

DEVELOPMENT AND VALIDATION OF SCALE APSPA FOR EFFECT OF SLEEPING PATTERNS ON ACADEMIC PERFORMANCE OF UNIVERSITY STUDENTS

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ABSTRACT

The present study investigates the effects of sleeping patterns on the academic performance of university students through the development and validation of the Academic Performance and Sleep Pattern Assessment (APSPA) scale. The study's objective is to construct a reliable and valid instrument to measure the intricate relationship between sleep habits, academic interest, engagement, and mental well-being. A panel of 14 experts reviewed the initial 50 items, leading to the removal of 14 items with a content validity ratio below 0.45. The refined 36-item questionnaire was administered to university students via Google Forms distributed through WhatsApp groups. Exploratory factor analysis with varimax rotation confirmed the scale's validity, yielding three factors. The scale demonstrated good internal consistency (Cronbach's alpha = 0.791), and the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity indicated the sample's adequacy for factor analysis.

Keywords: Scale APSPA, Sleeping Patterns, Academic Performance, University Students

INTRODUCTION

The relationship between sleeping patterns and academic performance is a critical area of study, particularly in the context of university students who often experience significant fluctuations in their sleep routines. University life brings a unique set of challenges, including rigorous academic demands, social engagements, part-time jobs, and extracurricular activities, all of which can disrupt regular sleep patterns. The importance of this topic lies in understanding how these disruptions can impact students' cognitive abilities, emotional well-being, and overall academic performance.

Sleep is a fundamental biological process essential for maintaining optimal cognitive function, emotional stability, and physical health. During sleep, the body undergoes vital restorative processes, including memory consolidation, toxin removal from the brain, and the repair of muscle tissue. For students, sufficient and quality sleep is particularly

important as it enhances learning, improves problem-solving skills, and aids in retaining information.

Cognitive Functions and Sleep

Several studies have established a strong link between sleep quality and cognitive functions. Sleep deprivation or poor sleep quality has been shown to impair attention, executive functions, and working memory, which are crucial for academic success. For instance, Walker (2017) highlights the role of sleep in memory consolidation, explaining that during sleep, particularly during REM (Rapid Eye Movement) sleep, the brain processes and consolidates information learned throughout the day. Without adequate sleep, this process is disrupted, leading to difficulties in recalling information and applying knowledge in academic settings.

Memory Consolidation

Memory consolidation is the process by which short-term memories are transformed into long-term ones, a process heavily dependent on sleep. The hippocampus, a region of the brain involved in forming new memories, is particularly active during sleep. Curcio, Ferrara, and De Gennaro (2006) found that students who lack sufficient sleep tend to have poorer memory consolidation, resulting in lower academic performance. This is because the neural mechanisms that underpin memory consolidation are significantly disrupted by sleep deprivation.

Academic Engagement

Academic engagement refers to the level of interest, enthusiasm, and commitment a student shows towards their studies. Sleep quality directly influences a student's ability to stay engaged in their academic work. Hershner and Chervin (2014) discuss how sleep deprivation can lead to decreased motivation, increased feelings of fatigue, and a higher likelihood of missing classes or failing to complete assignments on time. This disengagement can lead to a cycle of poor academic performance and further stress, exacerbating sleep problems.

Mental and Emotional Well-being

Mental and emotional well-being are also closely linked to sleep patterns. Lack of sleep can contribute to a range of mental health issues, including anxiety, depression, and stress. These mental health challenges can, in turn, negatively affect academic performance by impairing concentration, reducing cognitive efficiency, and decreasing the ability to manage time effectively. Moreover, students who experience chronic sleep deprivation are more likely to suffer from emotional instability, making it difficult to cope with the pressures of university life. Given the significant impact of sleep on various aspects of academic life, this study aims to develop and validate a comprehensive tool – the Academic Performance and Sleep Pattern Assessment (APSPA) scale. The APSPA is designed to measure the multifaceted relationship between sleep habits, academic interest and engagement, and mental well-being among university students. By developing a reliable and valid instrument, this study seeks to provide a means to accurately assess how sleep patterns influence academic performance, thereby informing interventions that can help improve student well-being and academic outcomes.

