

The importance of sleep in the learning process

Abstract

This study presents the relationship between sleep and the student's learning process. Begins with a brief description of learning and sleep, and then differentiates what is time and quality of sleep, bringing expected values for each age group, deals with the consequences of a poor quality and a reduced sleep time for academic performance in the international database, and finally, emphasize the importance of parents and the school in promoting sleep hygiene and prevent future school problems. It can be concluded that there is committed literature to show the relationship of a good night's sleep with a good academic performance, but are essential new research and actions towards prevention, intervention and education measures for favouring the health, quality of life and functioning cognitive development of students.

Keywords: sleep, learning, underachievement, parasomnias, neurobehavioral manifestations

Volume 2 Issue 3 - 2018

Monique Herrera Cardoso, Simone Aparecida Capellini

Department of Speech and Hearing Sciences, São Paulo State University, Brazil

Correspondence: Simone Aparecida Capellini, Full professor, Speech and Hearing Sciences Department, Avenue Higino Muzi Filho, 737-Mirante, Marília-São Paulo, Zip code: 17525900, Brazil, Email moniquehc@gmail.com, sacap@uol.com.br

Received: January 31, 2018 | **Published:** June 11, 2018

Introduction

The learning process is a cognitive activity, which occurs through the memory consolidation,¹ it is necessary that the students are mentally alert to learn during the grade level.² However, 10–20% of them may present low academic performance,³ with sleep as an aggravating factor. Sleep is a vital process that constitutes a wakeful cycle,⁴ being essential for health, well-being and cognitive functioning.⁵ Approximately 11 to 47% of children and adolescents present problems to initiate and maintain sleep,⁶ those with intellectual disabilities,⁷ reading disabilities⁸ or general learning difficulties.⁹ The aim of this study is present the brief map the general articles on relationship between sleep and the student's learning process. The database chosen for the search of articles with information about sleep and learning is based on international databases Science Direct, Pubmed, and Lilacs, available in online services. The search in the database began with the search for the following descriptors, combining two or three terms: learning, sleep, and learning process.

Sleep time, defined by the total time spent with sleep in one day,¹⁰ varies throughout life.² According to the recommendations of the National Sleep Foundation,¹¹ newborns should sleep from 14 to 17 hours per night, schoolchildren (6–13 years) from 9–11 hours, adolescents (14–17 years) from 8 to 10 hours and young adults (18–25 years) from 7–9 hours of nocturnal sleep. The foundation stresses that in addition to sleep time, sleep quality should be attenuated, for example, fast asleep, night time sleep, no sleepy sleep, and few naps during the day.^{12,13} However, the average with which a considerable proportion of elementary school children sleeps is 8 hours,¹⁴ which is significantly lower than the recommended 10 hours per night.^{15,16}

Poor quality and reduced sleep time are significant risk factors for unfavourable academic performance,¹⁷ as it will directly affect the underlying cognitive processes, such as executive functions, memory and attention.¹⁸ In addition, you can present emotional changes, slow reaction time, and difficulty in accuracy to accomplish the tasks, increased risk of accidents, excessive daytime sleepiness, late in class, impulsivity and difficulties in family relationships.^{19,20} According to a study²¹ sleepless nights can lead to drowsiness, fatigue and lack of energy, anxiety and irritability, lack of concentration, confusion, perceptual distortions, hallucinations, lapses and accidents

and difficulty understanding verbal language. A study of three meta-analyzes¹¹ aimed to investigate the relationship between sleep qualities, sleep duration, sleepiness and academic performance in children and adolescents, and found as a result of drowsiness with greater association with school performance, followed by sleep quality and sleep duration.

It is clear, therefore, that sleep has not only the function of rest.⁴ On good night's sleep the brain reprocesses the information obtained in wakefulness to consolidate or categorize it and proteins are synthesized with the goal of maintaining or expanding neural networks linked to cognitive functions, which has implications for memory consolidation and is critical for learning ability and for academic performance.^{1,4} A study²² reinforces this theory, as related to quality and sleeps time with academic success and found that math scores, English and French Language were influenced by sleep, suggesting therefore that he highly predictive and is associated with academic success.

Despite the knowledge of the importance of sleep for learning, the topic of sleep is not covered in most school curricula.²² A study shows that there are multiple barriers to engaging teachers, schools and families in the educational program,²³ difficulties in persuading teachers to add teaching time to the sleep education program,²⁴ as well as designing healthy sleep habits for change behavioral disorders related to sleep.²⁵

Simple measures by parents could bring about both improvement in quality of sleep and quality of life, such as setting regular bedtime, avoiding excessive use of electronic devices (e.g.: computer, tablet, video game, smartphone) during the nights and maintain a sleep duration appropriate to your child's age.²⁶

On the part of the school measures can also be taken, without presenting a high cost to the educational institution. According to the American Academy of Pediatrics, classes should not begin before 8:30 in the morning, as they would accommodate students' sleep needs.²⁷ Another option is the inclusion of naps during school hours, as this sleep can stabilize the newly learned material, making it resistant to normal loss that occurs throughout the day.²⁸ Studies show that naps after learning some content rescues perceptual fatigue, promotes gains in performance of visuospatial and procedural tasks,^{29,30} similar to the

gains observed after a good night's sleep. A study of students of the sixth grade³¹ showed that naps after approximately two hours of class improved retention learned content.

Conclusion

The importance of sleep for learning is something discussed in the literature, showing the need to have adequate sleep time and quality. However, there are few studies that effectively seek solutions to their favour and so little for their intervention. Parents, schools and researchers should be aware of how to optimize students' sleep so that they can enjoy and make the most of school learning. New research and actions aimed at prevention, intervention and pedagogical measures will favour the promotion of health, quality of life and cognitive functioning of students.

