



SLEEP QUALITY AND HUMAN HEALTH

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ABSTRACT

Sleep is a fundamental physiological process that plays a central role in maintaining physical, psychological, cognitive, and social well-being. Adequate and restorative sleep is essential for the normal functioning of the nervous, cardiovascular, endocrine, immune, and metabolic systems. In recent years, deterioration in sleep quality has become an increasingly important public health concern due to changes in lifestyle, prolonged exposure to digital devices, academic and occupational stress, irregular daily schedules, insufficient physical activity, and the growing prevalence of anxiety and other psychological stressors. Sleep disturbances may manifest as difficulties in falling asleep, frequent nocturnal awakenings, insufficient sleep duration, early morning awakening, or a subjective feeling of non-restorative sleep. Persistent disruption of sleep can negatively affect attention, memory, learning capacity, emotional regulation, physical performance, and overall quality of life. Moreover, chronic inadequate or poor-quality sleep has been associated with an increased risk of metabolic disorders, cardiovascular diseases, impaired immune responses, mood disturbances, and other adverse health outcomes. The present article examines the relationship between sleep quality and human health from a multidisciplinary perspective, emphasizing the physiological significance of sleep and the potential consequences of its



chronic disruption. Particular attention is given to the interaction between sleep patterns, circadian rhythms, lifestyle factors, psychological well-being, and the functioning of major physiological systems. Sleep quality is considered not only in terms of total sleep duration but also in relation to sleep continuity, latency, efficiency, regularity, and subjective restoration after sleep. The analysis highlights that maintaining an appropriate sleep–wake rhythm and creating favorable behavioral and environmental conditions for sleep may contribute substantially to disease prevention and the preservation of functional capacity. Furthermore, improving public awareness of healthy sleep practices and identifying persistent sleep problems at an early stage may support more effective approaches to maintaining individual and population health. Thus, sleep quality should be regarded as an integral component of a healthy lifestyle and an important indicator of general well-being rather than merely a period of physiological rest.

Introduction: Sleep is a fundamental biological process that is indispensable for the preservation of human health and the maintenance of normal physiological functions. Although sleep is often perceived as a passive period of rest, contemporary scientific understanding demonstrates that it represents a highly organized and dynamic state characterized by complex neurophysiological, endocrine, metabolic, and immunological processes. During adequate sleep, the organism performs a range of regulatory functions, including restoration of energy resources, consolidation of newly acquired information, regulation of emotional responses, maintenance of immune competence, and coordination of metabolic processes. Consequently, both the quantity and quality of sleep are important determinants of an individual's physical and psychological well-being. The significance of sleep has become increasingly evident against the background of modern changes in lifestyle. Rapid technological development, widespread use of smartphones and other digital devices, prolonged screen exposure, irregular working and studying schedules, reduced physical activity, and increasing psychosocial stress have contributed to changes in conventional sleep patterns. Many individuals experience shortened sleep duration or fragmented sleep because of late-night activities, occupational or academic responsibilities, social demands, and exposure to artificial light during the evening. Such changes may disturb the natural sleep–wake cycle and interfere with the physiological organization of circadian rhythms. Sleep quality is a multidimensional concept that cannot be assessed solely by determining the number of hours an individual spends asleep. It includes



several interconnected characteristics, such as the time required to fall asleep, continuity of sleep, frequency of nocturnal awakenings, duration and efficiency of sleep, regularity of the sleep schedule, subjective feeling of restoration, and daytime functioning. An individual may therefore obtain an apparently adequate number of hours of sleep while still experiencing insufficient restorative value because of fragmented or poorly structured sleep. This distinction is particularly important when evaluating the relationship between sleep and health outcomes. The physiological importance of sleep is closely associated with the functioning of the central nervous system. During different stages of sleep, the brain undergoes coordinated processes involved in memory consolidation, learning, emotional regulation, and adaptation to environmental stimuli. Persistent sleep disruption may impair attention, concentration, reaction time, decision-making, and cognitive performance. In children and adolescents, adequate sleep is especially important because neurological development, learning processes, behavioral regulation, and physical growth are closely interconnected with sufficient and regular sleep. Sleep also has an important relationship with cardiovascular health. Normal sleep contributes to the regulation of autonomic nervous system activity, blood pressure, heart rate, and other cardiovascular processes. Disturbed or insufficient sleep may adversely affect these regulatory mechanisms and contribute to an unfavorable cardiovascular profile. The relationship is potentially bidirectional: poor sleep may increase physiological stress, while certain cardiovascular problems may themselves interfere with normal sleep. This interaction emphasizes the importance of considering sleep quality within the broader context of preventive medicine. Another important area concerns the association between sleep and metabolic regulation. Sleep participates in the maintenance of energy balance and influences hormonal mechanisms involved in appetite, glucose metabolism, and regulation of body energy stores. Persistent disruption of sleep patterns may be accompanied by unfavorable behavioral and physiological changes, including alterations in eating patterns, reduced daytime activity, and impaired metabolic regulation. Therefore, adequate sleep should be considered alongside balanced nutrition and regular physical activity as an important component of a healthy lifestyle. The relationship between sleep and psychological well-being is equally significant. Emotional stress, anxiety, academic pressure, occupational demands, and persistent psychological tension may interfere with sleep initiation and maintenance. At the same time, prolonged sleep disturbances can negatively influence emotional stability, stress tolerance, concentration, and daily functioning. This creates a potentially self-reinforcing interaction in which psychological stress and poor sleep may aggravate one another. Recognition of this relationship is important for developing comprehensive approaches to health promotion and prevention. Modern public health therefore increasingly recognizes sleep as an important behavioral determinant of health. Despite its importance, sleep is frequently underestimated in everyday life, particularly when educational, professional, or social responsibilities are prioritized over adequate rest. The normalization of chronic sleep restriction may result in individuals perceiving daytime fatigue,



