



SEVEN

PUBLICAÇÕES ACADÊMICAS
2022

RELEVANT STUDIES FOCUSED ON
HEALTH SCIENCES

Carolina Fernandes Souza, Iuri Henrique da Silva Monteiro,
Larissa Caroline Alves Resende Costa and Larissa Soares Lopes
(Organizers)



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Dear

First of all, we would like to congratulate all the organizers and participants of this international multidisciplinary work. Furthermore, it should be noted that the knowledge built by the collectivity is of paramount importance for the development of humanity. In this sense, therefore, the present work seeks to highlight the relevance of studies carried out internationally by professionals, researchers, and academics of all nationalities, being a way to overcome scientific and linguistic barriers, since the translation can reach a wider audience, disseminating the work performed. Finally, we hope that all those present find pertinent the questions brought up in these studies and feel encouraged to be part of the next works and collections.

Sincerely Seven Publicações

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There has been increasing evidence denoting that insomnia, due to its high prevalence has become an important public health problem, moreover, it has a strong association with medical and psychiatric comorbidities (BURMAN, 2017) and also, according to Rocha and Martino (2010), has stress as one of its major causers.

Experts point out that the treatment for insomnia should begin with non-pharmacological measures, such as changes in habits, sleep hygiene, and physical exercises (RAMAKRISHNAN; SCHEID, 2007).

Considered a neurological disorder of movements associated with sleep in which during sleep, patients present characteristic movements of the legs that can be associated with waking up, PIS has increased prevalence with age and is higher in women. In patients who develop symptoms before the age of 40, family history is common (NETO, 2016).

The symptoms vary considerably in frequency, from less than once a month or year to daily, and in severity, from mildly annoying to disabling. Symptoms can also remit for several periods. There are four criteria for considering a diagnosis of PIS: a desire to move the legs (usually accompanied by uncomfortable sensations in the legs); temporary relief with movement; onset or worsening of symptoms during rest; and worsening or onset of symptoms at night (FRAGOSO *et al.*, 2011).

A good sleep hygiene, along with the practice of physical exercises, the interruption of aggravating drugs after medical orientation; the consumption of products that contain caffeine and alcoholic beverages, help combat this disorder (ALOE *et al.* , 2007).

According to the Brazilian Society of Pediatrics (SBP), sleep hygiene involves behavioral, environmental and other sleep-related factors that can affect everything from sleep initiation to sleep maintenance. Inadequate sleep hygiene is associated with problems sleeping and the total amount of sleep.

In this way, sleep hygiene aims to use psychoeducational strategies in order to establish a routine of healthy habits and eliminate both environmental and behavioral factors that interfere with the quality of sleep.

Among the measures that can be adopted for a better quality of sleep, we can mention doing physical exercises at times far from bedtime; eating light meals at night; avoiding products that contain tobacco, alcohol, and caffeine (coffee, yerba mate infusion, "cola" drinks, and even guaraná) or any substance that has an action on the central nervous system before going to bed; making sure that the bed, the mattress, and the temperature of the room are pleasant; keeping regular bedtime and wake-up times; using the room only for sleeping; and keeping it dark and quiet (MARTINEZ *et al.* , 2008).

2 SLEEP IN CHILDHOOD, ADOLESCENCE AND ADULTHOOD

When the individual is still a newborn, he sleeps about 16 to 18 hours a day, alternating cycles of wakefulness and sleep every 3 to 4 hours, distributed between day and night, approximately 50% of this period is dominated by REM sleep (CANANI, SILVA, 1998).

At around six months, the baby sleeps for up to six consecutive hours. At this stage two long periods of sleep occur during the night, interspersed with a brief awakening for feeding. Gradually the waking period consolidates, becoming longer and predominant during the day (COONS, 1987).

