

Analysis of Medical Student Sleep Metrics Using Wrist Actigraphy

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INTRODUCTION

Sufficient sleep is important for optimal cognitive performance, as studies have shown that sleep deprivation can lead to decreased alertness and increased risk for human error.¹ Additionally, chronic exposure to inadequate sleep has been linked to increased rates of poor mental and physical health conditions, such as depression and cardiovascular disease.² Medical students are a vulnerable population to sleep-related fatigue and associated adverse health outcomes due to the demanding nature of medical school. Alotaibi et al. (2020) found that 77% of Saudi medical students reported poor sleep quality and 63.5% reported psychological stress.³ Further, Brick et al. (2010) demonstrated that 50.9% of medical students in the United States reported poor sleep quality according to their Pittsburgh Sleep Quality Index (PSQI) scores (6.37 (+/-2.57)).⁴

Medical student sleep has historically been assessed using patient-reported surveys and health questionnaires, while lacking methods for objective measurements. With the increasing feasibility and accuracy of mobile technology, wrist actigraphy has been used to evaluate sleep metrics in several populations, yet medical students in the United States have not been investigated in this manner.

OBJECTIVE

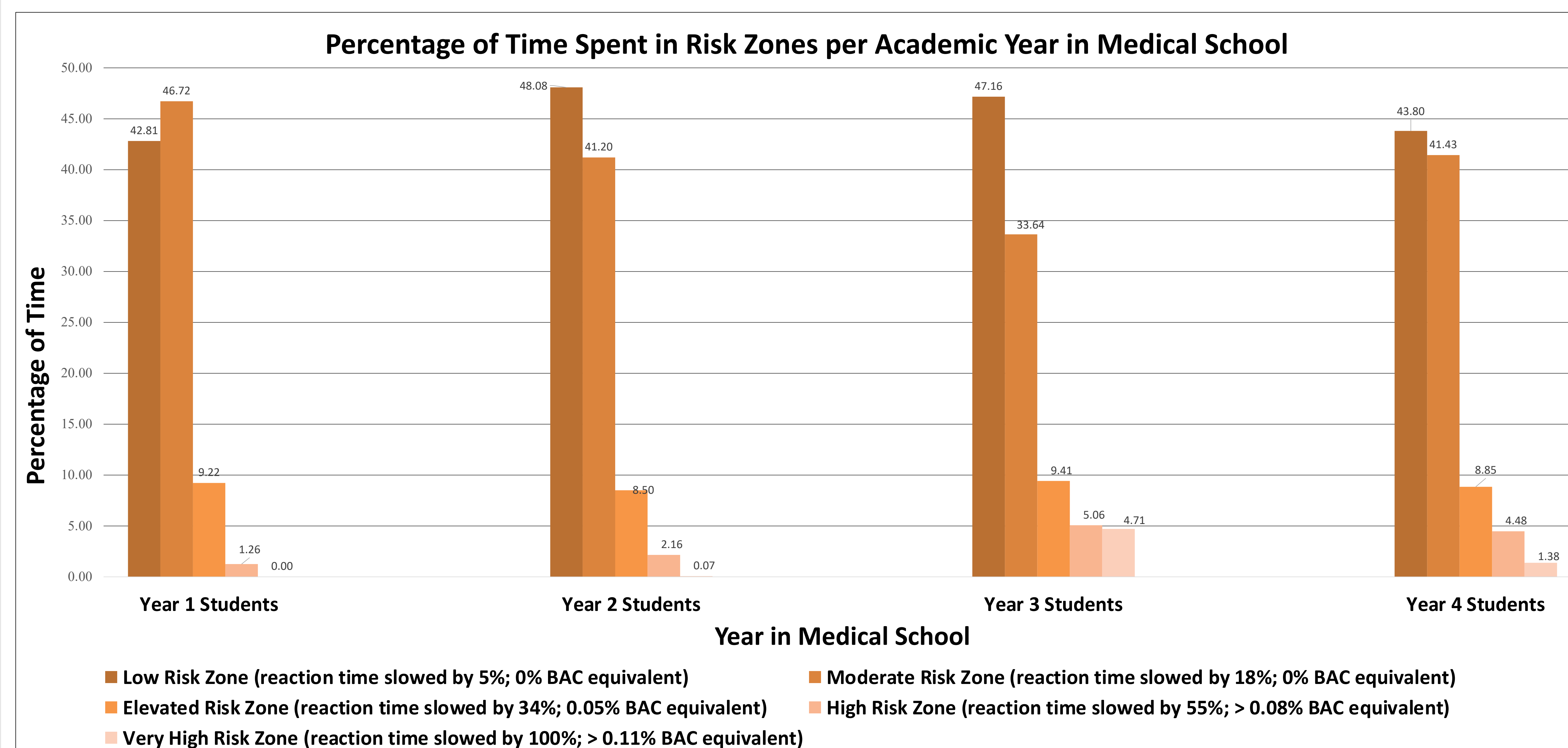
Due to the importance of sleep, the consequences of insufficient sleep, and the absence of wrist actigraphy for medical students in literature, we chose to measure sleep metrics in medical students using wrist actigraphy over a 2-week period.