reduced concentration, or impaired performance as unavoidable consequences of a busy lifestyle rather than as potential indicators of inadequate recovery. From a preventive medicine perspective, improving sleep quality represents a relatively accessible component of health promotion. Establishing a consistent sleep–wake schedule, maintaining an appropriate sleep environment, limiting stimulating activities before bedtime, managing evening exposure to electronic devices, engaging in regular physical activity, and addressing persistent psychological stress may contribute to healthier sleep patterns. At the same time, recurrent or persistent sleep problems should not be regarded solely as behavioral issues, since they may sometimes occur in association with underlying medical or psychological conditions requiring professional assessment. Thus, sleep quality should be regarded as an integral component of human health rather than an isolated lifestyle characteristic. Understanding the physiological functions of sleep and the consequences of its disruption is important for physicians, researchers, educators, and the general population. A comprehensive assessment of the relationship between sleep quality and health may contribute to the development of more effective preventive strategies, improve awareness of healthy sleep practices, and support the preservation of cognitive, psychological, and physical functioning throughout different stages of life. The purpose of this article is to examine the principal relationships between sleep quality and human health and to highlight the importance of adequate, regular, and restorative sleep in maintaining overall well-being.

Main part: The physiological significance of sleep: Sleep is a complex biological state regulated by coordinated interactions between the central nervous system, circadian mechanisms, endocrine pathways, and autonomic nervous system. Rather than representing a period of complete inactivity, sleep involves highly organized physiological processes that support restoration and adaptation. The alternation between non-rapid eye movement (NREM) and rapid eye movement (REM) sleep creates a structured cycle that is repeated throughout the night. Each stage contributes differently to neurological and systemic regulation. NREM sleep is particularly important for physical restoration, metabolic regulation, and the organization of physiological processes. During deeper stages of NREM sleep, the body enters a state of reduced metabolic activity and altered autonomic regulation, while processes associated with tissue recovery and hormonal regulation become more prominent. REM sleep, in contrast, is characterized by increased brain activity and plays an important role in memory processing, emotional regulation, and the integration of newly acquired information. The appropriate balance between these stages is therefore an important component of restorative sleep. The sleep–wake cycle is primarily coordinated by circadian rhythms, which are synchronized with environmental signals such as the light–dark cycle. The suprachiasmatic nucleus of the hypothalamus functions as a major biological clock, coordinating daily fluctuations in sleep propensity, body temperature, hormone secretion, and other physiological variables. Melatonin secretion increases under conditions of darkness and contributes to the physiological preparation



for sleep. Exposure to bright light, particularly during the evening, may interfere with this process and contribute to delayed sleep onset.

Sleep quality and cognitive function: Adequate sleep is closely associated with optimal cognitive performance. During sleep, the brain processes and reorganizes information acquired during wakefulness. Memory consolidation, learning, attention, and executive functions are influenced by the quality and continuity of sleep. Consequently, individuals experiencing persistent sleep disturbances may demonstrate reduced concentration, slower information processing, impaired working memory, and decreased ability to maintain sustained attention. Sleep deprivation may also influence decision-making and behavioral responses. Reduced alertness can increase susceptibility to errors and decrease the efficiency of complex cognitive tasks. These effects are particularly relevant in educational and occupational settings where sustained concentration and rapid decision-making are required. In children and adolescents, insufficient sleep may additionally interfere with learning efficiency, behavioral regulation, and academic functioning. Importantly, cognitive consequences are not necessarily proportional only to the number of hours slept. Fragmented sleep and repeated nocturnal awakenings can reduce restorative efficiency even when total sleep duration appears acceptable. Therefore, assessment of sleep quality should include both quantitative and qualitative characteristics.