The APSPA scale will undergo rigorous development and validation processes, including expert reviews and exploratory factor analysis, to ensure it accurately captures the relevant dimensions of sleep and academic performance. The goal is to create a tool that educators, counselors, and researchers can use to identify students at risk of academic underperformance due to poor sleep habits and to develop targeted strategies to support these students.

This study not only contributes to the academic literature on sleep and education but also offers practical implications for improving the academic success and overall health of university students. By understanding and addressing the sleep-related challenges that students face, institutions can foster a more supportive and productive educational environment.

Literature Review

The relationship between sleep patterns and academic performance has been extensively studied, revealing significant insights into how sleep impacts cognitive functions and overall academic success. This section reviews key studies and findings that highlight the critical role of sleep in academic performance, emphasizing the need for a reliable instrument to measure sleep patterns and their effects on university students.

The Role of Sleep in Cognitive Functions

Research consistently shows that sleep is crucial for maintaining cognitive functions, which are essential for academic performance. Walker (2017) provides an in-depth analysis of how sleep facilitates memory consolidation, a process where information acquired during the day is processed and stored in long-term memory during sleep. REM sleep, in particular, plays a vital role in this process, enabling the integration of new information with existing knowledge, thereby enhancing learning and recall.

Curcio et al. (2006) further demonstrate that sleep deprivation impairs various cognitive functions, including attention, executive functions, and working memory. Their study found that students who experience inadequate sleep exhibit slower cognitive processing speeds and reduced accuracy in tasks requiring sustained attention and complex problem-solving skills. These cognitive impairments directly translate into poorer academic performance, as students struggle to concentrate during lectures,

retain information, and perform well in examinations.

Sleep Disorders and Academic Performance

Hershner and Chervin (2014) highlight the prevalence of sleep disorders among college students, noting that conditions such as insomnia, sleep apnea, and delayed sleep phase syndrome are common in this population. These disorders significantly disrupt normal sleep patterns, leading to chronic sleep deprivation and daytime sleepiness. Their research underscores that students with sleep disorders often face considerable academic challenges, including lower grades, higher absenteeism, and increased risk of academic probation.

Additionally, Hershner and Chervin (2014) point out that many college students adopt irregular sleep schedules due to academic and social commitments, further exacerbating sleep problems. These irregular schedules disrupt the body's natural circadian rhythms, making it difficult for students to achieve restful sleep, which is essential for cognitive functioning and academic success.

The Impact of Sleep on Mental and Emotional Well-being

The relationship between sleep and mental health is well-documented, with numerous studies showing that poor sleep quality is associated with increased levels of anxiety, depression, and stress. For instance, Gilbert and Weaver (2010) found that students who report poor sleep quality also experience higher levels of psychological distress, which negatively impacts their academic performance. These findings suggest that interventions aimed at improving sleep quality could also have beneficial effects on students' mental health and academic outcomes.

Academic Engagement and Sleep

Academic engagement, which encompasses students' interest, enthusiasm, and commitment to their studies, is also influenced by sleep patterns. Dewald et al. (2010) conducted a meta-analysis showing that students who maintain regular sleep schedules and

obtain sufficient sleep are more likely to be engaged in their academic work. They are better able to participate in class, complete assignments on time, and maintain a positive attitude towards learning. In contrast, students suffering from sleep deprivation often exhibit lower levels of engagement, leading to a decline in academic performance.

Need

Despite the clear links between sleep and academic performance, there is a lack of comprehensive tools to measure the multifaceted relationship between sleep patterns, cognitive functions, academic engagement, and mental well-being. Existing instruments often focus on single aspects, such as sleep quality or academic performance, but fail to capture the complex interplay between these variables.

The development of the Academic Performance and Sleep Pattern Assessment (APSPA) scale aims to fill this gap by providing a robust and validated tool that can accurately assess how sleep patterns impact various dimensions of academic performance and student well-being. By incorporating factors such as sleep habits, academic interest, and mental health, the APSPA scale offers a holistic approach to understanding and addressing the sleep-related challenges faced by university students.

