CONSTRUCTION STUDENTS’ PERCEPTIONS OF THE CIRCADIAN RHYTHM

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Circadian rhythms, as nychthemeron cycles, are a component of the body’s internal clock that regulate essential functions and processes, which are vividly reflected in sleep routines. While issues pertaining to sleeping patterns are general, the problem is underscored among students who may not have established norms due to internal and external motives. Construction students are among those who may even experience worsened situations emanating from the nature of construction jobs. The construction industry is commonly perceived with long working hours, especially for new employees. Therefore, it is crucial to explore the status of construction students’ routines, knowledge, and perceptions about sleep in the context of education and profession. This study aimed to explore how construction students perceive sleeping hygiene and its impacts. This paper addresses the results of the first stage of the study, conducted in 2021-22 in the Department of Building Construction Science at Mississippi State University. A quantitative method was employed to gather the data. The results highlighted students’ experiences and expectations about sleep deprivation and its impact on their performances. The findings of this study contribute to the body of knowledge by emphasizing the importance of sleep effects on construction students’ education and careers.

Keywords: Sleep patterns, Industry, Education, Survey.

1 INTRODUCTION

The construction industry has one of the most challenging workplaces, affecting all aspects of the professionals’ lives, especially the workers in large-scale projects. Long-hour culture is a significant industry index full of considerable uncertainties imposing different risks during the project (Zhang and Bowen 2021). Various factors cause construction workplace challenges, including a competitive bidding system, cost overruns and constraints of financial plans, tight project deadlines, time slacks, multi-stakeholders, and various members and associations—these factors pressure workers’ sleep and well-being (Zhang and Bowen 2021). Moreover, many construction professionals suffer different mental side effects of job stressors, including feeling worried about not being professional enough and adequate for the job or feeling anxiety about coworkers and the work environment. These mental side effects lead to sleep deprivation, poor sleep patterns, de-concentration, difficulties in both private and social life, and communication with others (Bowen et al. 2014). Bowen et al. (2013) found that 32% of construction managers in this country work more than 55 hours per week in South Africa. Similarly, Zhang and Bowen (2021) reported that U.K. construction engineers often work 60–70 hours per week. Such long-
hour work conditions may affect sleep quality, including irrecoverable side effects for construction professionals. To further investigate the issue, a study was conducted to explore the current sleep pattern of construction students and their perceptions about their future jobs. A group of 86 students participated in the study in 2021-22. The results of this study indicated various sleep patterns which should be acknowledged. Also, the perceptions highlighted the necessity of sleep instructions and guidelines for construction students before starting their professional careers. This paper contributes to the body of knowledge by providing insights into human health conditions in the construction area.

2 BACKGROUND

The sleeping patterns and their irregularities impose various effects. The decrease of one hour of sleep from the average increases 24% of heart attack in the spring, while the increase of one hour of sleep decrease %21 of heart attack in the fall (Sandhu et al. 2013). Walker (2018) and his research team considered two groups of adults in an experiment to show the importance of high-quality sleeping. The first group had 8 hours of sleep during the night, and the second group had sleep deprivation and was still awake during the night. The comparison of the MRI scan of the two groups indicated indispensable differences. The result of the second group was 40 percent worse than the first group. They stated that the comprehensive data transferal mechanism at night from short-term to long-term memory makes worse sleep equal to worse memory. There has been developing evidence about some side effects of short sleep, such as diabetes, obesity, and other illnesses (Umar et al. 2020).

National Heart, Lung, and Blood Institute (NHLBI) describes sleep deficiency as a measure of sleep quality. Sleep deficiency emanates from various causes, such as the lack of enough sleep, sleep against the body clock, and sleep without attention to body needs (Phegley 2017). De Silva et al. (2010) highlighted the effect of the quality of sleep on stress which in turns results in an impact on three aspects of biological, mental, and behavioral in human lives. The biological effects include unhealthy diets and obesity, blood pressure, various body pains, and pimples. Frustration, deconcentrating, tiredness, sleep deprivation, feeling blues, and stress are among the mental effects, and the behavioral aspect includes polyphagia, smoking, inclination to drugs and alcohol, and various types of disputes and obstacles in private and social lives. According to Lombardi et al. (2010), the annual injury rate for construction workers who sleep less than 5 hours is more than others. Zhang and Bowen (2021) found that work-to-family struggle can drive distress and sleep dilemmas and also impact sleep quality. They stated that sleep difficulties are undeniably associated with alcohol consumption, suggesting construction professionals who suffer from sleep difficulties are likely to consume alcohol. Umar et al. (2020) conducted an assessment of the health profile and body pain among construction workers and found that an estimated 46.6% of the construction workers experienced body pain in a three-month period. Sleep patterns were determined to be one of the causative factors that led to the experience of pain among construction professionals.

Fatigue and Sleep deprivation are directly correlated. This means, in addition to tasks, sleep patterns can cause fatigue (Pilkington-Cheney et al. 2020). The consequences of such fatigue emerge as decreased efficiency, de-concentration, and health issues at work. Powell and Copping (2010) studied sleep deprivation and its consequences in construction workers and showed workers with less than 8 hours of sleep have a 9% of accident risk than others with a standard time of sleeping due to fatigue. Inadequate or improper sleep time in construction may be caused by unstable work frames, night work shifts, personal difficulties, ignorance of the magnitude of good sleep, and poor quality of daily routines (Phegley 2017). Techera et al. (2018) found
construction workers require at least 5 hours of sleep in 24 hours and 12 hours of sleep in 48 hours to maintain a minimum rate of health and fitness. Hanna et al. (2008) suggested that if the night shift work is necessary, supervisors have to check the site safety, prepare artificial lights, employ laborers for the night shift, and avoid continuing the work with the workers on the day shift.

