most students at Hurston Middle School not worry about missing objects?”

After reading, students were given a score out of 20, which was calculated into a percentage and inserted into a spreadsheet as seen in Figure 1. Results from these passages served as quantitative data and were compared against students’ sleep data to see any correlations between sleep and comprehension. The teacher-researcher kept a record of the date, hours of sleep, CBM scores, and the Passage read on a paper chart. This data was kept confidential and in a secure location.

Figure 1

Spreadsheet for tracking student sleep and comprehension scores

Name	Week 1				Week 2				Week 3			
	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage
Irma												
Rachel												
Kylie												
Larry												
Joel												
Bree												
Leon												
Sky												
Jamie												

Data Analysis Plan

Based on the types of data collection presented above, data analysis will include examining any sort of relationship between sleep duration (from sleep journals) and comprehension performance (from the easy CBM assessments).

Timeline

- Pre-research
 - Obtain IRB approval
- Week 1
 - Distribute and obtain consent forms
 - Distribute student sleep journals
 - Instruct and model how to record sleep duration
 - Conduct an initial student journal entry
 - Conduct initial student easyCBM assessments
- Week 2
 - Continue data collection
 - Begin reflection sessions with the faculty advisor
- Week 3
 - Continue with data collection
 - Continue reflections/debriefing with the faculty advisor
- Week 4
 - Review the sleep journal data and check for any noticeable patterns
 - Continue any additional data collection (if needed)
 - Continue debriefing with the faculty advisor
- Weeks 5-6
 - Administer any final data collection (if needed)
 - Begin quantitative data analysis of easyCBM assessment performance and sleep duration.
 - Continue reflection/debriefing with the faculty advisor
- Week 7
 - Analyze sleep journal entries for patterns in sleep duration
 - Continue debriefing with the faculty advisor
- Week 8
 - Triangulate data from multiple sources and draw conclusions
 - Begin a comprehensive report, synthesizing data
 - Prepare and present findings/publish

Findings

This study examined the link between getting fewer than eight hours of sleep each night and how that affects reading comprehension in 5th and 6th-grade students. The data was

collected over three weeks and measured the students' amounts of sleep and their CBM comprehension scores. Results can be seen in Image 2.

Image 2

Recorded sleep and comprehension scores

Name	2/3-2/7 Week 1				2/10-2/14 Week 2				2/24-2/28 Week 3			
	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage
Irma	2-3	8h23m	15/20 (75%)	6-1	2-10	7h40m	13/20 (65%)	6-4	2-24	8h45m	12/20 (60%)	6-7
	2-5	8h	11/20 (55%)	6-2	2-12	9h20m	14/20 (70%)	6-5	2-26	8h20m	13/20 (65%)	6-8
	2-7	7h50m	16/20 (80%)	6-3	2-14	8h5m	11/20 (55%)	6-6	2-28	8h15m	17/20 (85%)	6-9
Rachel	2-4	8h	20/20 (100%)	6-1	2-10	8h30m	15/20 (75%)	6-4	2-24	8h30m	19/20 (95%)	6-7
	2-5	8h30m	14/20 (70%)	6-2	2-12	8h20m	15/20 (75%)	6-5	2-26	8h50m	18/20 (90%)	6-8
	2-7	8h	17/20 (85%)	6-3	2-14	8h20m	14/20 (70%)	6-6	2-28	8h30m	14/20 (70%)	6-9
Kylie	2-3	10h	15/20 (75%)	5-2	2-11	10h40m	16/20 (80%)	5-5	2-24	10h5m	15/20 (75%)	5-8
	2-5	9h30m	17/20 (85%)	5-3	2-12	10h	12/20 (60%)	5-6	2-26	9h34m	18/20 (90%)	5-9
	2-7	9h30m	14/20 (70%)	5-4	2-14	10h20m	17/20 (85%)	5-7	2-28	9h20m	13/20 (65%)	5-10
Larry	2-3	9h20m	13/20 (65%)	5-2	2-10	8h50m	13/20 (65%)	5-5	2-24	9h20m	16/20 (80%)	5-8
	2-5	9h10m	16/20 (80%)	5-3	2-12	9h	10/20 (50%)	5-6	2-26	9h10m	13/20 (65%)	5-9
	2-7	9h10m	17/20 (85%)	5-4	2-14	9h20m	10/20 (50%)	5-7	2-28	9h	14/20 (70%)	5-10
Joel	2-3	9h40m	16/20 (80%)	5-2	2-10	9h10m	12/20 (60%)	5-5	2-24	9h5m	4/20 (20%)	5-8
	2-5	9h	15/20 (75%)	5-3	2-12	9h20m	10/20 (50%)	5-6	2-26	8h27m	11/20 (55%)	5-9
	2-7	7h	17/20 (85%)	5-4	2-14	9h	9/20 (45%)	5-7	2-28	8h27m	16/20 (80%)	5-10
Bree	2-4	9h10m	9/20 (45%)	5-2	2-10	9h	9/20 (45%)	4-2	2-24	8h50m	9/20 (45%)	4-5
	2-5	8h55m	14/20 (70%)	5-3	2-12	9h30m	10/20 (50%)	4-3	2-26	9h	8/20 (40%)	4-6
	2-7	8h45m	8/20 (40%)	5-4	2-14	7h20m	13/20 (65%)	4-4	2-28	9h17m	10/20 (50%)	4-7
Leon	2-4	9h20m	14/20 (70%)	5-2	2-10	8h50m	11/20 (55%)	5-5	2-24	10h25m	11/20 (55%)	5-8
	2-5	9h30m	13/20 (65%)	5-3	2-12	8h50m	13/20 (65%)	5-6	2-26	10h25m	17/20 (85%)	5-9
	2-7	9h30m	13/20 (65%)	5-4	2-14	7h57m	13/20 (65%)	5-7	2-28	10h35m	11/20 (55%)	5-10
Sky	2-3	8h47m	19/20 (95%)	5-2	2-10	8h50m	14/20 (70%)	5-5	2-24	8h45m	16/20 (80%)	5-8
	2-5	9h	11/20 (55%)	5-3	2-12	8h35m	12/20 (60%)	5-6	2-26	8h45m	18/20 (90%)	5-9
	2-7	8h15m	16/20 (80%)	5-4	2-14	8h15m	13/20 (65%)	5-7	2-28	8h35m	15/20 (75%)	5-10
Jamie	2-4	8h30m	9/20 (45%)	5-2	2-10	9h10m	5/20 (25%)	4-2	2-24	8h50m	11/20 (55%)	4-5
	2-5	8h20m	9/20 (45%)	5-3	2-12	8h20m	8/20 (40%)	4-3	2-26	7h20m	12/20 (60%)	4-6
	2-7	7h	6/20 (30%)	5-4	2-14	9h10m	13/20 (65%)	4-4	2-28	8h45m	13/20 (65%)	4-7

Overall trends indicated that students reported consistent sleep duration in line with recommended age guidelines. For example, 45% of students reported 8 hours of sleep or more every night of the study, 78% of students reported 8 hours of sleep or more on 8 out of the 9 nights of the study, and the overall average of students who reported 8 or more hours of sleep at any point was 90.8%

In the first week of data collection, 75% of students who received at least eight hours of sleep scored at or above 70% comprehension. For example, Rachel received eight hours of sleep on 2/4 and achieved a perfect score of 100%. Some students got less than eight hours of sleep, and it did not seem to impact their performance on the comprehension assessment. For

example, Joel only recorded seven hours of sleep but scored 85% on the comprehension assessment. One student's score seemed to be impacted negatively by their sleep. For example, Jamie received only seven hours of sleep on 2/7 and achieved a comprehension score of 30%, their lowest of the week. However, there were some anomalies. For example, Irma got exactly eight hours of sleep in the first week and scored 55%. Two days later, she got less than eight hours of sleep and scored 80% on the CBM assessment. These trends were also solidified in the second and third weeks of data collection.