In summary, the literature highlights the profound impact of sleep on cognitive functions, academic performance, and mental well-being. The development of a comprehensive assessment tool like the APSPA scale is crucial for identifying at-risk students and implementing effective interventions to enhance their academic success and overall health. This study builds on existing research to create a validated instrument that will provide valuable insights for educators, counselors, and researchers working to improve student outcomes.

Theoretical/Conceptual Framework

The theoretical framework guiding this study is based on the interaction between sleep quality, academic interest, and mental well-being. The conceptual diagram below illustrates the hypothesized relationships:

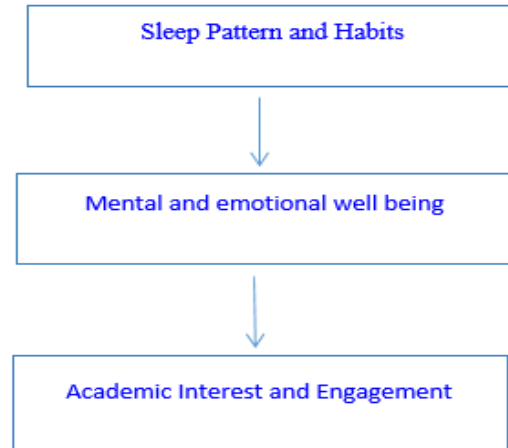


Fig.1

Methodology

Item Piloting and Content Validity: The initial pool of 50 items was developed based on existing literature and expert opinions. After a content validity assessment by 14 experts, 14 items were discarded due to a content validity ratio below 0.45.

Table 1.

Item No.	CVR	Item No.	CVR
1	0.57	19	1
2	0.71	20	1
3	1	21	0.85
4	0.71	22	0.85
5	0.71	23	1
6	1	24	0.85
7	1	25	1
8	1	26	1
9	0.71	27	1
10	0.85	28	0.85
11	0.85	29	0.85
12	0.85	30	0.71
13	0.85	31	0.85
14	0.85	32	0.85
15	0.85	33	0.85
16	1	34	0.85
17	0.85	35	0.85
18	0.71	36	1

Construct Validity: The revised 36-item questionnaire was administered via Google Forms to university students. The sample size was deemed adequate for exploratory factor analysis, which was performed using varimax rotation.

KMO and Bartlett's Test: The KMO measure of sampling adequacy was 0.730, and Bartlett's test of sphericity was significant ($\chi^2 = 1859.749, p < 0.000$), indicating the suitability of the data for factor analysis.

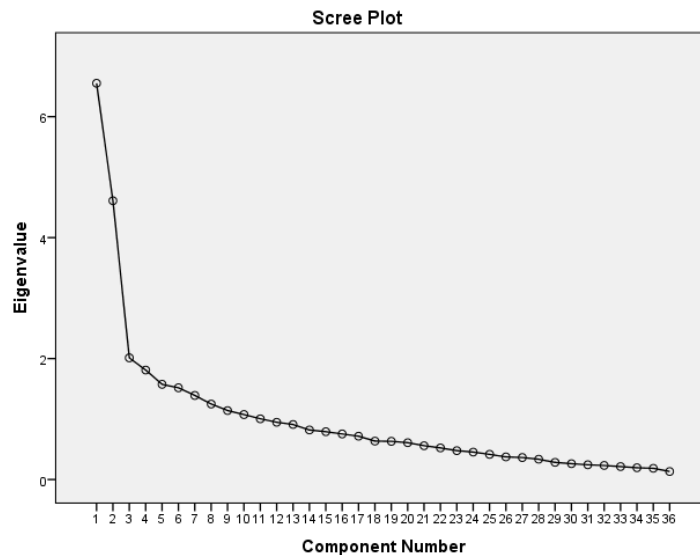


KMO and Bartlett's Test

Table 2

Kaiser -Meyer -Olkin Measure of Sampling Adequacy	.730
Bartlett's Test of Sphericity	1859.749
df	630
Sig..	.000

Screen Test and Total Variance Explained: The scree test suggested a three-factor solution, explaining a total variance of 63.47%.



