

# Adolescent Sleep Deprivation

Subjects: Psychology, Developmental

Contributor: Valentina Alfonsi

At this stage of adolescence, several environmental and biological factors may affect both circadian and homeostatic regulation of sleep. A large part of this population does not experience adequate sleep, leading to chronic sleep restriction and/or disrupted sleep-wake cycles.

Keywords: adolescence ; sleep loss ; health ; learning

---

## 1. Introduction

In recent years, there has been a growing interest in examining the relationship between sleep patterns and school performance in adolescents. Insufficient sleep in the teenage years has been tied with a wide range of adverse outcomes affecting their lifestyle.

## 2. The Effects of Sleep Deprivation on the Adolescent Population

Three main areas of daytime functioning are affected by chronic sleep restriction: mental and physical health, cognitive and academic performance, and risk-taking behaviors.

There is a solid body of literature pointing to a strong link between sleep quality and physical health. The main physical health consequences of adolescent sleep loss refer to metabolic dysregulation and cardiovascular morbidity. For example, an increase in body weight <sup>[1]</sup>, a higher risk of obesity <sup>[2][3][4]</sup>, and a reduced physical activity <sup>[5]</sup> in association with low sleep were observed in the teen population. Furthermore, sleep loss in adolescents is likely to lead to increases in blood pressure <sup>[6][7]</sup> and high cardiometabolic risk <sup>[8]</sup>. Poor sleep in adolescents is also positively associated with other somatic outcomes, such as headache <sup>[9]</sup>, persistent fatigue <sup>[10]</sup>, and lower back, neck, and abdominal pain <sup>[11]</sup>.

Given the well-established relation between sleep and many psychiatric disorders such as depression or anxiety <sup>[12]</sup>, the side effects of adolescent sleep debt on mental health are not surprising. More specifically, empirical studies showed high odds of depressive symptoms among adolescents with insufficient sleep duration <sup>[13][14][15][16]</sup>. Another serious source of concern is represented by the elevated rate of suicidal ideation <sup>[17][18][19]</sup> or suicidal attempts <sup>[20]</sup> in sleep-deprived adolescents. A possible explanation for the key role of sleep in the onset of mental disorders could be the physiological alteration of mood and emotional regulation as a result of acute or chronic sleep deprivation <sup>[21][22]</sup>.

Experimental studies applying sleep restriction protocols demonstrated the worsening of several neurocognitive functions, such as memory, attention, and executive functions, as a consequence of sleep loss <sup>[23][24][25]</sup>. In particular, the major impediment referred to circumstances requiring multi-tasking skills <sup>[26]</sup> frequently faced by young people.

Naturally, these harmful effects on cognitive functioning impair their academic performance. Several prospective and cross-sectional studies supported the notion of a strong correlation between scarce sleep quality and low school achievement <sup>[27][28][29][30][31]</sup>. However, the modulatory effect of individual and environmental factors could explain some negative findings <sup>[27][32][33]</sup>. As previously described, adolescents have a natural circadian preference for evening chronotype. A recent study on a large sample compared the two extreme chronotypes and found lower school grades in “evening type” compared to “morning type” adolescents <sup>[34]</sup>.

Several studies described a positive relationship between inadequate sleep and engagement in risk-taking behavior in adolescents, especially with regards to substance abuse <sup>[35]</sup>. Insufficient sleep was linked to greater tobacco smoking and marijuana use <sup>[36]</sup>, alcohol consumption <sup>[37]</sup>, and abuse of other illegal drugs <sup>[19]</sup>. Sleep loss was further associated with unhealthy behavioral strategies <sup>[38]</sup>, bullying <sup>[39]</sup>, physical violence <sup>[14]</sup>, and unsafe sexual activity <sup>[40]</sup>.

Excessive sleepiness due to sleep restriction represents the main reason for motor vehicle accidents in the adolescent population, especially in the context of late-night or early-morning driving <sup>[41]</sup>. A growing number of studies report increased car crashes in sleep-deprived adolescents <sup>[42][43][44][45]</sup>. Since motor vehicle accidents represent the principal cause of mortality among youths in the United States <sup>[46]</sup>, the high crash rate in this age group constitutes a matter of great concern.