However, there were also trends related to consistency. First, students who had consistent amounts of sleep also had highly variable comprehension scores. For example, Bree's sleep in the first week of the study varied little, receiving eight hours and fifty-five minutes on 2/5/25 (14/20), eight hours and forty-five minutes on 2/7/25 (8/20), and nine hours and ten minutes on 2/24/25 (9/20). Yet her scores varied significantly, ranging from 40% to 70%. On the other hand, several students maintained high comprehension scores, with large fluctuations in sleep duration. For example, in the first week of the study, Joel recorded anywhere from seven to over nine and a half hours of sleep. Despite these large fluctuations, his score only varied slightly, scoring 80%, 75%, and 85%. One notable piece of data is that every student's highest score over the three weeks happened when they had more than 8 hours of sleep, except for Joel, whose highest score happened on the night he recorded the least amount of sleep (seven hours) over the three weeks. Notably, none of the students' highest scores equated with the nights they recorded the most sleep. Conversely, their lowest individual scores still aligned with nights of reduced sleep, although not their lowest recorded nightly sleep.

Another notable finding was that scores on students' comprehension assessments differed depending on whether it was taken on a Monday versus a Friday. In the first week of data collection, 66% of students performed better on the comprehension assessments on Mondays versus Fridays. For example, Rachel reported eight hours of sleep on Monday and received a 100% on her comprehension assessment. However, on Friday, she reported eight

hours of sleep and only received an 85% on the comprehension assessment. In the second week, this trend was also noticed with 56% of students performing better on the comprehension assessment on Monday compared to Friday. However, in Week 3, this trend was still observed, but only 44% of students performed better on the assessment on Monday.

Discussion

Contrary to findings on the correlation between sleep and academic outcomes (Dewald et. al., 2010; Gruber, et. al., 2016), my study did not find a strong relationship between sleep and comprehension scores. Much to my surprise, students were consistently reporting more than the recommended hours of sleep and only performed marginally on their Easy CBM comprehension assessment, with an overall average of 65%. Further, when fewer than eight hours of sleep were reported, scores did not tend to have significant swings.

The unexpected outcome of the study could be attributed to several factors. This study could have been impacted by low sleep quality despite adequate sleep duration. As the literature suggests, sleep quality is just as important as duration (Lim and Dinges, 2023; Orihuela, 2023). For example, throughout the study, several students made comments that would suggest that their sleep quality might have impacted their comprehension assessment scores. For example, on 2/24, Larry stated, "I need to sleep on the bus, I'm so tired." Jamie also expressed, "I was tired. I could not focus at all." While students did report adequate sleep duration, the quality of sleep was not directly assessed.

Another factor leading to the unexpected outcome of the study was that students' comprehension scores did not show much difference from the beginning of the week to the end of the week. Students' best scores over all three weeks of the study were on the very first Monday of the study, which could have been explained by their fresh start and higher energy levels. However, as the study continued, testing fatigue likely set in. Still, surprisingly, the students' scores did not significantly drop. For example, the average score of the comprehension assessments on Mondays, across all three weeks of the study was 65%.

However, throughout all 3 weeks of the study, the average score on Fridays was 66%. While it was anticipated that students would perform better on their assessments on Mondays due to being well-rested after a weekend, the data did not support this assumption. Although students may experience cumulative fatigue by Friday, their scores did not significantly drop, suggesting that factors like familiarity with routine, mindset, and varying levels of engagement with the passage may have helped maintain performance.

As discussed in the literature review, the impact of background knowledge and its influence on comprehension cannot be ignored (Hirshkowitz et al., 2015). Indeed, this factor potentially impacted the outcome of the study. Almost all of the Easy CBM comprehension assessment passages were fiction-based. It was evident that students had higher levels of comprehension when passages were related to familiar topics, such as sibling relationships, compared to less familiar content. For example, a 5th-grade passage, titled “Beware of Sharks,” contained a storyline about two siblings. The 5th-grade students scored an average of 70% on this passage. Compared to the passage titled “The Patchwork Quilt,” which contained a storyline about quilting, the 5th graders scored an average of only 65%. Most of the 5th-grade students have experience with a sibling, however, they have very little background knowledge on quilting, which is reflected in these scores.

The higher comprehension scores with passages related to familiar topics were also evident with the 6th-grade students. The passage titled “On the Ice” discusses a student who is experiencing something for the first time with her uncle. The two sixth graders had an average of 82% on their comprehension assessment on this passage. This can be compared to the passage titled “Not All Fun and Games,” which is about siblings who try to pass the time on Sundays by coming up with and creating their unique games to play. On this passage, the 6th graders had an average score of only 63%. This suggests that both of the 6th graders have had some experience with trying something new, but possibly not creating their own games to play.

Like any assessment tool, the Easy CBM assessment has shortcomings and limitations that could have impacted student comprehension scores. One limitation of using the Easy CBM assessments is that it only assesses a student's ability to answer questions. In fact, many of the questions on the assessment focused largely on the literal and inferential questions, such as "who introduced the candidates at the debate?" (Literal; Passage 6-1) and "What will Rachel and Suki probably do the next time they hear bad things about each other?" (Inferential; Passage 5-8). I hypothesize that students would have decreased comprehension scores had the assessment included some critical comprehension questions, because these types of questions are generally more difficult for students to understand. This is because critical comprehension questions often involve higher-order thinking skills such as evaluating, analyzing, and synthesizing information ("Question-Answer Relationship", n.d.). Students can often answer literal and inferential comprehension questions with ease by recalling or finding an answer stated directly in the passage or by using some reasoning/clues in the text to answer the inferential questions. Given the difficulty, I believe that students might have lower comprehension scores had they been asked to engage in deeper, more complex comprehension tasks. That said, students' retelling and summarizing were also not assessed and could have had different outcomes on their results.