Total Variance Explained and Parallel analysis

Component	Eigenvalues	Random Eigenvalue	Decision	% of Variance	Cumulative %
1	6.553	1.293543	Accepted	15.149	15.149
2	4.610	1.155084	Accepted	13.635	28.784
3	2.012	1.050970	Accepted	7.813	36.597

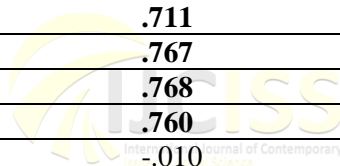
Table 3.

Cronbach's Alpha: The overall scale demonstrated good internal consistency with a Cronbach's alpha of **0.791**.
Rotated Component Matrix: The rotated component matrix identified three distinct factors: sleep patterns and habits, academic interest and engagement, and mental and emotional well-being.

Table 4.

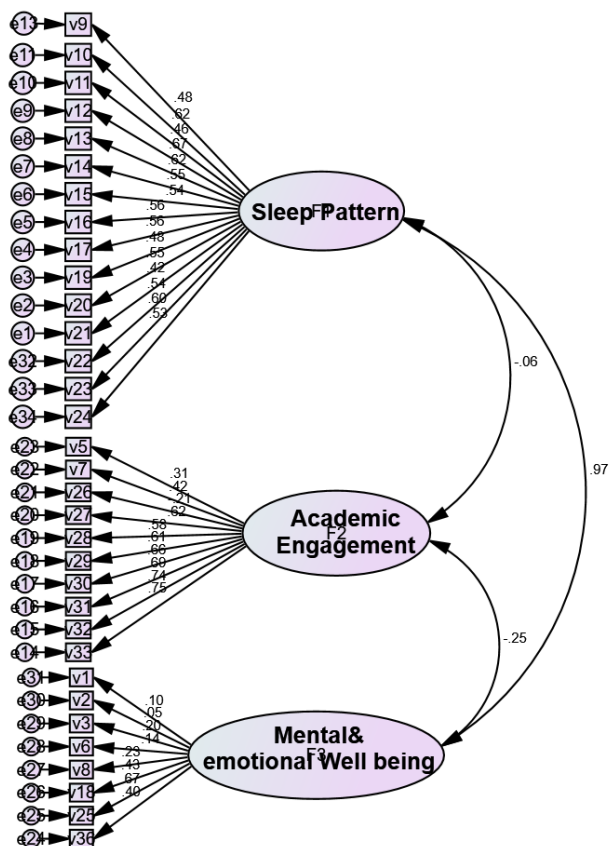
Variables	Component 1	Component 2	Component 3
V1	.075	-.147	.236
V2	-.095	-.006	.602
V3	.089	-.366	.412
V4	-.067	-.026	-.255
V5	-.155	.427	-.056
V6	.034	.108	.441
V7	-.114	.520	.069

V8	.108	-.098	.534
V9	.616	-.166	-.251
V10	.568	-.066	.274
V11	.469	.108	.177
V12	.585	-.017	.238
V13	.531	.010	.321
V14	.481	-.119	.078
V15	.687	-.112	-.154
V16	.398	.099	.478
V17	.513	.011	.091
V18	.264	-.098	.353
V19	.374	.162	.283
V20	.602	.048	-.121
V21	.405	-.224	.184
V22	.443	-.166	.344
V23	.563	.045	.263
sV24	.660	-.011	.145
V25	.252	-.149	.614
V26	.279	.602	-.194
V27	.274	.585	.012
V28	.066	.682	.064
V29	.011	.660	.132
V30	-.156	.711	.035
V31	-.084	.767	-.171
V32	-.070	.768	-.138
V33	-.018	.760	-.049
V34	.511	-.010	.296
V35	.346	-.430	.192
V36	.075	-.147	.236



APSPA AMOS Graphics

Owing to the finding in the above table, the following measurement model has been constructed using AMOS-21 to confirm the internal factor structure more critically. The model presents 16 items and 4 components.