Between 2 and 6 years of age, there is a decrease in REM sleep episodes, with a predominance in the second half of the night, together with a prolongation of the sleep cycle (CANANI, SILVA, 1998). At about 5 years of age, stages 3 and 4 of REM sleep reach their maximum duration, this event occurs until the end of 10 years of age, when a rapid decline will occur in order to reach adult patterns consolidating around 20 years of age (KAHN, FISHER, EDWARDS, 1973).

With the expansion of the creation of equipment and machines, fruits of the industrial revolution, the human being began to have more comfort and ease in performing tasks. This condition caused changes in human behavior, for example, the decrease in physical activities (OWEN *et al.* , 2010).

In adolescents and adults this situation ends up being more noticeable since during this phase more responsibilities and new professional and personal perspectives arise, and when faced with a high quantity of tasks to be accomplished, the quantity and quality of sleep ends up being affected (DINIZ *et al.*, 2020).

Sleep-related disorders occur with great frequency, and the causes and the real extent of their damage claim greater attention. Changes in sleep pattern and quality can affect people at a very early age, causing children of different ages to face consequences ranging from poor school performance to compromised physical and mental health.

In relation to the disorders that affect children, we have insomnia that presents behavioral characteristics and can be defined in two main types, sleep onset disorder due to inadequate associations and the disorder due to lack of establishing limits. The first is linked to infants who can only sleep with some object or under some circumstance requiring parental intervention. The second type covers children in the preschool and school years, because at this time parents should direct their children's bedtime, setting some limits, but they may give in if the child refuses to go to sleep for some reason (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

In adolescence, bad nights of sleep affect the health and healthy development of adolescents. What causes this poor quality of sleep in this public are changes in sleep patterns due to biological and environmental factors, such as very late bedtimes, phase delay and improper sleep hygiene. Thus, in this age group, insomnia is associated with mental health problems and poor school performance (BRUNI, ANGRIMAN, 2015).

These authors, Bruni and Angriman (2015), also highlight some aspects that predispose to insomnia such as birth order that is related to first-born and only child; positive family history; temperament (mood variability); maternal depression and caregivers' behavior (picking up the baby on the lap right upon waking will promote longer latency time) among others.

The different causes and factors associated with insomnia are listed in the following table:

Causes and/or precipitating factors of insomnia according to age group

AGE RATE	CAUSES
Infant	Sleep onset disturbance by inappropriate associations Food Allergies Gastroesophageal reflux Infant colic Excessive nighttime fluid intake Acute otitis media or other infectious diseases Chronic Diseases
2-3 years	Sleep onset disturbance by inappropriate associations Fear Separation anxiety from parents Prolonged naps or naps at inappropriate times Acute infectious diseases Chronic Diseases
Pre-school and school	Disorder due to lack of establishing boundaries Fear Nightmares Acute infectious diseases Chronic Diseases
Teenager	Sleep hygiene problems Phase Delay Psychiatric comorbidities (aniedade, depression, ADHD) Family, school pressure Sleep Disordered Breathing Movement disorders Acute infectious diseases Chronic Diseases

Source: Nunes and Bruni, 2015

With advancing age, the human being presents a reduced ability to sleep, with interference in the duration of normal sleep, which contributes to the onset or worsening of diseases (RAM *et al.*, 2010).

In adulthood, many challenges are imposed, employment, family, studies, lifestyle, can alter the sleep pattern, and chronic sleep deprivation has been shown to be harmful to health, being associated with various physiological problems and diseases (LESSA *et al.*, 2020).

According to Paruthi *et al.* (2016), adult people who reported sleeping less than 7 hours per day were more likely to report worse overall health than those who sleep more than 7 hours, also reporting worse quality of life related to exercise and mental health.

Sleep deprivation is associated with several alterations, among them: changes in psychomotor performance, memory consolidation, mood regulation, moral reasoning, appetite, and immune function regulation. Thus, the identification of abnormal patterns and their control can contribute greatly to a longer life with greater longevity and quality of life. Understanding how food and physical activity can help in the fight against SD is totally necessary and important.

