

Healthy Sleep: A defiant concept!

Rosário Ferreira

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Sleep occupies a very significant part of children's lives, contributing unequivocally to their physical, neurocognitive, and emotional development.

Sleep disturbance in children, including sleep disorders, sleep curtailment, and sleep fragmentation, has been increasingly linked to compromised behavioral, cognitive, and emotional development as well as poor academic performance,¹ accidental risks², and cardiovascular, metabolic, and immune adverse events.^{3,4}

Excessive weight and obesity have gained increasing attention in public health in recent decades. It has risen in high, medium, and low-income countries, being diagnosed in about one third of children.⁵ The interest in the interaction between obesity and sleep is evident, with a huge number of publications in recent years, but the conclusions are contradictory. Several studies show a complex interplay of factors relevant in this relationship, including sleep disturbance and duration, level of physical activity, screen time, energy expenditure, and caloric intake. Evidence shows that sleep deprivation causes endocrine and metabolic alterations that contribute to excessive weight and, at the same time, reduced sleep time increases the opportunity to eat and leads to an appetite for high calorie food.^{6,7} Inflammation also has a very important role in the metabolic and cardiovascular consequences of sleep disturbance, as increased pro-inflammatory cytokines have been described in obese and non-obese children diagnosed with obstructive sleep apnea, leading to the activation of pathways that contribute to endothelial dysfunction, atherogenesis, and neurobehavioral compromise.⁸

Sleep development is an integrative process, in which the biological characteristics are modulated and shaped by cultural aspects, such as beliefs about sleep function, cultural norms and habits, and social and emotional interactions.⁹ Environmental and economic aspects may also interfere with the way that the child sleeps. One of the issues related to sleep which have been the most discussed recently is sleep duration, which has been significantly reduced in recent decades, leading to the generalized idea that we live in a sleep deprived society.

However, the definition of adequate sleep duration is difficult to establish, as different durations are proposed by several authors for different populations. On the other hand, not only duration but also sleep architecture, regularity, timing, and continuity are important aspects when sleep adequacy is described.¹⁰ Generalized and too rigid considerations about sleep adequacy may lead to the misinterpretation of a sleep problem, when the child's sleep biology does not feature the beliefs and expectations of the parents. The evaluation of the sleep of any given child should consider not only the intrinsic aspects of sleep duration, organization, and distribution, but also the environmental, cultural, and genetic aspects, in an individualized approach. Interventions should be shaped for the children's circumstances and the expectations of the parents, usually in a gradual and progressive process.

Sleep medicine is a relatively recent medical science, dealing with the diagnostic and treatment of sleep disorders. Sleep specialists and centers are scarce, leading to underdiagnosis or the late diagnosis of a huge number of sleep disorders in children and adult patients, with relevant costs on countries' public health and economies. As the concept of health is much more than the simple absence of disease, an emerging concept in sleep medicine is that of a healthy sleep, integrating several dimensions of the human life. A definition was proposed for healthy sleep as "a multidimensional pattern of sleep-wakefulness, adapted to the individual, social, and environmental demands, which promotes physical and mental well-being. Good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours".¹¹ This concept introduces a positive way of considering sleep issues and not only the negative perspective of disease, putting the burden on sleep promotion and primary prevention.

The wide perspective of sleep health offers an extensive basis for intervention, comprising research, public policies, and education.¹² Educational projects looking

Pediatric Pulmonology Unit, Department of Pediatrics, Hospital Santa Maria, Centro Hospitalar Universitário Lisboa Norte, Lisboa, Portugal

Corresponding Author

Rosário Ferreira

Orcid.org/0000-0003-1374-4327

rosario.ferreira@sapo.pt

Hospital Santa Maria, Centro Hospitalar Universitário Lisboa Norte, Avenida Prof. Egas Moniz, 1649-028 Lisboa, Portugal

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for improved sleep quality have shown that they are worthy in different contexts, but they usually have restricted actions and targets, as is the case of the paper published in this issue of the Portuguese Journal of Pediatrics¹³ that describes simple, widely available, and effective measures to improve sleep in an inpatient setting or an intervention with very recent mothers.¹⁴ However, wide and integrative educational campaigns having children, adolescents, parents, educators, public figures, and economic and politic leaders as the targets are needed if the objective is to significantly improve the whole pediatric population's sleep health.

The education of health professionals is of paramount importance, as they have a privileged overview of children development. Medical schools barely include sleep in its curricula and most medical specialties do not have any time dedicated to sleep development and sleep disorders. An effort should be made to introduce sleep medicine in medical, nurse, and psychology students training as well as in post graduated training. Pediatricians and primary care physicians are in the first line of pediatric care, having the responsibility to contribute to sleep disturbance prevention and treatment. The assessment of sleep at every medical visit as is done, for example, with somatic growth and neurodevelopment, will enable systematic anticipatory guidance and early intervention.

There is a growing number of electronic wearable devices and software enabling you to collect and integrate a huge amount of data and whose role in sleep epidemiology, diagnosis, and promotion is not yet well established, but which will certainly have a wide development in the near future. Considering the high technological society that we live in and the interest that children and adolescents manifest by all of what concerns digital devices, educational campaigns will also probably benefit from the opportunities offered by

this type of technology, once aspects such as privacy, storage, and proper interpretation are considered.

Promoting sleep hygiene and diagnosis of related disorders *per se* is not sufficient, but we need to look to other activities and habits that have been linked with sleep development and behaviors as well as integrate it in a desirable way of life, as physical activity, sedentary behavior, and nutrition.¹⁵ Cardiovascular diseases and obesity are two of the major worldwide concerns on public health and all the measures that contribute to their prevention in childhood and adolescence will contribute to a future healthy society.

Pediatricians like to consider themselves as children advocates and sleep definitely has a huge contribution to children's lives. Therefore, we need to promote research on sleep epidemiology, disease mechanisms, and therapy as well as call for immediate and multidimensional public actions that contribute to healthy sleep and not only to identify sleep disorders.

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