One final factor that could have significantly impacted the outcome of the study is students' mindset. According to Dweck's (1998) research, students who hold a growth mindset, believing that their abilities can be developed and strengthened through hard work, tend to perform better on academic tests and tasks. Conversely, those who hold a fixed mindset may not fully engage with the assessments, therefore affecting their performance. Throughout the study, several students made remarks about their beliefs about their performance. For example, Jamie mentioned, "I feel like I did not do good. I thought the story was boring." For this passage, Jamie scored a 55% on her assessment. On the other hand, Sky mentioned on two separate occasions, "I thought I did really good on this one" and "I think I'm getting 16/20. I think I did

good.” In these instances, Sky scored an 80% and a 75% on her assessments, showcasing the influence of mindset, with Jamie’s negative mindset negatively influencing her score and Sky’s positive mindset positively influencing her score.

Limitations of this Study

One limitation of the study is the small class size, which consisted of only 9 students, making it difficult to generalize the findings for larger groupings. Additionally, this study relied heavily on students’ self-reported sleep data, making it challenging to determine if the data is entirely accurate. Future studies might consider asking parents and guardians to corroborate information as well as provide additional insights.

Another limitation of this study is that a single comprehension assessment was used, which might not provide a complete picture of and take into account the various factors that can impact a student’s reading comprehension. True comprehension involves more than answering multiple-choice questions. It encompasses many different skills such as summarizing main ideas, retelling events of a text in a logical sequence, drawing inferences, and making connections to previous knowledge (Dewald et al., 2010; Gruber et al., 2016). Additionally, other skills such as analyzing text structure and evaluating arguments are components of deeper comprehension (Moore & Meltzer, 2008; Hirshkowitz et al., 2015). While useful to determine literal and inferential understanding, this assessment does not assess these higher-level skills or critical components of comprehension.

Whose Interests Are Served and Who Benefits from this Study?

The primary beneficiaries of this research are the 5th and 6th-grade students in my classroom, as well as their parents and caregivers. By exploring the relationship between sleep and reading comprehension, I am better equipped to implement strategies to support students’ academic success and overall well-being. Parents gain a deeper understanding of how not just sleep quantity, but potentially sleep quality, may impact their children’s reading comprehension and overall reading success.

Educators and school administrators also benefit from this research. Although my findings do not show a strong correlation between sleep quantity and reading comprehension, the potential impact of sleep quality and other factors that influence comprehension, sheds light on the importance of gaining a deeper and more complete understanding of student academic success. The insights from this study can inform instructional practices, student supports, and school policies, possibly leading to school-wide wellness programs and initiatives. On a larger scale, society benefits from a deeper understanding of the factors that influence reading comprehension and the factors influencing the learning outcomes of children.

Potential Significance

In my classroom, this study has immediate and practical relevance. By recognizing that sleep quantity alone may not directly influence comprehension scores, it pushes me to take a deeper look at other factors. I can tailor my teaching strategies to better support students who struggle with fatigue or low energy. This might involve modifying lesson plans to include more active learning techniques. Moreover, sharing this information with parents and students in my school community could spark discussion about promoting better sleep, not just the right amount of sleep.

At the local level, this work could encourage other educators to prioritize sleep education in health or physical education curricula. It could also spark collaboration between administrators, school counselors, and educators to address student wellness needs more comprehensively.

On a broader level, this research adds to the growing body of dialogue around the intersection of health and academic outcomes. While the current narrative links sleep duration with academics, my findings suggest that the impact of background knowledge, mindset, and sleep quality might play larger roles in reading comprehension and overall student achievement. This supports the idea that addressing student success needs to evaluate both academic and non-academic factors.

Who Might Care About This Study?

This research is relevant for several groups including parents, educators, administrators, health professionals, and policymakers. Parents are likely to be interested in how sleep habits, specifically sleep quality, can affect academic performance and how they can support better sleep habits at home. Educators and administrators may use these insights to reflect on current practices and how to better support students who might be dealing with fatigue or inconsistent performance. Health professionals, especially those specializing in pediatric sleep and development, may use this data to further explore how sleep affects school performance. Finally, policymakers who advocate for systemic changes in schools to promote student well-being—such as adjusted school start times or sleep education programs—would find this research relevant and actionable.

Sharing the Findings

The findings from this study can be shared in a variety of formats. This research could be shared at local forums and workshops, such as parent-teacher association meetings or professional development sessions for educators. School newsletters or community presentations to engage parents and other stakeholders would share findings and actionable recommendations. This research might also be shared at various educational conferences, where the implications for teaching practices and school policies could be discussed with a broader audience.

For scholarly dissemination, this research could be submitted to peer-reviewed journals, such as *The Reading Teacher*, *Journal of Adolescent and Pediatric Health*, or *Sleep Health*. The findings from this study could also be published on online platforms, such as blogs dedicated to educational best practices or sleep research to reach a wider audience.

Conclusion

In conclusion, this research aimed to determine how getting fewer than eight hours of sleep affects reading comprehension among 5th and 6th-grade students. While the research showed some fluctuation and variability in scores, the findings do not suggest a strong relationship between the amount of sleep and reading comprehension. The lack of correlation can be attributed to several factors, including the small class size, self-reported data, and the use of a single assessment. Additionally, students' sleep quality and classroom environment could have impacted their assessments. These factors may not have given a complete picture of how sleep can impact comprehension. The identified limitations shed light on the importance of further research on this topic, with a larger number of and more diverse participants, use of other data points, and more precise measurement of sleep patterns, to better understand the relationship between sleep and reading comprehension.

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Exploring the Impact of Sleep on Reading Comprehension

By

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A Masters Paper

Submitted in Partial Fulfillment of

the Requirements for the degree of

Masters of Science in Education - Reading

Advisor's Name

Date

University of Wisconsin - River Falls 2025

Abstract

This study explored the relationship between sleep duration and reading comprehension among a small class of 5th and 6th-grade students at a Catholic School in the Midwest. The primary research question examined whether or not receiving fewer than eight hours of sleep negatively affected students' reading comprehension. Data was collected through students' self-reports of their nightly sleep hours, followed by administration of a single EasyCBM comprehension assessment the following morning. Findings indicated that there was no significant correlation between the amount of sleep and reading comprehension. Students' comprehension scores did not improve with adequate sleep, nor did it decrease with inadequate sleep. This study presented several limitations that may have influenced the results, which include the sample size, the assessment used, and the reliance/reliability of student-reported sleep data. Although there is adequate evidence that sleep influences overall well-being, social-emotional health, and student academic performance, the direct impact on reading comprehension may require additional and more comprehensive research to fully gain a clear understanding of the relationship between sleep and reading comprehension.

Introduction

Every day, I hear my students say things such as "I can't focus; I'm so exhausted," which highlights a recurring challenge in the classroom. My long-time fascination with the science of sleep health inspired my proposed research. Sleep plays a vital role in our health. It impacts nearly every area of life, including cognitive performance, physical development, social-emotional regulation, and overall quality of life (Hirshkowitz et al., 2015). Despite its importance, sleep occurs outside of the classroom, so teachers have little control over their students' sleep habits.