Relationship between sleep and cardiovascular health: The cardiovascular system undergoes characteristic changes during normal sleep. In healthy individuals, sleep is generally accompanied by reductions in sympathetic nervous system activity, heart rate, and blood pressure. These changes provide a period of relative cardiovascular recovery. Disturbances in sleep duration, continuity, or circadian regularity may interfere with these physiological patterns. Persistent poor-quality sleep can be associated with increased sympathetic activation and unfavorable regulation of cardiovascular function. Repeated disruption of normal sleep may contribute to physiological stress and may be particularly relevant among individuals who already have cardiovascular risk factors. In addition, irregular sleep schedules may influence the synchronization between circadian rhythms and cardiovascular processes. The relationship between sleep and cardiovascular health is bidirectional. Cardiovascular symptoms or disease may interfere with sleep, while persistent sleep disturbances may contribute to an unfavorable cardiovascular environment. For this reason, sleep assessment may be valuable as part of a broader preventive approach to cardiovascular health.

Sleep and metabolic regulation: Sleep has an important role in maintaining metabolic homeostasis. During normal sleep, the organism coordinates energy expenditure, hormonal activity, glucose regulation, and appetite-related processes. Disruption of sleep may alter these regulatory mechanisms and may influence eating behavior and daily physical activity. Insufficient or irregular sleep can be accompanied by increased daytime fatigue, which may reduce motivation for physical activity. At the same time, prolonged wakefulness may increase opportunities for food consumption and disrupt regular meal patterns. These behavioral changes



can interact with physiological mechanisms involved in energy regulation. The relationship between sleep and metabolism is therefore complex and multifactorial. Healthy sleep should be considered as one component of a comprehensive strategy that also includes balanced nutrition, regular physical activity, and appropriate management of daily routines.

Sleep quality and psychological well-being: Psychological well-being and sleep quality are strongly interconnected. Emotional stress, persistent worries, academic or occupational pressure, and an irregular daily routine may interfere with the ability to initiate and maintain sleep. Individuals experiencing psychological tension may have difficulty relaxing before bedtime, resulting in prolonged sleep latency or repeated awakenings. Conversely, inadequate sleep may negatively influence emotional regulation. Poor sleep can reduce tolerance to everyday stressors and may be accompanied by irritability, reduced motivation, impaired concentration, and decreased subjective well-being. Thus, sleep and psychological health can influence each other in both directions. This relationship highlights the importance of addressing sleep within comprehensive approaches to psychological well-being. Improving sleep hygiene and establishing a stable daily rhythm may support emotional resilience, while effective stress management can contribute to better sleep.

Sleep and immune function: Sleep is also involved in the regulation of immune responses. During sleep, neuroendocrine and immune mechanisms interact to maintain physiological balance. Adequate restorative sleep supports normal immune regulation, whereas persistent sleep disruption may adversely influence immune responsiveness. The immune system is continuously affected by factors such as nutritional status, physical activity, psychological stress, and sleep. Therefore, sleep should not be considered an independent determinant of immune health but rather an important component of a broader network of physiological and behavioral factors. Maintaining regular and sufficient sleep may consequently contribute to the body's ability to preserve normal physiological responses to environmental challenges. This is especially relevant during periods of increased physical or psychological stress.

Public health importance of healthy sleep: The consequences of poor sleep extend beyond individual discomfort and may have broader social and public health implications. Reduced attention and daytime alertness can influence educational performance, workplace productivity, and safety. Persistent sleep problems may also increase the demand for healthcare services and contribute to a reduction in overall quality of life. For these reasons, sleep health should be incorporated into preventive medicine and health education. Educational institutions, workplaces, healthcare organizations, and families can contribute to greater awareness of the importance of regular and restorative sleep. Public health initiatives that promote healthy daily routines should emphasize sleep alongside nutrition, physical activity, and psychological well-being. Early recognition of persistent sleep problems is also important. When sleep difficulties continue despite appropriate behavioral measures, professional evaluation may be necessary to



identify possible underlying medical, psychological, or sleep-related conditions. Such an approach can facilitate timely intervention and reduce the potential long-term consequences of chronic sleep disruption. Overall, the available evidence supports the view that sleep quality is a multidimensional determinant of health. Its influence extends across cognitive functioning, psychological well-being, cardiovascular regulation, metabolic balance, immune processes, and everyday performance. Consequently, improving sleep quality represents an important component of an integrated approach to maintaining and promoting human health.