While the research on the topic of sleep effects in the construction industry is limited, relevant studies are even more scarce in construction engineering education. To address this gap, Loosemore et al. (2020) conducted an exploratory analysis of the status of construction management, civil engineering, and architecture students in one Australian university. Overall, they found the prevalence of depression was considerably higher than in previous similar groups. Their results indicated that age, enrollment status, class level standing, and the number of hours studied are among the factors causing depression and sleep deprivation.

3 METHODOLOGY

The main objective of this study was to explore the current patterns of circadian rhythm among construction students and their perceptions about sleep time in professional careers. To address this question, a literature review was conducted to highlight the effects of inadequate or improper sleep patterns on individuals’ performance and health. The topic was particularly addressed in the area of construction. Based on the facts summarized from the review, a collection of topics for further investigation was prepared, which was then used to develop a survey. A quantitative research approach was used to approach a larger group of audience. The survey was administered during the 2021-22 academic year in the Department of Building Construction Science at Mississippi State University, in which 86 students participated in the survey. The data were gathered, cleaned, and modeled with statistical software, and descriptive analysis was performed to reveal patterns and associations between variables. A summary of results that is within the scope of this paper is provided in the Results section.

4 RESULTS

The first section of the questions covered demographic information. Among the students who participated in the study, 7% were female, while all of them were at the sophomore or junior year level. The average expected final grade in their studio, as the main course of the semester, was 87%. Based on participants’ reports on the number of internship positions, 31%, 20%, and 8% experienced one, two, and three or more internship positions, respectively, and the rest stated no internship experience. Students were asked how many hours they spent inside and outside class for their courses per week. As shown in Table 1, the highest percentage was for the 21-28 hours interval with 32%, followed by 13-20 hours with 30%. This indicates the average educational time was about 4 hours per day for students overall.

Table 1. Percentage of educational hours per week.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Up to 12 hours</th>
<th>13-20 hours</th>
<th>21-28 hours</th>
<th>29-36 hours</th>
<th>37+ hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>11</td>
<td>30</td>
<td>32</td>
<td>21</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

Participants reported their number of sleep hours in a 24-hour interval during the working days. As shown in Figure 1, the majority of students reported 6-7 hours of sleep in a 24-hour
cycle. In addition, over one-third of participants reported 4-5 hours in 24 hours during working days.

Figure 1. Reported sleep hours.

Following the previous question, participants were asked to indicate the likelihood of changing their sleep patterns if there was no external factor involved. A five-level Likert scale was used to quantify the responses. The percentage of each level is shown in Table 2, where the distribution of percentages shows an inclination to the willingness to change (45%: High and Very High versus 11%: Very Low and Low).

Table 2. Percentage of the likelihood of changing sleep patterns.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>3</td>
<td>8</td>
<td>44</td>
<td>26</td>
<td>19</td>
<td>100</td>
</tr>
</tbody>
</table>

In the next section, the expectations and assumptions of students as future construction professionals were explored. Participants were asked to specify the hours they should expect to spend on their work per week as construction graduates. As shown in Table 3, 51-60 hours per week received the highest percentage, followed by 41-50 hours.

Table 3. Percentage of the number of expected working hours per week upon graduation.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Up to 40 hours</th>
<th>41-50 hours</th>
<th>51-60 hours</th>
<th>61-70 hours</th>
<th>70+ hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>3</td>
<td>37</td>
<td>43</td>
<td>10</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

In the next section, the number of sleep hours in the construction industry was explored, for which five categories of hours were provided to participants’ ratings. The five categories included “Less than 4 hours”, “4-5 hours”, “6-7 hours”, “8-9 hours”, and “More than 9 hours” intervals. Participants specified the sleep hours in two situations: expected hours (reality) and ideal hours (appropriate). The percentage of each interval for the two situations is provided in Figure 2. The comparison of the two categories indicates a meaningful difference between the current trend and ideal situations in the construction industry.
Figure 2. Number of sleep hours in expected and ideal situations in construction.

Participants were also asked to specify the sleeping time level for employees in construction compared to other industries. As shown in Table 4, the majority of participants believed that the number of sleep hours in the construction industry is considerably lower than that of other industries.

Table 4. Sleeping time in construction in comparison with other industries.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>30</td>
<td>45</td>
<td>23</td>
<td>2</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Finally, participants were asked to express their opinion on considering the current sleep patterns as an issue in the construction industry. The percentage of levels shown in Table 5 indicates the strong belief of participants about perceiving sleep amount as a problem among construction professionals.

Table 5. Understanding sleep time as an issue in the construction industry.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>52</td>
<td>22</td>
<td>100</td>
</tr>
</tbody>
</table>

5 CONCLUSION

This paper briefly presented the summary of a study conducted on the perception of construction students about the sleep time required in the construction industry. The analysis of the results indicated crucial points. First, the amount of sleep time reported by construction students was not aligned with the recommended correct interval (Figure 1). However, overall, they expressed that if the influence of external factors was removed, they likely would change their sleep pattern. The tacit fact is that participants were aware of their inappropriate sleep habits. Second, participants expected a higher number of working hours upon their graduation. In addition, they
expressed a meaningful difference in their perceptions about the current and ideal sleep patterns in construction (Table 3 and Figure 2). Third, participants acknowledged that the lower number of sleep time in construction is an issue (Table 5). To further explore the subject, a larger sample will increase the reliability of the results. Also, a comparative analysis using construction professionals’ opinions will reveal similarities and differences. The findings of this study can help construction scholars to consider sleep time as a health determinant in construction education and a correct trend for professional careers in construction.

References


Phegley, K., Consequences of Fatigue and Sleep Deficiency in the Workplace: Implications for the Construction Industry, Master’s Thesis, Wright University Boonshoft School of Medicine, December, 2017.