METHODS

Thirty (n = 30) medical students wore a Fatigue Science REDIband for 14 days during the fall 2021 semester. The Fatigue Science REDIband has been shown to be 93% accurate compared to polysomnography and includes the Sleep, Activity, Fatigue, and Task Effectiveness (SAFTE) model.¹ The SAFTE model algorithm provides a score (0-100), representing an estimated value for alertness and cognitive effectiveness based on the previous 72-hour sleep/wake period. SAFTE scores are further categorized into risk zones (Figure 1), which accurately estimates slowed reaction time (*reaction time slowed by %*) and cognitive impairment (*% Blood Alcohol Content (BAC) equivalent*). Sleep metrics analyzed in this study include *SAFTE Scores* (0-100 scale), *Sleep Quantity* (hours), *Sleep Quality* (1-10 scale), and *SAFTE REDIband Zones* (Table 1). Means and standard deviations were calculated for each class (first-year = 9, second-year = 9, third-year = 8, fourth-year = 4) using Microsoft Excel.

RESULTS

Means (+/- standard deviations) of Fatigue Science REDIband Measures per Academic Year			
Year in Medical School	SAFTE Score (0-100)	Sleep Quantity (hours)	Sleep Quality (0-10)
Year 1 Students	88.22 (+/- 4.89)	6.76 (+/- 1.29)	6.67 (+/- 2.29)
Year 2 Students	88.78 (+/- 5.19)	6.52 (+/- 0.87)	7.00 (+/- 1.41)
Year 3 Students	86.63 (+/- 10.16)	6.26 (+/- 1.24)	6.88 (+/- 1.36)
Year 4 Students	87.00 (+/- 4.97)	6.53 (+/- 0.46)	6.25 (+/- 1.71)



CONCLUSION

This study determined that each medical school class obtained less than seven hours of sleep per night (6.26-6.76 hours/night). Each medical school class had a SAFTE score below 89/100, which may be due to sacrificing sleep for medical school-related demands. Second-year students demonstrated the best sleep metrics, possibly due to the increasing familiarity with medical school. On the other hand, clinical rotation requirements, residency applications, and residency interviews, likely contributed to poor sleep metrics among third and fourth-year students. The results of this study could be due to a small sample size, therefore, further analysis with a larger sample should be conducted. The low sleep quantity and suboptimal cognitive effectiveness demonstrated by the results of this study suggest that medical students are at an increased risk for adverse mental and physical health conditions. Additionally, the poor sleep habits acquired during medical school could continue into residency and subsequent practice as physicians, ultimately affecting patient care.

REFERENCES

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