---

## References

1. O'Dea, J.A.; Dibley, M.J.; Rankin, N.M. Low sleep and low socioeconomic status predict high body mass index: A 4-year longitudinal study of Australian schoolchildren. *Pediatr. Obes.* **2012**, *7*, 295–303.
2. Richard Lowry; Danice K. Eaton; Kathryn Foti; Lela McKnight-Eily; Geraldine Perry; Deborah A. Galuska; Association of Sleep Duration with Obesity among US High School Students. *Journal of Obesity* **2012**, *2012*, 1-9, [10.1155/2012/476914](#).
3. Leslie A. Lytle; Keryn E. Pasch; Kian Farbakhsh; The Relationship Between Sleep and Weight in a Sample of Adolescents. *Obesity* **2010**, *19*, 324-31, [10.1038/oby.2010.242](#).
4. Adolescent obesity and sleep duration. *Journal of Paediatrics and Child Health* **2013**, *49*, 1081-1081, [10.1111/jpc.12433](#).
5. R.J. Shephard; Sufficient Sleep, Physical Activity, and Sedentary Behaviors. *Yearbook of Sports Medicine* **2012**, *2012*, 162-164, [10.1016/j.yspm.2011.12.015](#).
6. Acute and Chronic Effects of Sleep Duration on Blood Pressure. *Pediatrics* **2013**, *133*, , [10.1542/peds.2013-1379d](#).
7. Janet C. Meininger; Martina R. Gallagher; Mona A. Eissa; Thong Q. Nguyen; Wenyaw Chan; Sleep Duration and Its Association With Ambulatory Blood Pressure in a School-Based, Diverse Sample of Adolescents. *American Journal of Hypertension* **2014**, *27*, 948-955, [10.1093/ajh/hpt297](#).
8. L. Azadbakht; Roya Kelishadi; Mahdieh Khodarahmi; Mostafa Qorbani; Ramin Heshmat; Mohammad Esmaeil Motlagh; Mahnaz Taslimi; Gelayol Ardalani; The association of sleep duration and cardiometabolic risk factors in a national sample of children and adolescents: The CASPIAN III Study. *Nutrition* **2013**, *29*, 1133-1141, [10.1016/j.nut.2013.03.006](#).
9. Terhi Luntamo; Andre Sourander; Maria Rihko; Minna Aromaa; Hans Helenius; Merja Koskelainen; Patrick McGrath; Psychosocial determinants of headache, abdominal pain, and sleep problems in a community sample of Finnish adolescents. *European Child & Adolescent Psychiatry* **2012**, *21*, 301-313, [10.1007/s00787-012-0261-1](#).
10. K.A. Rimes; Robert Goodman; Matthew Hotopf; Simon Wessely; Howard Meltzer; T. Chalder; Incidence, Prognosis, and Risk Factors for Fatigue and Chronic Fatigue Syndrome in Adolescents: A Prospective Community Study. *Pediatrics* **2007**, *119*, e603-e609, [10.1542/peds.2006-2231](#).
11. Auvinen, J.P.; Tammelin, T.H.; Taimela, S.P.; Zitting, P.J.; Järvelin, M.-R.; Taanila, A.M.; Karppinen, J.I. Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. *Eur. Spine J.* **2010**, *19*, 641–649.
12. Chiara Baglioni; Svetoslava Nanovska; Wolfram Regen; Kai Spiegelhalder; Bernd Feige; Christoph Nissen; Charles F. Reynolds; Dieter Riemann; Sleep and mental disorders: A meta-analysis of polysomnographic research.. *Psychological Bulletin* **2016**, *142*, 969-990, [10.1037/bul0000053](#).
13. Pasch, K.E.; Laska, M.N.; Lytle, L.A.; Moe, S.G. Adolescent sleep, risk behaviors, and depressive symptoms: Are they linked? *Am. J. Health Behav.* **2010**, *34*, 237–248. [Google Scholar] [CrossRef]
14. Lela R. McKnight-Eily; Danice K. Eaton; Richard Lowry; Janet B. Croft; Letitia Presley-Cantrell; Geraldine S. Perry; Relationships between hours of sleep and health-risk behaviors in US adolescent students. *Preventive Medicine* **2011**, *53*, 271-273, [10.1016/j.ypmed.2011.06.020](#).
15. Michelle A. Short; Michael Gradisar; Leon Lack; Helen Wright; Hayley Dohnt; The sleep patterns and well-being of Australian adolescents. *Journal of Adolescence* **2013**, *36*, 103-110, [10.1016/j.adolescence.2012.09.008](#).
16. Robert E. Roberts; Hao T. Duong; Depression and insomnia among adolescents: a prospective perspective.. *Journal of Affective Disorders* **2012**, *148*, 66-71, [10.1016/j.jad.2012.11.049](#).
17. Yu Jin Lee; Seong-Jin Cho; In Hee Cho; Seog Ju Kim; Insufficient Sleep and Suicidality in Adolescents. *Sleep* **2012**, *35*, 455-460, [10.5665/sleep.1722](#).
18. Maria M. Wong; Kirk J. Brower; The prospective relationship between sleep problems and suicidal behavior in the National Longitudinal Study of Adolescent Health. *Journal of Psychiatric Research* **2012**, *46*, 953-959, [10.1016/j.jpsychires.2012.04.008](#).

