

Unraveling the Complexities of Sleep Disturbances: A Scientific Perspective

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Dear Editor,

Sleep disorders, ranging from insomnia to sleep apnea, represent a significant public health concern due to their widespread prevalence and substantial impact on both individual health and societal productivity.¹⁻³ Sleep disturbances encompass a range of conditions, including insomnia, sleep apnea, restless leg's syndrome, and circadian rhythm disorders.⁴⁻⁶ The prevalence of these disorders has risen, attributed to various factors including increased screen time, lifestyle changes, and heightened stress levels.⁷⁻¹⁰ Physically, lack of sleep weakens the immune system, increases the risk of cardiovascular diseases, and is linked to obesity. Mentally, it is associated with anxiety, depression, and cognitive impairments. This creates a vicious cycle where poor sleep exacerbates these conditions, which in turn further disrupts sleep. The societal impact is equally alarming. Sleep deprivation affects work productivity and academic performance, and even increases the risk of accidents. It's estimated that sleep disorders cost billions in lost productivity and healthcare expenses.¹⁰⁻¹³

The prevalence of sleep disorders across various populations, including children, individuals with neurological conditions, and those with psychiatric diagnoses, underscores the importance of comprehensive assessment, diagnosis, and management of these conditions.¹⁴ For example, insomnia affects approximately 10–15% of the adult population, while obstructive sleep apnea is prevalent in about 9–38% of adults, with a higher incidence in males and older populations.^{7,8,10,12,14-17} The etiology of sleep disturbances is multifactorial. Factors include genetic predisposition, environmental influences, lifestyle choices, and co-existing medical or psychiatric conditions. Insomnia, for example, can be triggered by stress, poor sleep habits, or neurological imbalances, while sleep apnea is often associated with obesity and anatomical variations.¹⁸ Intrinsic factors include genetic predispositions, neurochemical imbalances, and physiological conditions, such as obstructive sleep apnea or neurological disorders.¹⁹ Extrinsic factors encompass environmental influences like light and noise pollution, lifestyle choices, and psychological stressors.²⁰⁻²²

Chronically disturbed sleep can lead to a range of physiological consequences. These include impaired immune function, hormonal imbalances, increased risk of cardiovascular disease, obesity, and diabetes.⁵ Sleep is critical for processes like memory consolidation and cellular repair, and disturbances can significantly impair these functions. Sleep disturbances are strongly linked to mental health. Conditions such as depression, anxiety, and bipolar disorder are both causes and consequences of disrupted sleep. Cognitive effects

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include impaired attention, memory, and executive function, impacting daily activities and quality of life.^{2,23}

The relationship between sleep disorders and orthodontics is multifaceted and has significant clinical implications. Obstructive sleep apnea (OSA) has been identified as an important contributor to poor health outcomes, and its treatment has been shown to be beneficial in improving sleep-related quality of life.^{14,24,25}

Furthermore, sleep-disordered breathing symptoms have been found to be strongly associated with the presence of respiratory conditions or orofacial symptoms, emphasizing the need for screening for sleep-disordered breathing in orthodontic patient populations.^{12,26,27}

The association between sleep bruxism and mental disorders, particularly anxiety disorders, underscores the need for orthodontists to consider psychological variables when addressing tooth grinding during sleep. The relationship between wake-time and sleep-related bruxism with temporomandibular joint disorders, sleep problems, and behavioral complaints in pediatric populations seeking orthodontic treatment further emphasizes the importance of understanding the impact of sleep disorders on orthodontic patients.^{9,28,29}

Craniofacial development has been shown to be influenced by sleep-related breathing disorders, potentially leading to abnormal development of the oral and nasal cavity and increasing the risk of malocclusion.^{10,30} Additionally, the association between narrow airway passage and sleep-disordered breathing highlights the relevance of airway and sleep issues in orthodontic practice, necessitating the need for orthodontic practitioners to screen for these issues and manage them effectively.

Technological advancements have improved the diagnosis and management of sleep disorders. Polysomnography remains the gold standard for diagnosing conditions like sleep apnea. Treatments range from continuous positive airway pressure (CPAP) therapy for sleep apnea to cognitive behavioral therapy for insomnia (CBT-I). Pharmacological treatments are also evolving, with a focus on improving efficacy and reducing side effects.^{14,31,32}

Lifestyle modifications are central to managing sleep disturbances. This includes maintaining a regular sleep schedule, optimizing the sleep environment, and minimizing exposure to blue light before bedtime. Behavioral interventions, such as relaxation techniques and sleep hygiene education, are effective in treating insomnia and improving overall sleep quality.^{21,29,33,34} Future research should focus on understanding the genetic basis of sleep disorders, developing personalized treatment approaches, and exploring the long-term impact of these disorders on health. Additionally, there is a need for increased public awareness and healthcare policy initiatives to address this growing issue.³⁴

Recent research focuses on understanding the genetic and molecular bases of sleep disorders, aiming to develop targeted therapies. Technological advancements, like wearable sleep trackers, offer new insights into sleep patterns and personalized interventions. Moreover, novel pharmacological agents and non-pharmacological approaches, such as bright light therapy for circadian rhythm disorders, are under investigation.^{3,34}

Finally, there is a need for policy changes. Workplaces should recognize the importance of sleep and adjust their cultures and expectations accordingly. Healthcare systems need to prioritize sleep health, making resources and treatments more accessible. The issue of sleep disturbances requires urgent attention. By understanding the causes and consequences and implementing holistic solutions, we can improve not only our sleep but our overall health and well-being. This is not just a personal issue; it's a societal one, and addressing it can lead to a healthier, more productive population.

