



## Sleep and better physical and mental health

*“Sleep is my lover now, my forgetting, my opiate, my oblivion.” Audrey Niffenegger, The Time Traveler's Wife*

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The light bulb was transformative to human civilisation, enabling us to work and play long after dark, but have we gone too far by altering the ebb and flow of natural light and our body's natural rhythms?

A good night's sleep is a gift that we all desire. When we lay our weary heads on the pillow and allow Morpheus to enfold us in his embrace, we surrender, leaving behind the noise, lights, smells and cares of the world. Our bodies however do not 'switch off' when we sleep – the brain powers down, but continues working, replenishing and re-processing, and various other systems including our bones, muscles and skin replenish and regenerate. Sleep seems to be all the more topical in 2020, since the pandemic has disrupted our routines at home, study and work, and forced us to modify our lifestyles as individuals, families and society.

For a condition that is such a large and essential part of the day for every human, sleep has been surprisingly poorly studied until recently, and the field of sleep medicine is young. William Charles Dement, Emeritus Professor of Psychiatry at Stanford University who died at the age of 93 earlier this year, is considered the founder of sleep medicine. His interest in Sigmund Freud and dreams prompted him to study Rapid Eye Movement (REM) sleep with Nathaniel Kleitman in the 1950s. He proceeded to study other sleep disorders, develop polysomnography and the first sleep clinic in 1970. Sleep research and medicine has since grown rapidly, enabling a better understanding of the mysteries of sleep.

Normal human sleep comprises non-REM (non-dreaming, restorative sleep stage) and REM (dream sleep) in cycles of approximately 90 minutes through the night. The nightly pattern of sleep begins in the lighter stages of NREM sleep (N1 & N2) which progress to Slow Wave Sleep (SWS or N3) before the first episode of REM sleep about 80 minutes later. NREM dominates the first half of the night while REM episodes lengthen through the night. Electroencephalograms (EEG) during NREM show sleep spindles, K-complexes and slow waves accompanied by low muscle tone while in REM sleep the EEG is desynchronised and muscles are atonic (except for respiratory muscles).

The amount of time we spend in sleep declines over our lifetimes. New-borns spend between 16 and 20 hours of the day asleep, up to 50% of this is REM sleep, but REM decreases to 25% of total sleep by age two. The amount of time spent asleep decreases to about 12 hours by the age of four and this gradual decline continues through life, with the elderly requiring up to 8 hours<sup>(1)</sup>. The quality of our sleep seems to decline as we get older – it takes longer to fall asleep, experience more awakenings and as a result can feel less refreshed. Various factors can affect the quality of sleep, especially in the elderly, including anxiety, depression, congestive heart failure, gastric reflux, nocturia or the inability to find a comfortable position due to pain from arthritis or curvature of the spine. Quality

of sleep can be improved by better managing comorbid conditions.

Sleep has been found to be essential for several of our cognitive functions, including memory consolidation and reorganization, problem solving and creativity, emotional reactivity and regulation, empathy and management of interpersonal conflicts.

Polysomnography is considered the gold standard when investigating sleep and its disorders, and involves an overnight stay in a sleep clinic. However, rapid advances in technology have put smartphones in all our pockets and smartwatches on our wrists – almost all of these gadgets use accelerometers to track and mathematical algorithms to estimate and feedback our wake and sleep patterns. These can be useful objective adjuncts to sleep diaries.

There are over 100 disorders of sleep classified in the International Classification of Sleep Disorders (ICSD – 3), some are listed below.

Insomnia is by far the most common sleep disorder – with prevalence estimates of 10 – 30% in the general population depending on how it is diagnosed. Women seem to suffer more than men and the prevalence increases with age and the presence of comorbid physical and mental health problems – indeed there appears to be bidirectional relationship between insomnia and mental disorder. Research suggests that not only can insomnia lead to impaired quality of life and psychosocial functioning, but it can increase the risk of developing depression, type 2 diabetes and cardiovascular disease.

Cognitive Behaviour Therapy for insomnia (CBTi) is recommended by NICE as the best treatment for insomnia<sup>(2)</sup>. The Sleepio App provides digital CBTi, it has been appraised by NICE HTA in 2017<sup>(3)</sup> and is available free of cost in some areas of the UK. Short term non-benzodiazepine hypnotics can be useful adjuncts.

#### Sleep hygiene

- Use the bedroom for sleep and sex only (no television watching or phones/ipads in bed).
- Do not watch the clock while in bed.
- Avoid struggling to fall asleep in bed. Instead, get up and spend quiet time out of bed until sleep comes.
- Avoid caffeine, especially late in the day.
- Avoid activities that will get you stimulated or upset late in the day.
- Practice relaxation techniques before bedtime.
- Exercise each day.
- Maintain a regular schedule for bedtime and waking; avoid naps.