19. Adam Winsler; Aaron Deutsch; Robert Daniel Vorona; Phyllis Abramczyk Payne; Mariana Szklo-Coxe; Sleepless in Fairfax: The Difference One More Hour of Sleep Can Make for Teen Hopelessness, Suicidal Ideation, and Substance Use. *Journal of Youth and Adolescence* **2014**, 44, 362-378, [10.1007/s10964-014-0170-3](#).
20. Caris T. Fitzgerald; Erick Messias; Daniel J. Buysse; Teen Sleep and Suicidality: Results from the Youth Risk Behavior Surveys of 2007 and 2009. *Journal of Clinical Sleep Medicine* **2011**, 7, 351-356, [10.5664/jcsm.1188](#).
21. Katherine T. Baum; Anjali Desai; Julie Field; Lauren E. Miller; Joseph Rausch; Dean W. Beebe; Sleep restriction worsens mood and emotion regulation in adolescents.. *Journal of Child Psychology and Psychiatry* **2013**, 55, 180-90, [10.1111/jcpp.12125](#).
22. Lisa S. Talbot; Eleanor L. McGlinchey; Katherine A. Kaplan; Ronald E. Dahl; Allison G. Harvey; Sleep deprivation in adolescents and adults: Changes in affect.. *Emotion* **2010**, 10, 831-41, [10.1037/a0020138](#).
23. S.F. Jones; Attention, Learning, and Arousal of Experimentally Sleep-restricted Adolescents in a Simulated Classroom. *Yearbook of Pulmonary Disease* **2011**, 2011, 211-212, [10.1016/j.yepdi.2010.12.026](#).
24. Avi Sadeh; Reut Gruber; Amiram Raviv; The effects of sleep restriction and extension on school-age children: what a difference an hour makes.. *Child Development* **2003**, 74, 444-455, [10.1111/1467-8624.7402008](#).
25. Dubi Lufi; Orna Tzischinsky; Stav Hadar; Delaying School Starting Time by One Hour: Some Effects on Attention Levels in Adolescents. *Journal of Clinical Sleep Medicine* **2011**, 7, 137-143, [10.5664/jcsm.28100](#).
26. Ronald E Dahl; Daniel S Lewin; Pathways to adolescent health sleep regulation and behavior.. *Journal of Adolescent Health* **2002**, 31, 175-184, [10.1016/s1054-139x\(02\)00506-2](#).
27. Seblewengel Lemma; Yemane Berhane; Alemayehu Worku; Bizu Gelaye; Michelle A. Williams; Good quality sleep is associated with better academic performance among university students in Ethiopia.. *Sleep and Breathing* **2013**, 18, 257-63, [10.1007/s11325-013-0874-8](#).
28. Amy R. Wolfson; Mary A Carskadon; Sleep Schedules and Daytime Functioning in Adolescents. *Child Development* **1998**, 69, 875, [10.2307/1132351](#).
29. Anne Marie Meijer; Godfried L.H Van Den Wittenboer; The joint contribution of sleep, intelligence and motivation to school performance. *Personality and Individual Differences* **2004**, 37, 95-106, [10.1016/j.paid.2003.08.002](#).
30. Daniel Perez-Chada; Santiago Perez-Lloret; Alejandro J. Videla; Daniel Cardinali; Miguel A. Bergna; Mariano Fernández-Acquier; Luis Larrateguy; Gustavo E. Zabert; Christopher L. Drake; Sleep Disordered Breathing And Daytime Sleepiness Are Associated With Poor Academic Performance In Teenagers. A Study Using The Pediatric Daytime Sleepiness Scale (PDSS). *Sleep* **2007**, 30, 1698-1703, [10.1093/sleep/30.12.1698](#).
31. Giuseppe Curcio; Michele Ferrara; Luigi De Gennaro; Sleep loss, learning capacity and academic performance. *Sleep Medicine Reviews* **2006**, 10, 323-337, [10.1016/j.smrv.2005.11.001](#).
32. Annette Karmiloff-Smith; Fredriksen K; Rhodes J; Reddy R; Way N; Faculty of 1000 evaluation for Sleepless in Chicago: tracking the effects of adolescent sleep loss during the middle school years.. *F1000 - Post-publication peer review of the biomedical literature* **2016**, 75, , [10.3410/f.726204016.793515506](#).
33. Xue Ming; Rebecca Koransky; Victor Kang; Sarah Buchman; Christina E. Sarris; George C. Wagner; Sleep Insufficiency, Sleep Health Problems and Performance in High School Students. *Clinical Medicine Insights: Circulatory, Respiratory and Pulmonary Medicine* **2011**, 5, 71-79, [10.4137/CCRPM.S7955](#).
34. Paolo Maria Russo; Valeria Biasi; Carlo Cipolli; Luca Mallia; Elisa Caponera; Sleep habits, circadian preference, and school performance in early adolescents. *Sleep Medicine* **2017**, 29, 20-22, [10.1016/j.sleep.2016.09.019](#).
35. Deirdre A. Conroy; The Role of Sleep on the Pathway to Substance Abuse in Teens.. *Journal of Adolescent Health* **2017**, 60, 129-130, [10.1016/j.jadohealth.2016.11.011](#).
36. Keryn E Pasch; Lara A. Latimer; Jessica Duncan Cance; Stacey G. Moe; Leslie A. Lytle; Longitudinal bi-directional relationships between sleep and youth substance use.. *Journal of Youth and Adolescence* **2012**, 41, 1184-96, [10.1007/s10964-012-9784-5](#).
37. Brant P. Hasler; Adriane M. Soehner; Duncan B. Clark; Circadian rhythms and risk for substance use disorders in adolescence.. *Current Opinion in Psychiatry* **2014**, 27, 460-6, [10.1097/YCO.0000000000000107](#).
38. Anne G. Wheaton; Geraldine S. Perry; Daniel P. Chapman; Janet B. Croft; Self-Reported Sleep Duration and Weight-Control Strategies Among US High School Students. *Sleep* **2013**, 36, 1139-1145, [10.5665/sleep.2872](#).
39. Violaine Kubiszewski; Roger Fontaine; Catherine Potard; Guillaume Gimenes; Bullying, sleep/wake patterns and subjective sleep disorders: Findings from a cross-sectional survey. *Chronobiology International* **2014**, 31, 542-553, [10.3109/07420528.2013.877475](#).