As students transition from elementary to middle school, they are often asked to comprehend much more complex information, and with increasing pressures outside of school, such as sports, family obligations, and technology use. Given these demands, sleep seems

imperative to their success both in and out of school, yet insufficient sleep among these students has become a growing concern. To this point, the National Sleep Foundation (2015) recommends children and adolescents in this age group obtain nine hours of sleep per night. Yet, Moore and Meltzer (2008) report that 45-47% of this population sleeps less than the recommended amount per night. This inquiry/research seeks to understand the impacts of sleep deprivation on our students' levels of comprehension. My proposed research question is "What effects does sleep have on 5th and 6th graders' reading comprehension?"

Background for the Study/Review of Current Literature

Sleep is critical in children's and early adolescents' cognitive and academic functioning, making it an increasingly pressing issue in today's classrooms. Adequate sleep supports the brain's ability to process and retain information, which is crucial for learning and academic success (Lim & Dinges, 2010). Recent research has sought to understand the links between sleep quality, duration, and academic achievement.

Factors That Influence Sleep

Several internal, external, socioeconomic, and environmental factors can all contribute to this lack of sleep in adolescents. During adolescence, there is a natural biological shift in circadian rhythms, causing adolescents to fall asleep later and wake up earlier (Hummer and Lee, 2016). With these shifts, coupled with early school start times, students are more likely to experience sleep deprivation, as they cannot sleep later in the morning. As a result, most adolescents get less sleep than their brains and bodies need. Additionally, with increasing age, heavy homework loads and extracurricular events, such as sports can also extend students' evening routines, reducing time for sleep. Maas highlights this phenomenon: "Almost all teenagers, as they reach puberty, become walking zombies because they are getting far too little sleep" (Carpenter, 2001).

Technology use has been one of the most significant barriers to sufficient sleep in adolescents, as highlighted in the book, *The Anxious Generation*. With constant access to

smartphones, “sleep deprivation is increased by the ease of access to other highly stimulating smartphone activities, including mobile gaming and video streaming” (pg. 124). Rather than going to sleep at night, children are up on their phones instead. Haidt (2024) goes on to explain that the impacts of ongoing sleep deprivation are far-reaching. It not only causes lower cognitive functioning and academic performance but can also lead to heightened levels of anxiety and mood instability, often in adolescents who are already susceptible to many social pressures.

Socioeconomic and environmental factors, such as living in noisy or crowded conditions, inconsistent routines due to parental work schedules, or lack of access to sleep resources like comfortable beds, can also hinder sleep. Together, these factors create significant barriers to achieving adequate sleep for many students, impacting their overall health and academic performance.

Negative Impact of Sleepiness

Many adolescents report feeling sleepy throughout their school days, with insufficient sleep being identified as the most common cause of daytime sleepiness in this age group (Moore & Meltzer, 2008). Continued sleepiness can eventually lead to a range of negative outcomes, such as impaired attention, decreased motivation, and reduced academic achievement (Dewald et al., 2010). If sleep deprivation goes on long enough, it can even lead to weight gain, immune suppression, and other health problems (Owens et al, 2014). When students do not get enough sleep, their ability to concentrate, process information, and retain knowledge is compromised, often resulting in lower grades. Lim and Dinges (2023) found that short-term sleep deprivation significantly impairs attention, alertness, and overall cognitive performance.

Furthermore, early adolescents are more susceptible to the effects of sleepiness on academic achievement due to a “dynamic period of cognitive development characterized by developmental increases in processes important for learning and academic achievement” (Orihuela, 2023, p. 2). Piaget's theory of cognitive development echoes that students in this

phase are in a critical period marked by significant cognitive growth, including improved comprehension skills vital to academic success (Piaget, 1952). This is referred to as the operational stage of development. During this critical phase, the prefrontal cortex is still developing and maturing. The prefrontal cortex is responsible for more complex, higher-order cognitive processes such as decision-making, problem-solving, and self-regulation, and is highly sensitive to sleep loss.

Sleep Duration Versus Sleep Quality

It is also important to distinguish between sleep quantity and sleep quality. Sleep quantity refers to the total number of hours slept, while sleep quality refers to restfulness and uninterrupted sleep. While sleep quantity (total hours of sleep) is essential for physical and mental restoration, sleep quality determines how effectively the body and mind rest during those hours. Much of the research, specifically those seminal studies by Lim and Dinges (2023) and Orihuela (2023), focuses on sleep quantity. Lim and Dinges (2023) examine how inadequate sleep negatively affects cognitive processes, such as attention and memory. Orihuela examines and highlights the direct correlation between sleep duration and academic outcomes. However, the effects of sleep quality and duration should not be overlooked. Both domains of sleep have profound impacts on cognitive functioning, emotional regulation, and overall sleep health, making these components essential when examining overall sleep, well-being, and academic performance.

Social Emotional Effects

Sleepiness can also have detrimental effects on the social and emotional well-being of students. Orihuela (2023) examined the social and emotional effects of sleep deprivation, revealing that it can lead to increased anxiety, irritability, and difficulties in developing peer relationships. When students are tired, their ability to engage socially and emotionally is compromised.

Sleepiness and Academics

Several studies have examined the relationship between sleepiness and various academic subjects. For example, in a meta-analysis conducted by Dewald (2010), the findings showed that students who self-reported fewer than eight hours of sleep per night had significantly lower grades, especially in subjects like science and math. Similarly, Lim and Dinges (2023) found that sleepiness negatively impacts math performance, specifically in areas such as problem-solving and computation. Additionally, their continued research showed that even with one night of sleep deprivation, participants experienced a 30% decrease in tasks requiring focus and attention.

Concentration

The ability to concentrate allows students to retain information, engage in problem-solving, and actively participate in class discussions and activities. Without focus, students are less likely to succeed (Dewald et al., 2010; Lim & Dinges, 2010). Much of the existing literature has primarily focused on sustained attention and decision-making (Hirshkowitz et al., 2015; Moore & Meltzer, 2008), neglecting the implications for reading and writing, which are vital skills for academic success. Many studies analyze overall grade point averages, report cards, and standardized test scores to explore sleep patterns and sleep deprivation in adolescents. Research consistently shows that adolescents who experience sleep deprivation often score lower on tests, show slower cognitive processing, and have lower overall grades (Dewald et al., 2010; Orihuela et al., 2023). However, there has been limited research on the effect of sleepiness on literacy achievement and specific reading skills, such as comprehension.

Comprehension

Comprehension is a cognitive process of understanding and making meaning of information, whether it is read, heard, or observed. It does involve more than just decoding words and sentences, but is also about making connections, inferences, and connecting new knowledge to existing knowledge (synthesizing). Comprehension is a crucial process that allows

individuals to engage with material, follow directions, understand complex information, and apply new knowledge to effectively solve problems (Dewald et al., 2010; Gruber et al., 2016).