Conclusion: Sleep quality is an essential component of human health and should be considered an integral element of preventive medicine and a healthy lifestyle. The analysis presented in this article demonstrates that sleep is not simply a period of physiological rest but a complex biological process that contributes to the coordinated functioning of the nervous, cardiovascular, endocrine, metabolic, and immune systems. The restorative value of sleep depends not only on its duration but also on continuity, regularity, sleep architecture, latency, efficiency, and the individual's subjective perception of recovery. Persistent deterioration in sleep quality may negatively affect cognitive performance, memory, attention, emotional regulation, and daytime functional capacity. At the systemic level, chronic sleep disturbances may be associated with unfavorable cardiovascular and metabolic changes and may interfere with normal immune regulation. The interaction between sleep and psychological well-being is particularly important, as stress and emotional tension can impair sleep, while persistent sleep problems may further reduce emotional resilience and the ability to cope with everyday demands. Modern lifestyle factors, including irregular daily schedules, excessive evening exposure to electronic devices, insufficient physical activity, psychosocial stress, and an unfavorable sleeping environment, can substantially contribute to deterioration in sleep quality. Therefore, improving sleep should involve a comprehensive approach aimed at establishing regular sleep-wake patterns, maintaining an appropriate sleeping environment, reducing excessive evening stimulation, promoting healthy daytime activity, and addressing persistent sources of stress. An important conclusion is that sleep quality should be assessed as a multidimensional health indicator rather than by sleep duration alone. The use of standardized questionnaires and, when clinically indicated, objective assessment methods can facilitate the identification of persistent sleep disturbances and support appropriate preventive or clinical interventions. Early recognition of sleep-related problems may help reduce their potential impact on cognitive, psychological, and physical functioning. In conclusion, maintaining adequate, regular, and restorative sleep represents a significant opportunity for promoting individual and population health. Greater public awareness of sleep hygiene, integration of sleep assessment into preventive healthcare, and development of educational programs focused on healthy sleep behavior may contribute to improved quality of life and long-term health outcomes. Further research should continue to clarify the complex interactions between sleep, lifestyle, psychological factors, and chronic diseases and should support the development of



evidence-based strategies for improving sleep health across different age groups and populations.

REFERENCES:

1. Walker M.P. *Why We Sleep: Unlocking the Power of Sleep and Dreams*. New York: Scribner; 2017. 368 p.
2. Kryger M.H., Roth T., Dement W.C. *Principles and Practice of Sleep Medicine*. 7th ed. Philadelphia: Elsevier; 2022. 1728 p.
3. Buysse D.J. Sleep health: Can we define it? Does it matter? *Sleep*. 2014;37(1):9–17. doi:10.5665/sleep.3298.
4. Hirshkowitz M., Whiton K., Albert S.M., Alessi C., Bruni O., DonCarlos L., et al. National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health*. 2015;1(1):40–43. doi:10.1016/j.sleh.2014.12.010.
5. Watson N.F., Badr M.S., Belenky G., Bliwise D.L., Buxton O.M., Buysse D., et al. Recommended amount of sleep for a healthy adult: A joint consensus recommendation of the American Academy of Sleep Medicine and Sleep Research Society. *Sleep*. 2015;38(6):843–844. doi:10.5665/sleep.4716.
6. Medic G., Wille M., Hemels M.E.H. Short- and long-term health consequences of sleep disruption. *Nature and Science of Sleep*. 2017;9:151–161. doi:10.2147/NSS.S134864.
7. Irwin M.R. Why sleep is important for health: A psychoneuroimmunology perspective. *Annual Review of Psychology*. 2015;66:143–172. doi:10.1146/annurev-psych-010213-115205.
8. Cappuccio F.P., Miller M.A. Sleep and cardio-metabolic disease. *Current Cardiology Reports*. 2017;19(11):110. doi:10.1007/s11886-017-0916-0.
9. St-Onge M.P., Grandner M.A., Brown D., Conroy M.B., Jean-Louis G., Coons M., Bhatt D.L. Sleep duration and quality: Impact on lifestyle behaviors and cardiometabolic health. *Circulation*. 2016;134(18):e386. doi:10.1161/CIR.0000000000000444.
10. Walker M.P., Stickgold R. Sleep-dependent learning and memory consolidation. *Neuron*. 2004;44(1):121–133. doi:10.1016/j.neuron.2004.08.031.
11. Buysse D.J., Reynolds C.F., Monk T.H., Berman S.R., Kupfer D.J. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*. 1989;28(2):193–213. doi:10.1016/0165-1781(89)90047-4.
12. Johns M.W. A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale. *Sleep*. 1991;14(6):540–545. doi:10.1093/sleep/14.6.540.