Diane Kraemer Prof LeBlanc WRI Revision focus: Accuracy and Audience concerns with slight structural changes Revision: 20 May 2019

The Effects of Altered Circadian Rhythms On Student Success Due to Light Pollution

I study until 10pm, rub my eyes, and get ready for bed. I go to the bathroom and the

hallway lights blind my eyes. I walk with one-eye closed like a pirate to make my trip as efficient as possible, wanting to "maintain my sleepiness." After getting back in bed, I toss and turn, restless and awake. What happened?



(Photo of Mellby dorm hallway at night, taken by author)

Many college students suffer from similar experiences. Studies have shown that LED lights on college campuses are too bright at night for students who wish to go to bed at a decent hour. I am concerned with light pollution's effect on college students' sleep and academic success.

Light pollution is associated with detrimental health effects because it alters the human circadian rhythm. Our circadian rhythm is the human body's internal clock for sleep and wake schedules. The circadian rhythm instructs the body to sleep when it is dark and to be awake when it is light. Maintenance of the cycle requires consistent sleep and wake schedules. Changes in sleep-wake time interrupts your circadian rhythm, which results in poor quality sleep.

Exposure to artificial light at night confuses the body's circadian rhythm. Normally, the body produces melatonin, a sleep enhancing hormone, in response to darkness to incentivize the body to follow the circadian rhythm. Melatonin is not released as readily when students look at artificial light late at night, which makes it harder to fall asleep. Tähkämö, a researcher at Aalto University, studied students' change in melatonin levels before and after exposure to 30 minutes of artificial light at night. Subjects were exposed to a variety of wavelengths of light. All wavelengths caused a change in melatonin levels (Tähkämö, 2019). These changes in melatonin prove that artificial light is damaging to student's sleep.



Quality of Sleep Ratings

(High low and average are measurements of self reported quality of sleep)(Data gathered from, "Circadian preference, nighttime sleep and daytime functioning in young adulthood", Mendoza, F(2010))

If consistent sleep is the problem, it seems like working at night is fine as long as you keep it regular, right? Mendoza, a Spanish psychologist, studied college students' sleep quality and how they identified their sleep schedules. Results show (reference the image above) that morning and non-identified groups reported higher quality sleep. Sleep onset that aligns with darkness onset allows for a more natural pattern of sleep that is higher quality and more consistent. Conversely, evening people were reported to have poor quality sleep due to an unhealthy circadian rhythm. Quality sleep is when the circadian rhythm is set with the course of natural sunlight and going to sleep when your body tells you to, which means shortly after the sun sets.

Does a change in circadian rhythm affect grades? Circadian rhythm is strongly associated with the attention, memory, and success of a student. Witkowski, a researcher at The University of Texas, did a semester long study of University students' sleep patterns, brain activity, sleep,

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circadian rhythm, and GPA. As the semester progressed, most students experienced a decrease in circadian rhythm regularity which decreased brain activity, focus, and GPA. Students that had a more consistent sleep schedule maintained a higher GPA. He found that chronic sleep deprivation has been proven to impair vigilant attention that is required for the success of a college student (Witkowski, 2015).

Poor sleep quality is associated with severe mental distress as well as inability to focus. As a result, sleep deprived students are more stressed and less productive, and spend more time completing assignments then if they had just caught up on sleep. More hours spent studying and working on homework with decreasing productivity increases stress and only intensifies the cycle. As a result, sleep deprived students were found to be less likely to succeed academically (Witkowski, 2015).

Students can improve their academic success by going to bed at an earlier, regular time, and by limiting artificial light near bedtime. St. Olaf can help their students get better sleep by removing LED lights in dorm hallways late at night. This way, students would not be blinded and abruptly awaked just for quick trips to the restroom. The hallways do not require much lighting, especially at night. Switching the bulbs to less intense light or having fewer lights in general could help students' health and overall success.

Excessive light contributes to a culture of longer, less productive working hours in combination with poor quality sleep. College students are busy enough as it is, and their success depends on quality sleep. Therefore, light at night, especially in dorm hallways and bathrooms past a certain hour must be limited for the sake of health, safety, and success of the students at St. Olaf College.

References

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***See Rubric notes on next page.

Evaluation

	Satisfactory (S)	Needs Attention (S-)	Unsatisfactory (U)
Focuses on a clear central question related to artificial light and an impact in Northfield.	Very good		
Addresses the intended audience.	Revisions address reader concerns.	The overall connection between solutions and science is stronger. Clarifying from research what kinds of light would further address reader concerns.	
Guides reader clearly while developing the question, claims, and evidence.	Structural changes strengthen the logic.		
Presents two relevant images.	Very good		
Uses appropriate sources and standard citation.	Very good		
Language and Grammar	Editing strengthens clarity		

Comments & Grade	
	Diane, This revision demonstrates your ability (and willingness) to
	re-enter the essay with reader feedback as your guide. Well done.
А-	Revising is a sure way to continue to improve your writing and
	habits. You've come a long way this semester. Keep practicing!