Sr.#	Indicators	Estimates	Cutt off Value	Reference
1	CMIN/df	2.108	0 < CMIN/df	Hair et al.(2010)
2	IFI	.750	>0.90	Hu et al.(1998)
3	PNFI	.438	>0.50	Mulaik et al.(1989)
4	NFI	.499	.90 < NFI	Basak et al.(2013)
5	CFI	.639	.90 < CFI < .95	Basak et al.(2013)
6	PCFI	.561	>0.50	Mulaik et al.(1989)
7	RMSEA	.086	.05 < RMSEA < .08	Hair et al.(2010)

Discussion

The development and validation of the Academic Performance and Sleep Pattern Assessment (APSPA) scale represent a significant advancement in the ability to measure and understand the multifaceted relationship between sleeping patterns and academic performance among university

students. This discussion delves deeper into the implications of the study's findings, the relevance of the APSPA scale, and how it aligns with existing research while also highlighting its potential applications and limitations.

Internal Consistency and Construct Validity

The APSPA scale's high Cronbach's alpha (0.791) demonstrates robust internal consistency, indicating that the items within the scale reliably measure the intended constructs. This level of reliability is crucial for ensuring that the scale can consistently produce accurate and dependable results across different samples and settings.

The exploratory factor analysis, which identified three distinct factors—sleep patterns and habits, academic interest and engagement, and mental and emotional well-being—confirms the scale's construct validity. These factors encapsulate the primary dimensions that the APSPA aims to measure, reflecting the intricate relationship between sleep and academic performance.

Consistency with Previous Research

The findings of this study are consistent with a substantial body of existing research that underscores the critical role of sleep in academic performance and mental health. For instance, the identification of sleep patterns and habits as a key factor aligns with Walker's (2017) research on the importance of sleep for memory consolidation and cognitive functions. This factor encompasses various aspects of sleep, including duration, quality, and regularity, all of which are essential for optimal cognitive functioning.

The second factor, academic interest and engagement, resonates with Dewald et al.'s (2010) findings that students who maintain regular sleep schedules are more likely to be actively engaged in their academic work. This engagement is reflected in their participation in class, timely completion of assignments, and overall enthusiasm for learning.

The third factor, mental and emotional well-being, highlights the well-documented link between sleep quality and mental health issues such as anxiety, depression, and stress. Gilbert and Weaver (2010) found that poor sleep quality is associated with higher levels of psychological distress, which can negatively impact academic performance. By including this factor, the APSPA scale provides a comprehensive view of how sleep affects not only academic outcomes but also the emotional and psychological well-being of students.

Implications for Interventions and Support

The APSPA scale's ability to measure the complex interplay between sleep, academic engagement, and

mental health has significant implications for developing targeted interventions to support university students. Educators, counselors, and health professionals can use the scale to identify students who are at risk of academic underperformance due to poor sleep habits. This identification can lead to early interventions, such as sleep education programs, time management workshops, and mental health support services, tailored to address the specific needs of students.

Furthermore, the scale can serve as a diagnostic tool in research studies aimed at exploring the causal relationships between sleep and academic performance. Longitudinal studies using the APSPA scale can provide deeper insights into how changes in sleep patterns over time affect academic outcomes and mental health, thereby informing evidence-based strategies to enhance student well-being and success.

Potential Applications

Beyond individual interventions, the APSPA scale has broader applications in institutional policy and program development. Universities can use aggregated data from the scale to assess the overall sleep health of their student population and implement campus-wide initiatives to promote healthy sleep habits. For example, universities could design flexible academic schedules, create quiet dorm environments conducive to sleep, and offer resources for managing stress and maintaining a balanced lifestyle.

Limitations and Future Research

While the APSPA scale offers a comprehensive tool for measuring the relationship between sleep and academic performance, it is not without limitations. The study's reliance on self-reported data, collected via Google Forms, may introduce response biases, such as social desirability bias or inaccuracies in self-assessment of sleep patterns and academic engagement. Future studies should consider incorporating objective measures of sleep, such as actigraphy or polysomnography, to complement self-reported data and enhance the validity of findings.