Reading comprehension is typically assessed through many different methods, all designed to gauge how well a reader understands and engages with written texts. Traditionally, methods used to assess comprehension have included multiple choice questioning, cloze tests, and other recall tasks (Keenan et al., 2008). The assessments that utilize multiple-choice questions typically include literal, inferential, and evaluative questions to determine comprehension at different levels. Literal questions assess basic understanding by asking students to find the answer directly stated in the text. Inferential questions require students to dig deeper into the text and make inferences using their prior knowledge and experiences. Finally, evaluative questions are questions where students make judgments about the text using their reasoning (“Question-Answer Relationship”, n.d.).

However, scholars such as Timothy Shanahan (2023) argue that comprehension assessments should prioritize the quality and complexity of the texts themselves, not necessarily the questions being asked. He mentions that questions alone do not serve as a sufficient measure of a student’s comprehension (Shanahan, 2023). He also critically evaluates maze and cloze reading assessment types, as they typically do not capture the reader’s interaction with the entire text (Shanahan, 2018). Therefore, comprehension assessments should balance question types, text complexity, and context to gain a full understanding of a student’s comprehension level.

Understanding the relationship between sleepiness and comprehension can help inform educational interventions and practices, allowing for healthier students and overall, more conducive learning environments.

Factors that Influence Comprehension

Background knowledge is any information, knowledge, or experience that a reader has acquired and then uses that knowledge to connect and construct meaning from new content.

Research suggests that background knowledge significantly improves reading comprehension because students can reduce the cognitive load, as they are not processing as much new information (Hirshkowitz et al., 2015). When students are familiar with the content, they can use more energy to think deeply instead of trying to understand basic concepts.

In contrast, students who do not have background knowledge may struggle to understand new information because they do not have any existing knowledge to connect it to, meaning that they need to work harder to make sense of or build meaning from the content (Dewald, et al., 2010). This challenge can lead to lower comprehension as those with low background knowledge rely on the information as it is solely presented instead of connecting it to what they already know or have experienced.

As a result, students with high background knowledge tend to be better readers than those without background knowledge, highlighting its significance (Hirshkowitz et al., 2015; Moore & Meltzer, 2008). In a seminal study (Recht & Leslie, 1988), researchers assessed junior high school students' comprehension of a baseball passage. They found that students' background knowledge of baseball was the best predictor of their comprehension scores.

Another factor that largely impacts comprehension is mindset. Mindset is referred to as the underlying messages and beliefs that individuals hold about their abilities and knowledge (Dweck, 1998). This impacts comprehension as it shapes students' motivation, effort, and ability to persevere through challenging situations, particularly with texts and reading tasks. According to Stanley et al. (2023), individuals who have a growth mindset believe that abilities can be developed through effort. They are more likely to persist through difficult situations, apply strategies, and develop stronger comprehension. In contrast, those who believe that their abilities are fixed are more likely to avoid challenges and situations that are difficult and have lower reading performance and comprehension.

Despite being an essential component of daily life and academic contexts, there is a lack of literature and research on how sleepiness specifically affects this domain. As mentioned,

several studies have focused on attention and memory, but the oversight of the effects on comprehension is significant, as comprehension is essential for academic success.

Sleep Interventions

In the pilot study done by Davis (2022), an e-learning program was designed to improve student knowledge regarding sleep and, therefore, improve their sleep habits. This intervention was delivered by trained teachers during the regular curriculum for six weeks. It was reported that “adolescents need to know about sleep and how to improve it before they can change their behavior” (pg. 8). Results showed that sleep knowledge and healthy habits improved.

When educators make known the benefits of good, quality sleep and the consequences of sleep deprivation, we better equip adolescents with tools, allowing them to take an active role and prioritize their sleep hygiene, academic performance, and overall health. To establish effective, comprehensive interventions regarding sleep and academic performance, we must take into account the wider context, such as the external and internal factors that contribute to sleep deprivation.

Integrating these types of interventions into the larger school curriculum is highly beneficial. Gruber and his colleagues (2016) explored the impact of interventions by implementing a structured sleep education program containing four modules aimed at improving sleep duration and sleep quality. These modules included general education regarding sleep habits, staff modeling of healthy sleep habits, and conversations between children and parents about balancing daily activities and sleep. Gruber states, “The results of this present study suggest that sleep education programs can achieve measurable and significant improvements in children's daytime functioning by extending their sleep duration and improving their sleep efficiency. In terms of academic performance, participation in the intervention was associated with improved grades in English and mathematics” (pg. 97).

Summary

In conclusion, insufficient sleep not only impairs cognitive functions but is also associated with social-emotional well-being and lower academic outcomes, specifically in math. However, research on the impacts of insufficient sleep on comprehension scores is sparse. Exploring sleep education programs allows a framework for possible solutions to equip schools, educators, parents, and adolescents with tools to prioritize sleep hygiene and health, and then, in turn, improve academic success. Given the impact of daytime sleepiness and sleep deprivation on adolescent academics, it is crucial to explore sleep interventions to help mitigate the effects of sleep loss and enhance overall academic achievement. By bringing awareness to the sleep-related challenges that are facing today's adolescents and exploring the relationship between sleep and its effects on comprehension, we can foster healthier learning environments and improve our students' academic success.

Methods

Context

This study took place at a Kindergarten through sixth-grade private Catholic school in the Midwest. This school enrolls approximately 50-60 students per year. Enrollment for the 2024-2025 school year is currently 53 students. Due to its small population and rural atmosphere, the school has an average student-to-teacher ratio of 12:1. There is one teacher for every two grade levels, as classrooms, excluding Kindergarten, are combined (1/2, 3/4th, 5th/6th). The student body identifies as Caucasian. The student body is characterized by close-knit, community-based demographics, often reflecting the cultural and socio-economic profile of the Midwest. The majority of the student population comes from families with strong ties to the Catholic faith and rural community values. The school serves zero ELL students, zero immigrant students, three students with an IEP, zero students with a 504 plan, nine students receiving free lunches, and only one student who is receiving price-reduced lunch. Several students also qualify for tuition assistance.

Participants

Due to small class sizes, there will be only nine participants in this study, ages 10-11. Of the nine participants, there are six females and three males. The fifth-grade students consist of three males and four females, and the sixth-grade students are all females. One of the students is on an IEP. The rest of the students do not have formalized educational plans, but do reflect a variety of personal and academic backgrounds. See Table 1 for a list of participants included in this study.

These students were a part of my 5th and 6th-grade classroom, during the 2024-2025 academic year. I had an existing relationship with participants as their teacher, which helped to create trust and reliability. I obtained informed consent from the parents of all participants, as well as assent from the participants themselves. Both parents and participants were informed that participation was voluntary, and they could withdraw from the study at any time without penalty. Any identifiable information was removed to protect student privacy. Pseudonyms were assigned to students and kept separate from the corresponding data. All data and files were securely stored in a designated, protected location.