Obstructive sleep apnoea syndrome (OSAS) is also common, with estimated prevalence of 2 to 4% of the adult population, characterized by repetitive episodes of upper airway collapse during sleep. Patients present with daytime sleepiness, with sleep partners reporting loud snoring, witnessed breathing interruptions, or awakenings due to gasping or choking (hence the term 'disease of listeners!'). OSAS treatment can include medical, continuous positive airway pressure (CPAP) or intra-oral devices, psychological and surgical options.

Circadian Rhythm disorders are linked to desynchronization between internal sleep-wake rhythms and the light-darkness cycle – this can happen when we travel across time zones (jet lag), work shifts or consistently stay up late browsing the net or gaming, commonly seen in adolescents (delayed sleep phase syndrome). Melatonin and bright light therapy alongside behavioural interventions can help.

Restless legs syndrome, with estimated prevalence as high as 4% is characterised by an irresistible urge to move one's legs to relieve uncomfortable sensations, thereby disrupting sleep.

REM behaviour disorder (RBD) is a condition that has been increasingly identified over the last few years – patients appear to 'act out their dreams', and present with vivid dreams associated with simple or complex motor behaviour due to loss of normal skeletal muscle atonia during REM sleep (such as falling out of bed or attacking their bed partner). Management includes Clonazepam as the drug of choice. Evidence is growing that RBD might precede a diagnosis of a neurodegenerative condition such as Parkinson's disease.

Hypersomnia syndromes are relatively rare, but patients can present with dramatic symptoms. Patients report severe, irresistible daytime sleepiness and sudden loss of muscle tone (cataplexy), and can be associated with sleep-onset or sleep-offset paralysis and hallucinations (due to rapid entry into REM sleep), frequent movement and awakening during sleep. The cause had been unknown until recently - in type 1 narcolepsy (T1N) discrete pathophysiology has been described, the autoimmune destruction of hypocretin neurons in the hypothalamus associated with low CSF concentrations of the hypocretin-1 (orexin-A) neuropeptide. Animal models of narcolepsy have been extensively studied and picked up in the media, here is an example: <https://www.youtube.com/watch?v=X0h2nleWTwi&t=48s>

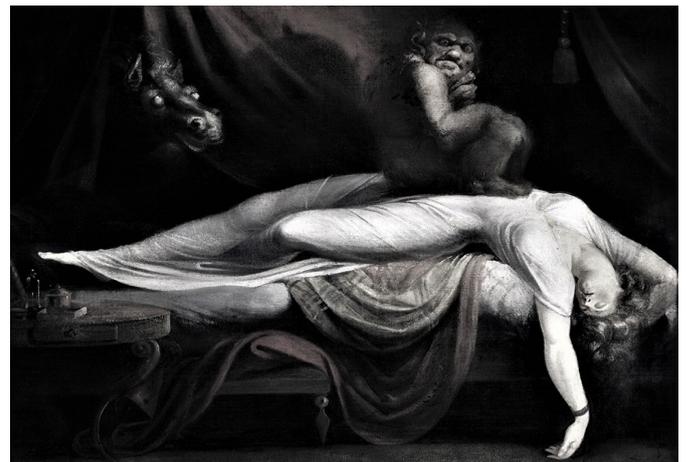
We are rediscovering the importance of sleep in our increasingly frantic '24/7' lifestyles with better scientific understanding of sleep. Meta-analyses seem to suggest that sleep is a key modifiable "lifestyle factor" alongside physical activity,

smoking and diet in the prevention and treatment of physical and mental disorders <sup>(4, 5)</sup>. We need to understand the importance of sleep and further insight will pave the way for higher-quality sleep and better overall health.

References:

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Header Picture source [https://en.wikipedia.org/wiki/Nightmare\\_disorder](https://en.wikipedia.org/wiki/Nightmare_disorder). Original painting: Henry Fuseli, *The Nightmare*, 1781, oil on canvas, Detroit Institute of Arts)

**Commonwealth and UN Technology Bank join forces to support least developed countries**

A new Commonwealth and UN Technology Bank have been formed a new partnership to support least developed countries (LDCs).

This will facilitate through technology transfer, capacity building and knowledge sharing.

The Commonwealth and UN Technology Bank, the two organisations have signed a memorandum of understanding that would commit them to collaborate to build science, technology and innovation capacity for least developed countries in the Commonwealth.

The partnership will include joint research to assess the needs of least developed countries in the areas of science, technology and innovation. Capacity will

be built through training in innovation and technology policies, digital transformation and regulatory and intellectual property rights issues.

The strengthened cooperation will focus specifically on promoting structural transformation of LDC economies in an effort to help eradicate poverty, fostering long-term sustainable development.

Joshua Setipa, UN Technology Bank's Managing Director said: "I am delighted to formally strengthen the UN Technology Bank's institutional relationship with The Commonwealth Secretariat, especially at such a crucial time for the least developed countries, 14 of which are members of the Commonwealth.