Acknowledgements

We thank Coordination for the Improvement of Higher Education Personnel (CAPES) for financial support.

Conflict of interest

The author declares that there are no conflicts of interest.

References

1. Valle LELR, Valle ELR, Reimão R. Sono e aprendizagem. *Rev psicopedag.* 2009;26(80):286–290.
2. Bowers JM, Moyer A. Effects of school start time on students' sleep duration, daytime sleepiness, and attendance: a meta-analysis. *Sleep Health.* 2017;3(6):423–431.
3. Giannotti F, Cortesi F, Ottaviano S. Sleep, behavior and school functioning in school-aged children. *J Sleep Res.* 1997;26:197.
4. Azevedo DPGD, Azevedo NG. A relação do sono-aprendizagem e as novas tecnologias de informação e comunicação: um desafio na educação dos adolescentes. *Anais do Encontro Virtual de Documentação em Software Livre e Congresso Internacional de Linguagem e Tecnologia Online.* 2016;5(1).
5. Guglielmo D, Gazmararian JA, Chung J, et al. Racial/ethnic sleep disparities in US school-aged children and adolescents: a review of the literature. *Sleep Health.* 2018;4(1):68–80.
6. Russo PM, Bruni O, Lucidi F, et al. Sleep habits and circadian preference in Italian children and adolescents. *J Sleep Res.* 2007;16(2):163–9.
7. Richdale A, Francis A, Gavidia-Payne S, et al. Stress, behaviour, and sleep problems in children with an intellectual disability. *J Intellect Dev Disabil.* 2000;25(2):147–161.
8. Mercier L, Pivik RT, Busby K. Sleep patterns in reading disabled children. *Sleep.* 1993;16(3):207–215.
9. Quine L. Sleep problems in primary school children: comparison between mainstream and special school children. *Child Care Health Dev.* 2001;27(3):201–221.
10. Surtees A, Oliver C, Jones C, et al. Sleep duration and sleep quality in people with and without intellectual disability: A meta-analysis. *Sleep Med Rev.* 2017.
11. Bowers JM, Moyer A. Effects of school start time on students' sleep duration, daytime sleepiness, and attendance: a meta-analysis. *Sleep Health.* 2017;3(6):423–431.
12. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health.* 2015;1(1):40–43.
13. Didden R, Sigafoos J. A review of the nature and treatment of sleep disorders in individuals with developmental disabilities. *Res Dev Disabil.* 2001;22(4):255–272.
14. Ohayon M, Wickwire EM, Hirshkowitz M, et al. National Sleep Foundation's sleep quality recommendations: first report. *Sleep Health.* 2017;3(1):6–19.
15. Spruyt K, Molfese DL, Gozal D. Sleep duration, sleep regularity, body weight, and metabolic homeostasis in school-aged children. *Pediatrics.* 2011;127(2):345–352.
16. National Sleep Foundation Sleep in America Poll. 2006.
17. National Sleep Foundation Sleep in America poll: communications technology in the bedroom National Sleep Foundation, Washington, DC. 2011.
18. Kopasz M, Loessl B, Hornyak M, et al. Sleep and memory in healthy children and adolescents—a critical review. *Sleep Med Rev.* 2010;14(3):167–77.
19. Thacher PV, Onyper SV. Longitudinal outcomes of start time delay on sleep, behavior, and achievement in high school. *Sleep.* 2016;39(2):271–281.
20. Chase RM, Pincus DB. Sleep-Related Problems in Children and Adolescents With Anxiety Disorders. *Behav Sleep Med.* 2011;9(4):224–236.
21. Paiva T. *Bom sono boa vida.* Cruz Quebrada: Oficina do livro. 2008.
22. Gruber R, Somerville G, Enros P, et al. Sleep efficiency (but not sleep duration) of healthy school-age children is associated with grades in math and languages. *Sleep Med.* 2014;15(12):1517–1525.
23. Rigney G, Blunden S, Maher C, et al. Can a school-based sleep education programme improve sleep knowledge, hygiene and behaviours using a randomised controlled trial. *Sleep Med.* 2015;16(6):736–745.
24. Pagel JF, Forister N, Kwiatkowski C. Adolescent sleep disturbance and school performance: the confounding variable of socioeconomic status. *J Clin Sleep Med.* 2017;3(1):19–23.
25. Meijer AM, Van Den Wittenboer GLH. The joint contribution of sleep, intelligence and motivation to school performance. *Pers Individ Dif.* 2004;37(1):95–106.
26. Capelani CRL, Dias RG. Qualidade de sono na coordenação geral de adolescentes entre 12 e 14 anos. *Do corpo: Ciências e Artes.* 2017;7(1).
27. American Academy of Pediatrics. Let them sleep: AAP recommends delaying start times of middle and high schools to combat teen sleep deprivation. 2014.
28. Ellenbogen JM, Hulbert JC, Stickgold R, et al. Interfering with theories of sleep and memory: sleep, declarative memory, and associative interference. *Curr Biol.* 2006;16(13):1290–1294.
29. Mednick SC, Nakayama K, Cantero JL, et al. The restorative effect of naps on perceptual deterioration. *Nat Neurosci.* 2002;5(7): 677–681.
30. Nguyen ND, Tucker MA, Stickgold R, et al. Overnight sleep enhances hippocampus-dependent aspects of spatial memory. *Sleep.* 2013;36(7):1051–1057.
31. Lemos N, Weissheimer J, Dias A. Investigation of the role of sleep in school learning. In: Proceedings of the XXVI annual meeting of the Federation of Experimental Biology Societies (FeSBE). Rio de Janeiro. 2011.