Table 1

Description of Study Participants

<u>Student Pseudonym</u>	<u>Grade</u>	<u>Gender</u>	<u>Other Notes</u>
Irma	6	Female	
Rachel	6	Female	
Kylie	5	Female	
Larry	5	Male	
Joel	5	Male	
Bree	5	Female	Struggles with Comprehension/LA tasks,

			Possible LD
Leon	5	Male	
Sky	5	Female	
Jamie	5	Female	Has been on an IEP for a while, just recently exited this year, still below comprehension benchmarks

Data Collection Plan

Data was collected using a variety of methods to gain insight into students' sleep habits and comprehension performance. The data collected consisted of student-recorded sleep journals and a performance-based comprehension assessment. Each student maintained a sleep journal where they recorded their nightly sleep duration. Journal entries were conducted on Mondays, Wednesdays, and Fridays for three weeks.

Students completed an easy CBM (Alanzo, 2006) comprehension assessment on the days they recorded a sleep journal entry. EasyCBM is an assessment tool that measures reading comprehension using age-appropriate, standardized reading passages. EasyCBM is a widely used tool for classroom progress monitoring. Its assessments are generally reliable; however, since comprehension is complex and consists of several factors, these short assessments are more reliable for screening rather than diagnostic tools. The reliability of any assessment can be influenced by factors such as the number of items, the range of text difficulty, and consistency in administration.

Students independently read a grade-level passage silently that is based on their reading ability. Passages range in topic and length. For example, the text *The Grass Monster* is a 6th-grade level passage about two students who are investigating items that are mysteriously disappearing from their school's playing field and runs about 2,545 words. A sample of this passage can be seen in Appendix A. Students then independently took a written assessment containing 20 multiple-choice comprehension questions about the passage that was just read.

These questions consist of both literal and inferential questions. Students were instructed to circle the correct answer out of three possible options. An example of a literal question includes: “What did Mona lose while playing soccer?” while an example of an inferential question includes: “Why did most students at Hurston Middle School not worry about missing objects?”

After reading, students were given a score out of 20, which was calculated into a percentage and inserted into a spreadsheet as seen in Figure 1. Results from these passages served as quantitative data and were compared against students’ sleep data to see any correlations between sleep and comprehension. The teacher-researcher kept a record of the date, hours of sleep, CBM scores, and the Passage read on a paper chart. This data was kept confidential and in a secure location.

Figure 1

Spreadsheet for tracking student sleep and comprehension scores

Name	Week 1				Week 2				Week 3			
	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage
Irma												
Rachel												
Kylie												
Larry												
Joel												
Bree												
Leon												
Sky												
Jamie												

Data Analysis Plan

Based on the types of data collection presented above, data analysis will include examining any sort of relationship between sleep duration (from sleep journals) and comprehension performance (from the easy CBM assessments).

Timeline

- Pre-research
 - Obtain IRB approval
- Week 1
 - Distribute and obtain consent forms
 - Distribute student sleep journals
 - Instruct and model how to record sleep duration
 - Conduct an initial student journal entry
 - Conduct initial student easyCBM assessments
- Week 2
 - Continue data collection
 - Begin reflection sessions with the faculty advisor
- Week 3
 - Continue with data collection
 - Continue reflections/debriefing with the faculty advisor
- Week 4
 - Review the sleep journal data and check for any noticeable patterns
 - Continue any additional data collection (if needed)
 - Continue debriefing with the faculty advisor
- Weeks 5-6
 - Administer any final data collection (if needed)
 - Begin quantitative data analysis of easyCBM assessment performance and sleep duration.
 - Continue reflection/debriefing with the faculty advisor
- Week 7
 - Analyze sleep journal entries for patterns in sleep duration
 - Continue debriefing with the faculty advisor
- Week 8
 - Triangulate data from multiple sources and draw conclusions
 - Begin a comprehensive report, synthesizing data
 - Prepare and present findings/publish

Findings

This study examined the link between getting fewer than eight hours of sleep each night and how that affects reading comprehension in 5th and 6th-grade students. The data was

collected over three weeks and measured the students' amounts of sleep and their CBM comprehension scores. Results can be seen in Image 2.

Image 2

Recorded sleep and comprehension scores

Name	2/3-2/7 Week 1				2/10-2/14 Week 2				2/24-2/28 Week 3			
	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage	Date	Hours of Sleep	CBM Comp. Scores	Passage
Irma	2-3	8h23m	15/20 (75%)	6-1	2-10	7h40m	13/20 (65%)	6-4	2-24	8h45m	12/20 (60%)	6-7
	2-5	8h	11/20 (55%)	6-2	2-12	9h20m	14/20 (70%)	6-5	2-26	8h20m	13/20 (65%)	6-8
	2-7	7h50m	16/20 (80%)	6-3	2-14	8h5m	11/20 (55%)	6-6	2-28	8h15m	17/20 (85%)	6-9
Rachel	2-4	8h	20/20 (100%)	6-1	2-10	8h30m	15/20 (75%)	6-4	2-24	8h30m	19/20 (95%)	6-7
	2-5	8h30m	14/20 (70%)	6-2	2-12	8h20m	15/20 (75%)	6-5	2-26	8h50m	18/20 (90%)	6-8
	2-7	8h	17/20 (85%)	6-3	2-14	8h20m	14/20 (70%)	6-6	2-28	8h30m	14/20 (70%)	6-9
Kylie	2-3	10h	15/20 (75%)	5-2	2-11	10h40m	16/20 (80%)	5-5	2-24	10h5m	15/20 (75%)	5-8
	2-5	9h30m	17/20 (85%)	5-3	2-12	10h	12/20 (60%)	5-6	2-26	9h34m	18/20 (90%)	5-9
	2-7	9h30m	14/20 (70%)	5-4	2-14	10h20m	17/20 (85%)	5-7	2-28	9h20m	13/20 (65%)	5-10
Larry	2-3	9h20m	13/20 (65%)	5-2	2-10	8h50m	13/20 (65%)	5-5	2-24	9h20m	16/20 (80%)	5-8
	2-5	9h10m	16/20 (80%)	5-3	2-12	9h	10/20 (50%)	5-6	2-26	9h10m	13/20 (65%)	5-9
	2-7	9h10m	17/20 (85%)	5-4	2-14	9h20m	10/20 (50%)	5-7	2-28	9h	14/20 (70%)	5-10
Joel	2-3	9h40m	16/20 (80%)	5-2	2-10	9h10m	12/20 (60%)	5-5	2-24	9h5m	4/20 (20%)	5-8
	2-5	9h	15/20 (75%)	5-3	2-12	9h20m	10/20 (50%)	5-6	2-26	8h27m	11/20 (55%)	5-9
	2-7	7h	17/20 (85%)	5-4	2-14	9h	9/20 (45%)	5-7	2-28	8h27m	16/20 (80%)	5-10
Bree	2-4	9h10m	9/20 (45%)	5-2	2-10	9h	9/20 (45%)	4-2	2-24	8h50m	9/20 (45%)	4-5
	2-5	8h55m	14/20 (70%)	5-3	2-12	9h30m	10/20 (50%)	4-3	2-26	9h	8/20 (40%)	4-6
	2-7	8h45m	8/20 (40%)	5-4	2-14	7h20m	13/20 (65%)	4-4	2-28	9h17m	10/20 (50%)	4-7
Leon	2-4	9h20m	14/20 (70%)	5-2	2-10	8h50m	11/20 (55%)	5-5	2-24	10h25m	11/20 (55%)	5-8
	2-5	9h30m	13/20 (65%)	5-3	2-12	8h50m	13/20 (65%)	5-6	2-26	10h25m	17/20 (85%)	5-9
	2-7	9h30m	13/20 (65%)	5-4	2-14	7h57m	13/20 (65%)	5-7	2-28	10h35m	11/20 (55%)	5-10
Sky	2-3	8h47m	19/20 (95%)	5-2	2-10	8h50m	14/20 (70%)	5-5	2-24	8h45m	16/20 (80%)	5-8
	2-5	9h	11/20 (55%)	5-3	2-12	8h35m	12/20 (60%)	5-6	2-26	8h45m	18/20 (90%)	5-9
	2-7	8h15m	16/20 (80%)	5-4	2-14	8h15m	13/20 (65%)	5-7	2-28	8h35m	15/20 (75%)	5-10
Jamie	2-4	8h30m	9/20 (45%)	5-2	2-10	9h10m	5/20 (25%)	4-2	2-24	8h50m	11/20 (55%)	4-5
	2-5	8h20m	9/20 (45%)	5-3	2-12	8h20m	8/20 (40%)	4-3	2-26	7h20m	12/20 (60%)	4-6
	2-7	7h	6/20 (30%)	5-4	2-14	9h10m	13/20 (65%)	4-4	2-28	8h45m	13/20 (65%)	4-7