REFERENCES

- Kim S, Han KT, Jang SY, et al. The association between migraine and types of sleep disorder. *Int J Environ Res Public Health* 2018;15(12):2648. DOI: 10.3390/ijerph15122648.
- Chénier-Leduc G, Béliveau MJ, Dubois-Comtois K, et al. Sleep difficulties in preschoolers with psychiatric diagnoses. *Int J Environ Res Public Health* 2019;16(22):4485. DOI: 10.3390/ijerph16224485.
- Al-Shawwa B, Glynn E, Hoffman MA, et al. Outpatient health care utilization for sleep disorders in the Cerner Health Facts database. *J Clin Sleep Med* 2021;17(2):203–209. DOI: 10.5664/jcsm.8838.
- Xu W, Tan CC, Zou JJ, et al. Sleep problems and risk of all-cause cognitive decline or dementia: An updated systematic review and meta-analysis. *J Neurol Neurosurg Psychiatry* 2020;91(3):236–244. DOI: 10.1136/jnnp-2019-321896.
- Frangopoulos F, Nicolaou I, Zannetos S, et al. Setting objective clinical assessment tools for circadian rhythm sleep-wake disorders—A community-based cross-sectional epidemiological study. *Nat Sci Sleep* 2021;13:791–802. DOI: 10.2147/NSS.S308917.
- Reddy LKV, Madithati P, Narapureddy BR, et al. Perception about health applications (Apps) in smartphones towards telemedicine during COVID-19: A cross-sectional study. *J Pers Med* 2022;12(11):1920. DOI: 10.3390/jpm12111920.
- Munyumu K, Idro R, Abbo C, et al. Prevalence and factors associated with sleep disorders among children with cerebral palsy in Uganda; A cross-sectional study. *BMC Pediatr* 2018;18(1):26. DOI: 10.1186/s12887-018-0996-z.
- Lee JW, Hwang J, Hyun MK. Prevalence and treatment patterns of sleep disorders in the under 20 Population: Analysis using a national health insurance claims database. *J Pharmacopuncture* 2022;25(3):276–289. DOI: 10.3831/KPI.2022.25.3.276.
- Carra MC, Huynh N, Morton P, et al. Prevalence and risk factors of sleep bruxism and wake-time tooth clenching in a 7- to 17-yr-old population. *Eur J Oral Sci* 2011;119(5):386–394. DOI: 10.1111/j.1600-0722.2011.00846.x.
- Vázquez-Casas I, Sans-Capdevila O, Moncunill-Mira J, et al. Prevalence of sleep-related breathing disorders in children with malocclusion. *J Clin Exp Dent* 2020;12(6):e555–e560. DOI: 10.4317/jced.56855.
- Gamayani U, Aryani M, Lailiyya N, et al. Sleep disorder prevalence and influencing factors in children with cerebral palsy. *Global Medical & Health Communication (GMHC)* 2022;10(1). DOI:10.29313/gmhc.v10i1.8789.
- Baidas L, Al-Jobair A, Al-Kawari H, et al. Prevalence of sleep-disordered breathing and associations with orofacial symptoms among Saudi primary school children. *BMC Oral Health* 2019;19(1):43. DOI: 10.1186/s12903-019-0735-3.
- Efan O, Mahmood H. People's knowledge and opinions about getting dental implants with other conventional treatment modalities in Herat City habitats, Afghanistan. *Open Dentistry Journal* 2024;18:e18742106272268a. DOI: 10.2174/0118742106272268240204143559.
- Benjafield A V, Ayas NT, Eastwood PR, et al. Estimation of the global prevalence and burden of obstructive sleep apnoea: A literature-based analysis. *Lancet Respir Med* 2019;7(8):687–698. DOI: 10.1016/S2213-2600(19)30198-5.
- Beydoun HA, Hossain S, Huang S, et al. Sex differences in patterns of sleep disorders among hospitalizations with Parkinson's disease: 2004–2014 nationwide inpatient sample. *Psychosom Med* 2021;83(5):477–484. DOI: 10.1097/PSY.0000000000000949.
- dos Santos Barroso L, Baroudi K, Nunes AM, et al. Different disinfection protocols for pulp revitalization: An in vitro study. *Open Dentistry Journal* 2024;18:e18742106289467. DOI: 10.2174/0118742106289467240319075618.
- Blasi A, Nucera R, Ronsivalle V, Candida E, Grippaudo C. Asymmetry index for the photogrammetric assessment of facial asymmetry. *Am J Orthod Dentofacial Orthop* 2022;162(3):394–402. DOI: 10.1016/j.ajodo.2021.04.030.
- Cohen ZL, Eigenberger PM, Sharkey KM, et al. Insomnia and other sleep disorders in older adults. *Psychiatr Clin North Am* 2022;45(4):717–734. DOI: 10.1016/j.psc.2022.07.002.
- Sadat-Ali M, Omar OM, Almas K, et al. Treatment of bisphosphonate-related osteonecrosis of jaw (BRONJ) in rabbit model: A