3 INFLUENCE OF PHYSICAL ACTIVITY ON SLEEP QUALITY

The Ministry of Health defines physical activity as any body movement performed in different tasks occurring caloric expenditure (BRASIL, 2021). These activities are performed at different times such as: leisure, work at home and even when commuting from home to school/work.

On the other hand, physical exercise is defined as planned physical activities, structures with different purposes in favor of health improvement, aesthetics among other purposes (BRASIL, 2021). Thus, it is understood that all physical exercise is a physical activity, but not all physical activity is a physical exercise, because the structuring and planning of exercise performed by a physical education professional differentiates both practices.

Both physical activity and physical exercise performed with an adequate frequency have health benefits (DIAS *et al.* , 2020). Physical activity promotes benefits to physical fitness, improves flexibility and blood circulation. On the other hand, physical exercise has the same benefits as physical activity, however, it becomes more effective with its structure and can be a non-pharmacological solution in the treatment and prevention of various chronic diseases such as diabetes mellitus type II, bad cholesterol, heart disease and improvement of sleep quality (BRASIL, 2021).



Source: Image from the WHO Physical Activity Recommendation Guide document (2020).

In the Table below are recommendations from the World Health Organization (WHO, 2020) for physical activity, considering age groups and also some physical limitations and clinical health situations.

WHO GUIDELINES FOR PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR		
Variables	Minutes/Day	Frequency/Weekly
II. Children and Adolescents (5 to 17 years old)	At least 60 minutes	At least 3 times
II. Adults (18 to 64 years old)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	At least 2 days a week

III. Elderly (65 years or older)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	At least 2 to 3 days weekly
IV. Pregnant and postpartum women	At least 150 minutes per week	At the individual's discretion
V. Adults and Elderly with chronic diseases (18 years or older)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	On at least 2 or 3 days a week
VI. Adults (18 years or older) with disabilities	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	On at least 2 or 3 days a week

Source: adapted by the authors of this study: WHO (2020).

For children under the age of 5 the World Health Organization (WHO, 2020) suggests some recommendations for physical activity, sedentary behavior, and sleep, present in the table below:

RECOMMENDATIONS FOR 24 HOURS OF PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, AND SLEEP FOR CHILDREN UNDER 5 YEARS OF AGE			
Variables	PHYSICAL ACTIVITY	SCREEN TIME	GOOD QUALITY SLEEP
Infants (less than 1 year old) should:	At least 30 minutes	0 minutes of sedentary time on screens at this age is recommended	They should get 14-17h (0-3 months old) or 12-16h (4-11 months old) of good quality sleep, including naps
Children from 1 to 2 years old should:	At least 180 minutes of physical activity	0 minutes of sedentary screen time is advised for 1-year-olds and no more than 60 minutes for 2-year-olds	It is recommended to get 11 to 14 h of good quality sleep, including naps, with regular sleeping and waking times
Children 3-4 years old should:	At least 180 minutes of which at least 60 minutes of moderate to vigorous intensity	60 minutes maximum	It is suggested to have 10-13h of good quality sleep, which may include naps, with regular sleeping and waking times.

Source: created by the authors of this study: WHO (2019).

The quantity/quality of sleep in children, adolescents and in adults is a parameter of great importance that has been studied by science for many years, because there are many factors that can have an association with good or bad sleep quality (NATIONAL SLEEP FOUNDATION, 2022; MILLER *et al.*, 2018).

A healthy sleep depends on several factors, such as the number of hours of sleep, the time at which we lie down and the sleep environment (SOCIEDADE PORTUGUESA DE PEDIATRIA, 2017). Children and adolescents need to have a greater amount of sleep, because they are individuals who are in the growth phase and through sleep occurs the release of hormones such as growth hormone (GH) that is essential in

the process of increasing their height and many other important physiological actions in the physical and mental development of these subjects (HERMES, NUNES, MELO, 2022; SILVA *et al.* , 2021).