Additionally, the generalizability of the study may be limited by the specific demographic characteristics of the sample, which consisted predominantly of university students from a particular region. Further research should aim to validate the APSPA scale across diverse student populations and educational contexts to ensure its broader applicability.

The APSPA scale is a valuable instrument for assessing the multifaceted relationship between sleeping patterns and academic performance among university students. Its robust internal consistency and construct validity, coupled with its alignment with existing research, make it a reliable tool for both practical applications and further academic investigation. By providing a nuanced understanding of how sleep impacts academic and mental health, the APSPA scale can inform targeted interventions and support strategies to enhance student well-being and academic success. Future research should continue to refine and validate the scale, exploring its applicability across different populations and integrating objective measures to further strengthen the evidence base.

Conclusion

The development of the Academic Performance and Sleep Pattern Assessment (APSPA) scale represents a significant advancement in the field of educational psychology and sleep research. By creating a comprehensive and validated tool, this study has provided a means to accurately measure the multifaceted relationship between sleep patterns and academic performance among university students. The APSPA scale's ability to assess dimensions such as sleep habits, academic interest and engagement, and mental well-being offers a nuanced understanding of how sleep impacts not only cognitive functions but also emotional and psychological health.

The study's findings are consistent with existing literature, reinforcing the critical role of sleep in academic success and mental health. The high internal consistency (Cronbach's $\alpha = 0.791$) and the validation through exploratory factor analysis underscore the reliability and validity of the APSPA scale. By identifying three key factors—sleep patterns and habits, academic interest and engagement, and mental and emotional well-being—the scale provides a robust framework for assessing the impact of sleep on various aspects of academic life.

Suggestions for Future Research

Given the promising results of this study, several avenues for future research are recommended to further explore and enhance our understanding of sleep and academic performance:

Longitudinal Studies: Future research should consider longitudinal studies to examine the causal relationships between sleep patterns and academic performance over time. Such studies can provide deeper insights into how changes in sleep habits affect cognitive functions, academic engagement, and mental health across different academic terms and years.

Objective Measures of Sleep: To complement self-reported data, future studies should incorporate objective measures of sleep, such as actigraphy, polysomnography, or wearable sleep trackers. These methods can provide more accurate and reliable data on sleep duration, quality, and patterns, reducing potential biases associated with self-reports.

Diverse Populations and Settings: The APSPA scale should be validated across diverse populations and educational contexts to ensure its broader applicability. This includes examining the scale's effectiveness among students from different cultural backgrounds, age groups, and types of educational institutions (e.g., community colleges, vocational schools, graduate programs).

Intervention Studies: Research should also focus on intervention studies aimed at improving sleep hygiene among university students. These studies can test the effectiveness of various interventions, such as sleep education programs, cognitive-behavioral therapy for insomnia (CBT-I), and stress management workshops, in enhancing sleep quality and, consequently, academic performance.

Practical Implications for Educators and Policymakers

The findings from this study have several practical implications for educators, university administrators, and policymakers:

Educational Programs: Universities should develop and implement educational programs that raise awareness about the importance of sleep and its impact on academic performance. Workshops and seminars on sleep hygiene, time management, and stress reduction can equip students with the knowledge and skills to improve their sleep habits.

Support Services: Institutions should enhance their support services by providing access to mental health counseling, sleep clinics, and wellness centers. These resources can help students address sleep-related issues and manage stress more effectively.

Flexible Scheduling: Universities could consider more flexible academic scheduling to accommodate

students' sleep needs. This may include offering online classes, asynchronous learning options, and later start times for morning classes to align better with students' natural sleep patterns.

Policy Initiatives: Policymakers should be informed of the critical role of sleep in academic success and student well-being. Policies that promote healthy sleep environments, such as regulating noise levels in dormitories and providing comfortable living spaces, can significantly impact students' sleep quality.