- proof-of-concept animal study comparing angiogenesis factor versus autologous bone marrow-derived osteoblasts (ABMDO). *Open Dentistry Journal* 2024;18:e18742102405091. DOI: 10.2174/0118742106287485240212405091.
20. Hansen C, Markström A, Sonnesen L. Sleep-disordered breathing and malocclusion in children and adolescents—a systematic review. *J Oral Rehabil* 2022;49(3):353–361. DOI: 10.1111/joor.13282.
 21. Nesbitt AD. Delayed sleep-wake phase disorder. *J Thorac Dis* 2018;10(S1):S103–S111. DOI: 10.21037/jtd.2018.01.11.
 22. Qazi N, Pawar M, Padhly PP, et al. Teledentistry: Evaluation of Instagram posts related to bruxism. *Technol Health Care* 2023;31(5):1923–1934. DOI: 10.3233/THC-220910.
 23. Subramanian S, Rose M, Surani S. Depression in sleep related breathing disorder. *Curr Respir Med Rev* 2007;3(4):282–285. DOI: 10.2174/157339807782359968.
 24. Alshadidi AAF, Alshahrani AA, Aldosari LIN, et al. Investigation on the application of artificial intelligence in prosthodontics. *Applied Sciences* 2023;13(8):5004. DOI: 10.3390/app13085004.
 25. Langaliya A, Alam MK, Hegde U, et al. Occurrence of temporomandibular disorders among patients undergoing treatment for obstructive sleep apnoea syndrome (OSAS) using mandibular advancement device (MAD): A systematic review conducted according to PRISMA guidelines and the Cochrane handbook for systematic reviews of interventions. *J Oral Rehabil* 2023;50(12):1554–1563. DOI: 10.1111/joor.13574.
 26. Sivakumar S, Sivakumar G, Sundramoorthy AK. Factors influencing dental practitioners in the management of temporomandibular joint related disorders in clinical practice – A structural equation modelling approach. *Open Dentistry Journal* 2024;18:e18742106307033. DOI: 10.2174/0118742106307033240729092845.
 27. Giudice A Lo, Quinzi V, Ronsivalle V, et al. Evaluation of imaging software accuracy for 3-dimensional analysis of the mandibular condyle. A comparative study using a surface-to-surface matching technique. *Int J Environ Res Public Health* 2020;17(13):4789. DOI: 10.3390/ijerph17134789.
 28. Khalil A, Nohily Y, Mohammed A, et al. Intraoral retrieval of a displaced impacted lower third molar into submandibular space: A case report. *Open Dentistry Journal* 2024;18:e18742106283538. DOI: 10.2174/0118742106283538240304092649.
 29. Uzunçibuk H, Marrapodi MM, Meto A, et al. Prevalence of temporomandibular disorders in clear aligner patients using orthodontic intermaxillary elastics assessed with diagnostic criteria for temporomandibular disorders (DC/TMD) axis II evaluation: A cross-sectional study. *J Oral Rehabil* 2024;51(3):500–509. DOI: 10.1111/joor.13614.
 30. Minervini G, Marrapodi MM, Cicciù M. Online bruxism-related information: can people understand what they read? a cross-sectional study. *J Oral Rehabil* 2024;50(11):1211–1216. DOI: 10.1111/joor.13519.
 31. Almeida LE, Cicciù M, Doetzer A, et al. Mandibular condylar hyperplasia and its correlation with vascular endothelial growth factor. *J Oral Rehabil* 2023;50(9):845–851. DOI: 10.1111/joor.13487.
 32. Lo Russo L, Guida L, Mariani P, et al. Effect of fabrication technology on the accuracy of surgical guides for dental-implant surgery. *Bioengineering* 2023;10(7):875. DOI: 10.3390/bioengineering10070875.
 33. Meltzer LJ, Plaufcan MR, Thomas JH, et al. Sleep problems and sleep disorders in pediatric primary care: Treatment recommendations, persistence, and health care utilization. *J Clin Sleep Med* 2014;10(04):421–426. DOI: 10.5664/jcsm.3620.
 34. Lobbezoo F, de Vries N, de Lange J, et al. A Further Introduction to Dental Sleep Medicine. *Nat Sci Sleep* 2020;12:1173–1179. DOI: 10.2147/NSS.S276425.