Overall trends indicated that students reported consistent sleep duration in line with recommended age guidelines. For example, 45% of students reported 8 hours of sleep or more every night of the study, 78% of students reported 8 hours of sleep or more on 8 out of the 9 nights of the study, and the overall average of students who reported 8 or more hours of sleep at any point was 90.8%

In the first week of data collection, 75% of students who received at least eight hours of sleep scored at or above 70% comprehension. For example, Rachel received eight hours of sleep on 2/4 and achieved a perfect score of 100%. Some students got less than eight hours of sleep, and it did not seem to impact their performance on the comprehension assessment. For

example, Joel only recorded seven hours of sleep but scored 85% on the comprehension assessment. One student's score seemed to be impacted negatively by their sleep. For example, Jamie received only seven hours of sleep on 2/7 and achieved a comprehension score of 30%, their lowest of the week. However, there were some anomalies. For example, Irma got exactly eight hours of sleep in the first week and scored 55%. Two days later, she got less than eight hours of sleep and scored 80% on the CBM assessment. These trends were also solidified in the second and third weeks of data collection.

However, there were also trends related to consistency. First, students who had consistent amounts of sleep also had highly variable comprehension scores. For example, Bree's sleep in the first week of the study varied little, receiving eight hours and fifty-five minutes on 2/5/25 (14/20), eight hours and forty-five minutes on 2/7/25 (8/20), and nine hours and ten minutes on 2/24/25 (9/20). Yet her scores varied significantly, ranging from 40% to 70%. On the other hand, several students maintained high comprehension scores, with large fluctuations in sleep duration. For example, in the first week of the study, Joel recorded anywhere from seven to over nine and a half hours of sleep. Despite these large fluctuations, his score only varied slightly, scoring 80%, 75%, and 85%. One notable piece of data is that every student's highest score over the three weeks happened when they had more than 8 hours of sleep, except for Joel, whose highest score happened on the night he recorded the least amount of sleep (seven hours) over the three weeks. Notably, none of the students' highest scores equated with the nights they recorded the most sleep. Conversely, their lowest individual scores still aligned with nights of reduced sleep, although not their lowest recorded nightly sleep.

Another notable finding was that scores on students' comprehension assessments differed depending on whether it was taken on a Monday versus a Friday. In the first week of data collection, 66% of students performed better on the comprehension assessments on Mondays versus Fridays. For example, Rachel reported eight hours of sleep on Monday and received a 100% on her comprehension assessment. However, on Friday, she reported eight

hours of sleep and only received an 85% on the comprehension assessment. In the second week, this trend was also noticed with 56% of students performing better on the comprehension assessment on Monday compared to Friday. However, in Week 3, this trend was still observed, but only 44% of students performed better on the assessment on Monday.

Discussion

Contrary to findings on the correlation between sleep and academic outcomes (Dewald et. al., 2010; Gruber, et. al., 2016), my study did not find a strong relationship between sleep and comprehension scores. Much to my surprise, students were consistently reporting more than the recommended hours of sleep and only performed marginally on their Easy CBM comprehension assessment, with an overall average of 65%. Further, when fewer than eight hours of sleep were reported, scores did not tend to have significant swings.

The unexpected outcome of the study could be attributed to several factors. This study could have been impacted by low sleep quality despite adequate sleep duration. As the literature suggests, sleep quality is just as important as duration (Lim and Dinges, 2023; Orihuela, 2023). For example, throughout the study, several students made comments that would suggest that their sleep quality might have impacted their comprehension assessment scores. For example, on 2/24, Larry stated, "I need to sleep on the bus, I'm so tired." Jamie also expressed, "I was tired. I could not focus at all." While students did report adequate sleep duration, the quality of sleep was not directly assessed.

Another factor leading to the unexpected outcome of the study was that students' comprehension scores did not show much difference from the beginning of the week to the end of the week. Students' best scores over all three weeks of the study were on the very first Monday of the study, which could have been explained by their fresh start and higher energy levels. However, as the study continued, testing fatigue likely set in. Still, surprisingly, the students' scores did not significantly drop. For example, the average score of the comprehension assessments on Mondays, across all three weeks of the study was 65%.

However, throughout all 3 weeks of the study, the average score on Fridays was 66%. While it was anticipated that students would perform better on their assessments on Mondays due to being well-rested after a weekend, the data did not support this assumption. Although students may experience cumulative fatigue by Friday, their scores did not significantly drop, suggesting that factors like familiarity with routine, mindset, and varying levels of engagement with the passage may have helped maintain performance.

As discussed in the literature review, the impact of background knowledge and its influence on comprehension cannot be ignored (Hirshkowitz et al., 2015). Indeed, this factor potentially impacted the outcome of the study. Almost all of the Easy CBM comprehension assessment passages were fiction-based. It was evident that students had higher levels of comprehension when passages were related to familiar topics, such as sibling relationships, compared to less familiar content. For example, a 5th-grade passage, titled “Beware of Sharks,” contained a storyline about two siblings. The 5th-grade students scored an average of 70% on this passage. Compared to the passage titled “The Patchwork Quilt,” which contained a storyline about quilting, the 5th graders scored an average of only 65%. Most of the 5th-grade students have experience with a sibling, however, they have very little background knowledge on quilting, which is reflected in these scores.