Regular Assessments: Regular assessments using tools like the APSPA scale can help institutions monitor students' sleep patterns and academic performance, enabling timely interventions for those at risk of poor outcomes.

The overall results from the AMOS graphics output suggest that the current model does not fit the data well. Specifically:

CMIN/df (2.108) is slightly above the acceptable threshold, indicating a marginally acceptable fit. **IFI** (0.750), **NFI** (0.499), and **CFI** (0.639) are all significantly below the recommended thresholds of 0.90, indicating poor model fit. **PNFI** (0.438) is below the recommended threshold, suggesting the model lacks parsimony. **PCFI** (0.561) is acceptable, indicating a reasonable balance between complexity and fit. **RMSEA** (0.086) is slightly above the acceptable range, indicating a mediocre fit.

Conclusion

In conclusion, the APSPA scale is a valuable tool that enhances our understanding of how sleep impacts academic performance and student well-being. By providing a reliable and validated measure, this study lays the groundwork for future research and practical applications that can improve educational outcomes and support the holistic health of university students. Through continued exploration and targeted interventions, educators, researchers, and policymakers can work together to create environments that foster both academic excellence and healthy sleep practices.

References

- A. A., Tavares, J., & de Azevedo, M. H. P. (2011). Sleep and academic performance in undergraduates: A multi-measure, multi-predictor approach. *Chronobiology International*, 28(9), 786-801. <https://doi.org/10.3109/07420528.2011.606518>
- Brown, F. C., Buboltz, W. C., & Soper, B. (2002). Relationships of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. *Behavioral Medicine*, 28(1), 33-38. <https://doi.org/10.1080/08964280209596396>
- Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity and academic performance. *Sleep Medicine Reviews*, 10(5), 323-337. <https://doi.org/10.1016/j.smrv.2006.05.001>
- Dewald, J. F., Meijer, A. M., Oort, F. J., Kerkhof, G. A., & Bögels, S. M. (2010). The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*, 14(3), 179-189. <https://doi.org/10.1016/j.smrv.2009.10.004>
- Galambos, N. L., Dalton, A. L., & Maggs, J. L. (2009). Losing sleep over it: Daily variation in sleep quantity and quality in Canadian students' first semester of university. *Journal of Research on Adolescence*, 19(4), 741-761. <https://doi.org/10.1111/j.1532-7795.2009.00618.x>
- Gaultney, J. F. (2010). The prevalence of sleep disorders in college students: Impact on academic performance. *Journal of American College Health*, 59(2), 91-97. <https://doi.org/10.1080/07448481.2010.483708>
- Gilbert, S. P., & Weaver, C. C. (2010). Sleep quality and academic performance in university students: A wake-up call for college psychologists. *Journal of College Student Psychotherapy*, 24(4), 295-306. <https://doi.org/10.1080/87568225.2010.509245>
- Hershner, S., & Chervin, R. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, 6, 73-84. <https://doi.org/10.2147/NSS.S62907>
- Lemma, S., Gelaye, B., Berhane, Y., Worku, A., & Williams, M. A. (2012). Sleep quality and its psychological correlates among university students in Ethiopia: A cross-sectional study. *BMC Psychiatry*, 12, 237. <https://doi.org/10.1186/1471-244X-12-237>
- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health*, 46(2), 124-132. <https://doi.org/10.1016/j.jadohealth.2009.06.016>
- Trockel, M. T., Barnes, M. D., & Egget, D. L. (2000). Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors. *Journal of American*

College Health, 49(3), 125-131.
<https://doi.org/10.1080/07448480009596294>

Walker, M. P. (2017). *Why we sleep: Unlocking the power of sleep and dreams*. Scribner.

Wolfson, A. R., & Carskadon, M. A. (2003). Understanding adolescents' sleep patterns and school performance: A critical appraisal. *Sleep Medicine Reviews*, 7(6), 491-506.
[https://doi.org/10.1016/S1087-0792\(03\)90003-7](https://doi.org/10.1016/S1087-0792(03)90003-7)