For children, adolescents and adults being physically active and having a healthy lifestyle is a relevant factor for a good quality of life, since obesity, sedentary lifestyle and ways of eating can interfere with the quantity and quality of sleep (MILLER *et al.* , 2018). Insulin resistance, type II diabetes mellitus, acute myocardial infarction, are also risks associated with physical inactivity and sleep debt (DONGA *et al.* , 2010).

In recent years, Brazil has experienced an economic crisis that has leveraged the increase of socioeconomic inequality in the country (FILHO, 2017). Amidst these economic setbacks, people with low financial status usually face difficulties in accessing the practice of physical activity properly prescribed and monitored by a physical education professional (SMETANINA *et al.* , 2015). These factors cause the practice of regular physical activity to be lower in low-income people (FERREIRA; ANDRADE, 2021).

The research by SILVA *et al.* (2021) on the practice of physical activity in Brazilians identified that almost 50% of the participants practiced exercises outdoors and without guidance from a physical education professional. It is believed that the high percentage of the practice of outdoor physical activity and without the guidance of a physical education professional is due to the financial condition, because many cannot afford to pay this professional to guide them on the frequency and how to exercise correctly.

In addition to economic factors, the advancement of technology today has led to a lazy lifestyle in many people who spend many hours sitting at work, at home watching TV or using social networks and do not seek to have an active life by regularly practicing physical activity (VASCONCELLOS *et al.* , 2022). It is important to note that the inappropriate use of social networks such as facebook, Instagram, WhatsApp during the night before bedtime can cause sleep disturbances that reflect in the performance of the human being at work, study, sexual relationship and in other aspects (EVERS *et al.* , 2020).

Several studies, such as Andrade, Pedrosa (2016) and Peng *et al.* (2022), show that regular exercise, in addition to improving physical fitness, is an excellent non-pharmacological intervention that improves sleep efficiency in humans. However, the time and frequency with which exercises are practiced are also points that can have an influence on the quantity and quality of sleep in humans.

There are several types of physical exercise practices and aerobic exercise is one of them that was the objective of the study by Andrade, Pedrosa (2016) who evaluated the role of physical exercise in obstructive sleep apnea obtaining the following results: Volunteers who participated in a predominantly aerobic exercise program had a reduction in disease state and daytime sleepiness, thus improving their sleep efficiency and oxygen consumption.

Besides aerobic exercise, the practice of Pilates has also shown benefits to the quality of people's sleep, as shown in the research Corazza *et al.* (2022), in which after 26 sessions of Pilates, improvements in the participants' sleep efficiency and other health variables such as strength, flexibility, mental alertness, and body awareness were identified.

The research by Pancotto, Tome, Esteves (2021) identified a significant influence of swimming practice on sleep and quality of life in the study participants. From a simple walk outdoors to the practice of planned and properly prescribed exercises are actions that cause metabolic and physiological changes and adaptations in the human body, which present benefits to the quality of people's sleep (SILVA *et al.* , 2019).

In this sense, the rush of people, especially in large Brazilian cities, is a factor that has caused an increase in stress, anxiety, depressive feelings, inadequate diet, sedentary lifestyle and, consequently, all of this can cause excessive loss of sleep, insomnia, and fatigue, damaging the sleep of individuals (SEJBUK *et al.*, 2022).

In today's capitalist society, night work has become increasingly common (BRUM *et al.*, 2015). It is estimated that more 7.5% of Brazilian workers perform their function during the night (COSTA *et al.* , 2021). Such fact, offers several risks to the mental, physical and social health of people who are harmed with sleep loss, which in turn deregulates several essential physiological mechanisms in human health (SUN *et al.* , 2018).

Andrade, *et al* (2017), when investigating whether absenteeism in industry is associated with shift work and sleep problems, concluded that sleep was related to workers' absence, and employees with high perceived stress missed more work because of health problems. It was also observed that workers with sleep disorders were twice as likely to miss work compared to workers who had good sleep quality (ANDRADE *et al.* , 2017). It is assumed that the high rate of stress and sleep disorders is a consequence of the high demand of tasks at night work.

