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Impact of lifestyle and technology developments on sleep

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Abstract

Although the physiological and psychological mechanisms involved in the development of sleep disorders remain similar throughout history, factors that potentiate these mechanisms are closely related to the “zeitgeist”, ie, the sociocultural, technological and lifestyle trends which characterize an era. Technological advancements have afforded modern society with 24-hour work operations, transmeridian travel and exposure to a myriad of electronic devices such as televisions, computers and cellular phones. Growing evidence suggests that these advancements take their toll on human functioning and health via their damaging effects on sleep quality, quantity and timing. Additional behavioral lifestyle factors associated with poor sleep include weight gain, insufficient physical exercise and consumption of substances such as caffeine, alcohol and nicotine. Some of these factors have been implicated as self-help aids used to combat daytime sleepiness and impaired daytime functioning. This review aims to highlight current lifestyle trends that have been shown in scientific investigations to be associated with sleep patterns, sleep duration and sleep quality. Current understanding of the underlying mechanisms of these associations will be presented, as well as some of the reported consequences. Available therapies used to treat some lifestyle related sleep disorders will be discussed. Perspectives will be provided for further investigation of lifestyle factors that are associated with poor sleep, including developing theoretical frameworks, identifying underlying mechanisms, and establishing appropriate therapies and public health interventions aimed to improve sleep behaviors in order to enhance functioning and health in modern society.

Keywords: sleep, technology, lifestyle, behavior

Introduction

The discipline of modern sleep medicine is dated back to the early 1950s, following the discovery of rapid eye movement (REM) sleep and the identification of nightly sleep stage distribution.^{1,2} While much basic and clinical research has been done in the past six decades, advancing our understanding of the etiology and mechanisms underlying sleep disorders on the one hand, and enabling the application of clinical diagnosis and treatment practices on the other, it is important to keep in mind that sleep disorders

existed and were described long before the mid-20th century.

Ancoli-Israel³ has investigated references to sleep in the *Bible* and the *Talmud*, regarding the function of sleep, the consequences of both sleep deprivation and excessive sleep, factors involved in the development of insomnia, as well as indications for its cures and treatments. Kryger^{4,5} referred to descriptions of sleep apnea in ancient Greek writings, and in the 19th century novelist Charles Dickens' *The Pickwick Papers*; and both Lavie^{6,7} and Guilleminault⁸ explored 19th century landmark reports of sleep apnea in the medical literature.

Clearly, sleep disorders are “nothing new under the moon”,⁶ and the physiological and psychological mechanisms involved in their development remain similar throughout history. For example, Ancoli-Israel³ provides several quotes from the *Bible* regarding anxiety, stress and anguish in relation to sleeplessness; indeed, these are some of the same factors which are associated with the development of insomnia today.^{9–11}

Nevertheless, factors that potentiate the mechanisms involved in the development of sleep disorders are closely related to the “zeitgeist”, ie, the sociocultural, technological and lifestyle trends which characterize an era. One salient demonstration of such factors refers to shift work, which has evolved from the 24/7 lifestyle enforced in modern societies. Shift work imposes a continuous misalignment between endogenous circadian (24-hour) rhythms and the environmental light/dark cycle. Such desynchrony in physiological and behavioral circadian rhythms has been shown to cause sleep loss and sleepiness, and to detrimentally affect mental performance, safety and health.^{12,13} Similar consequences may be found in cases of jet lag, yet another circadian rhythm disorder, which has become prevalent due to the vast expansion of transmeridian travel.^{12,14}

Other modern lifestyle factors affecting sleep are also closely linked to advances in modern technology, enabling and indeed encouraging later bedtimes and longer hours of nighttime arousal; eg, electronic media devices such as television and computers.^{15–17} Yet other factors that interfere with normal sleep/wake patterns include substances such as caffeine, nicotine, alcohol, and drugs, which are commonly consumed in attempts either to maintain alertness and arousal, or to achieve sleepiness and tranquility.^{15,18–23} Lifestyle changes in dietary and physical activity habits and the increased prevalence of overweight and obesity in modern society are also associated with sleep deprivation and disturbance.^{24–26}

The aim of this review is to highlight current lifestyle trends that have been shown in scientific investigations to be associated with sleep patterns, sleep duration and sleep quality. Available therapies used to treat some lifestyle related sleep disorders will be discussed. Future perspectives will be provided for the investigation of lifestyle factors that are associated with poor sleep, in terms of understanding the underlying mechanisms, as well as establishing appropriate therapies and public health interventions for their treatment.

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