The higher comprehension scores with passages related to familiar topics were also evident with the 6th-grade students. The passage titled “On the Ice” discusses a student who is experiencing something for the first time with her uncle. The two sixth graders had an average of 82% on their comprehension assessment on this passage. This can be compared to the passage titled “Not All Fun and Games,” which is about siblings who try to pass the time on Sundays by coming up with and creating their unique games to play. On this passage, the 6th graders had an average score of only 63%. This suggests that both of the 6th graders have had some experience with trying something new, but possibly not creating their own games to play.

Like any assessment tool, the Easy CBM assessment has shortcomings and limitations that could have impacted student comprehension scores. One limitation of using the Easy CBM assessments is that it only assesses a student's ability to answer questions. In fact, many of the questions on the assessment focused largely on the literal and inferential questions, such as "who introduced the candidates at the debate?" (Literal; Passage 6-1) and "What will Rachel and Suki probably do the next time they hear bad things about each other?" (Inferential; Passage 5-8). I hypothesize that students would have decreased comprehension scores had the assessment included some critical comprehension questions, because these types of questions are generally more difficult for students to understand. This is because critical comprehension questions often involve higher-order thinking skills such as evaluating, analyzing, and synthesizing information ("Question-Answer Relationship", n.d.). Students can often answer literal and inferential comprehension questions with ease by recalling or finding an answer stated directly in the passage or by using some reasoning/clues in the text to answer the inferential questions. Given the difficulty, I believe that students might have lower comprehension scores had they been asked to engage in deeper, more complex comprehension tasks. That said, students' retelling and summarizing were also not assessed and could have had different outcomes on their results.

One final factor that could have significantly impacted the outcome of the study is students' mindset. According to Dweck's (1998) research, students who hold a growth mindset, believing that their abilities can be developed and strengthened through hard work, tend to perform better on academic tests and tasks. Conversely, those who hold a fixed mindset may not fully engage with the assessments, therefore affecting their performance. Throughout the study, several students made remarks about their beliefs about their performance. For example, Jamie mentioned, "I feel like I did not do good. I thought the story was boring." For this passage, Jamie scored a 55% on her assessment. On the other hand, Sky mentioned on two separate occasions, "I thought I did really good on this one" and "I think I'm getting 16/20. I think I did

good.” In these instances, Sky scored an 80% and a 75% on her assessments, showcasing the influence of mindset, with Jamie’s negative mindset negatively influencing her score and Sky’s positive mindset positively influencing her score.

Limitations of this Study

One limitation of the study is the small class size, which consisted of only 9 students, making it difficult to generalize the findings for larger groupings. Additionally, this study relied heavily on students’ self-reported sleep data, making it challenging to determine if the data is entirely accurate. Future studies might consider asking parents and guardians to corroborate information as well as provide additional insights.

Another limitation of this study is that a single comprehension assessment was used, which might not provide a complete picture of and take into account the various factors that can impact a student’s reading comprehension. True comprehension involves more than answering multiple-choice questions. It encompasses many different skills such as summarizing main ideas, retelling events of a text in a logical sequence, drawing inferences, and making connections to previous knowledge (Dewald et al., 2010; Gruber et al., 2016). Additionally, other skills such as analyzing text structure and evaluating arguments are components of deeper comprehension (Moore & Meltzer, 2008; Hirshkowitz et al., 2015). While useful to determine literal and inferential understanding, this assessment does not assess these higher-level skills or critical components of comprehension.

Whose Interests Are Served and Who Benefits from this Study?

The primary beneficiaries of this research are the 5th and 6th-grade students in my classroom, as well as their parents and caregivers. By exploring the relationship between sleep and reading comprehension, I am better equipped to implement strategies to support students’ academic success and overall well-being. Parents gain a deeper understanding of how not just sleep quantity, but potentially sleep quality, may impact their children’s reading comprehension and overall reading success.

Educators and school administrators also benefit from this research. Although my findings do not show a strong correlation between sleep quantity and reading comprehension, the potential impact of sleep quality and other factors that influence comprehension, sheds light on the importance of gaining a deeper and more complete understanding of student academic success. The insights from this study can inform instructional practices, student supports, and school policies, possibly leading to school-wide wellness programs and initiatives. On a larger scale, society benefits from a deeper understanding of the factors that influence reading comprehension and the factors influencing the learning outcomes of children.

Potential Significance

In my classroom, this study has immediate and practical relevance. By recognizing that sleep quantity alone may not directly influence comprehension scores, it pushes me to take a deeper look at other factors. I can tailor my teaching strategies to better support students who struggle with fatigue or low energy. This might involve modifying lesson plans to include more active learning techniques. Moreover, sharing this information with parents and students in my school community could spark discussion about promoting better sleep, not just the right amount of sleep.

At the local level, this work could encourage other educators to prioritize sleep education in health or physical education curricula. It could also spark collaboration between administrators, school counselors, and educators to address student wellness needs more comprehensively.

On a broader level, this research adds to the growing body of dialogue around the intersection of health and academic outcomes. While the current narrative links sleep duration with academics, my findings suggest that the impact of background knowledge, mindset, and sleep quality might play larger roles in reading comprehension and overall student achievement. This supports the idea that addressing student success needs to evaluate both academic and non-academic factors.

Who Might Care About This Study?

This research is relevant for several groups including parents, educators, administrators, health professionals, and policymakers. Parents are likely to be interested in how sleep habits, specifically sleep quality, can affect academic performance and how they can support better sleep habits at home. Educators and administrators may use these insights to reflect on current practices and how to better support students who might be dealing with fatigue or inconsistent performance. Health professionals, especially those specializing in pediatric sleep and development, may use this data to further explore how sleep affects school performance. Finally, policymakers who advocate for systemic changes in schools to promote student well-being—such as adjusted school start times or sleep education programs—would find this research relevant and actionable.

Sharing the Findings

The findings from this study can be shared in a variety of formats. This research could be shared at local forums and workshops, such as parent-teacher association meetings or professional development sessions for educators. School newsletters or community presentations to engage parents and other stakeholders would share findings and actionable recommendations. This research might also be shared at various educational conferences, where the implications for teaching practices and school policies could be discussed with a broader audience.

For scholarly dissemination, this research could be submitted to peer-reviewed journals, such as *The Reading Teacher*, *Journal of Adolescent and Pediatric Health*, or *Sleep Health*. The findings from this study could also be published on online platforms, such as blogs dedicated to educational best practices or sleep research to reach a wider audience.

Conclusion

In conclusion, this research aimed to determine how getting fewer than eight hours of sleep affects reading comprehension among 5th and 6th-grade students. While the research showed some fluctuation and variability in scores, the findings do not suggest a strong relationship between the amount of sleep and reading comprehension. The lack of correlation can be attributed to several factors, including the small class size, self-reported data, and the use of a single assessment. Additionally, students' sleep quality and classroom environment could have impacted their assessments. These factors may not have given a complete picture of how sleep can impact comprehension. The identified limitations shed light on the importance of further research on this topic, with a larger number of and more diverse participants, use of other data points, and more precise measurement of sleep patterns, to better understand the relationship between sleep and reading comprehension.

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