The work overload with alternating shifts and sleepless nights causes an increase in stress and consequently a greater release of the hormone cortisol into the bloodstream, which can cause daytime sleepiness in people (SIMÕES, MARQUES, ROCHA, 2010). Physical effort during the night shift is associated with poor quality of sleep, compared to workers who practice less physical effort during this period of work (MARQUEZE, SILVA, MORENO, 2009).

Throughout the previous paragraphs studies such as by MILLER *et al.* (2018) and DONGA *et al.* (2010) have made noticeable the beneficial influence of regular physical activity/exercise on the quality of sleep of people at different ages. It is worth noting that these parameters are intertwined with negative factors arising from socioeconomic aspects and capitalistic actions. Moreover, the importance of creating public policies that help people increase their physical activity practice, care with the quantity and quality of sleep becomes essential, in the face of several evils that have caused interference in these variables leading to a worsening in the quality of human life.

4 INFLUENCE OF NUTRITION ON SLEEP QUALITY

Sleep is considered an essential modulator of metabolic functioning, including energy metabolism, glucose regulation, and even appetite. Information on the effects of sleep duration and food intake has

increased in recent years (POT, 2018). While there is evidence that sleep affects food intake, diet, and specific foods, dietary patterns may also impact sleep, necessitating further investigation (BEEBE *et al.*, 2013).

Cao *et al.*, (2016) point out that the high blood glucose index caused by the exacerbated consumption of carbohydrates has been observed and more often associated with a rapid onset of sleep in young people considered healthy. As for the protein intake, it is related to the difficulty in getting to sleep and, consequently, is associated with the problem of keeping the various systems of the body in balance in order to fall asleep. The minimum fiber intake and the high intake of saturated fat and sugar correlate to a softer sleep with more rises in young and middle aged adults.

Even in childhood, it is very important that the quality of sleep is observed by the individual's caregivers, considering that children usually do not express such symptoms related to lack of sleep, hiding such disorders. It is essential to identify any sleep disorders in childhood, in order to design strategies that promote sleep quality, preventing complications such as overweight (GONZAGA *et al.* , 2016).

Sleep plays a crucial role in the homeostasis of the body. Its association with weight development in childhood and adolescence, and its association with weight gain, has generated great interest. There is increasing evidence in favor of an influence of lack of adequate sleep on weight gain. It is evidenced that sleep deprivation acts as a factor in the risk of overweight/obesity, developing a role in sympathetic activation and increase of catecholamines, and cortisol by activation of the hypothalamic-pituitary-adrenal axis and increase of interleukins and TNF by activation of the inflammatory cascade (EL HALAL, NUNES, 2019).

Furthermore, according to El Halal, Nunes (2019), the association between shorter sleep duration and risk of overweight and obesity is well established for all pediatric age groups. Insufficient sleep duration due to height growth deficit is also added.

On the other hand, studies show that food intake shortly before bedtime can have a negative influence on sleep quality (FRANK *et al.*, 2017). Micronutrient intake is directly related to sleep habits and patterns. Crispim *et al.*, (2007) shows that deficiencies in vitamin B1, folate, iron, magnesium, phosphorus, selenium and zinc are associated with shorter sleep duration, while the absence of calcium and alpha-carotene is associated with difficulty sleeping.

5 Final considerations

The sleep pattern changes with the passing of the years, with a greater space for wakefulness during adulthood. Its deprivation can lead to sleep disorders and, consequently, to an individual's health, such as the various problems reported in this chapter.

Physical exercise has proven to be an adjuvant factor in fighting diseases and consequently a good quality of sleep, having as an ally nutrition, which has also proven to be essential to fight obesity, NCDs, and especially to improve the quality of sleep.

Therefore, with all the problems that SD can cause in people's lives, changes in lifestyle habits such as exercise and a healthier diet can go a long way toward more restful nights of sleep and a healthier, longer life.

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