40. Yen, C.-F.; King, B.H.; Tang, T.-C. The association between short and long nocturnal sleep durations and risky behaviors and the moderating factors in Taiwanese adolescents. *Psychiatry Res.* 2010, 179, 69–74.
41. Fabio Pizza; Sara Contardi; Alessandro Baldi Antognini; Maroussa Zagoraiou; Matteo Borrotti; Barbara Mostacci; Susanna Mondini; Fabio Cirignotta; Sleep Quality and Motor Vehicle Crashes in Adolescents. *Journal of Clinical Sleep Medicine* **2010**, 6, 41-45, [10.5664/jcsm.27708](#).
42. Fabio Lucidi; Paolo Maria Russo; Luca Mallia; Alessandra Devoto; Marco Lauriola; Cristiano Violani; Sleep-related car crashes: Risk perception and decision-making processes in young drivers. *Accident Analysis & Prevention* **2006**, 38, 302-309, [10.1016/j.aap.2005.09.013](#).
43. Martiniuk, A.L.C.; Senserrick, T.; Lo, S.; Williamson, A.; Du, W.; Grunstein, R.R.; Woodward, M.; Glozier, N.; Stevenson, M.; Norton, R. Sleep-deprived young drivers and the risk for crash: The DRIVE prospective cohort study. *JAMA Pediatr.* 2013, 167, 647–655. [Google Scholar] [CrossRef] [PubMed]
44. Brian C Tefft; Prevalence of motor vehicle crashes involving drowsy drivers, United States, 1999–2008. *Accident Analysis & Prevention* **2012**, 45, 180-186, [10.1016/j.aap.2011.05.028](#).
45. Shamsi Shekari Soleimanloo; Melanie J. White; Veronica Garcia-Hansen; Simon Smith; The effects of sleep loss on young drivers' performance: A systematic review. *PLOS ONE* **2017**, 12, e0184002, [10.1371/journal.pone.0184002](#).
46. Wendy M. Troxel; Amy R. Wolfson; The intersection between sleep science and policy: introduction to the special issue on school start times. *Sleep Health* **2017**, 3, 419-422, [10.1016/j.sleh.2017.10.001](#).

---

Retrieved from <https://encyclopedia.pub/entry/history/show/7531>