

## Improving Adequate Sleep Duration with Advanced Technology

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### DESCRIPTION

In today's world, achieving proper sleep has become increasingly challenging. With work demands, social obligations, and the constant allure of technology, our sleep patterns are often disrupted, leading to a growing number of individuals experiencing sleep deprivation or poor-quality rest. Ironically, while technology may contribute to sleep problems, it also offers innovative solutions to enhance sleep quality and manage sleep schedules more effectively. This article explores how advanced technology can help improve sleep, from monitoring devices and sleep apps to smart environments and scientifically-backed techniques. With the right approach, technology can improve healthier sleep habits and ensuring restful, rejuvenating slumber.

### Sleep crisis in modern society

Sleep plays an important role in overall health and well-being, affecting everything from mood and cognitive function to physical health and immune response. Unfortunately, many people struggle to get the recommended 7-9 hours of sleep per night. According to studies, over one-third of adults in the United States of America don't get enough sleep on a regular basis, which can lead to chronic issues like insomnia, fatigue, and even long-term conditions such as obesity, heart disease, and depression. One of the main contributors to this sleep crisis is technology itself. Late-night screen time, overstimulation from social media, and constant notifications disrupt our natural sleep rhythms. However, the same technology that causes these problems can be harnessed to improve sleep patterns when used appropriately.

### Sleep-tracking devices: Personalized insights

One of the most impactful advancements in sleep technology is the introduction of wearable sleep-tracking devices. These gadgets, ranging from smartwatches to dedicated sleep monitors, provide insights into sleep patterns that would otherwise be difficult to gauge. By using sensors to track movement, heart rate, breathing, and even blood oxygen levels, sleep trackers can give detailed data on sleep stages—light sleep, deep sleep, and (REM) Rapid Eye Movement sleep. Some devices also monitor

environmental factors like room temperature or noise levels, which can affect sleep quality. By understanding this data, individuals can make adjustments to their sleep habits, such as altering bedtime routines or optimizing their sleep environment for better rest. Brands like Fitbit, Apple watch have developed sophisticated algorithms to provide actionable sleep insights. These devices not only track sleep duration but also offer personalized recommendations to improve sleep quality. For instance, if the device detects frequent nighttime awakenings, it might suggest earlier wind-down routines or changes in sleep positions.

### Sleep apps: Digital coaches for better sleep

In addition to wearable devices, sleep-enhancing apps have become a popular tool for managing and improving sleep habits. These apps often act as digital sleep coaches, offering guided meditation, relaxation exercises, and breathing techniques designed to calm the mind and prepare the body for rest. Some of the most effective sleep apps, such as Calm, Headspace, and Sleep Cycle, offer a variety of features, including soothing soundscapes, bedtime stories, and sleep-tracking capabilities. Apps like Sleep Cycle go a step further by using your smartphone's sensors to monitor sleep patterns and wake you up during the lightest stage of sleep, ensuring you wake up feeling more refreshed and less groggy. Sleep apps can also provide detailed feedback on sleep quality, helping users identify patterns and potential disruptors.

### Smart sleep environments

Another significant advancement in sleep technology comes from creating smart sleep environments. These environments incorporate technology to automatically adjust the room's conditions, ensuring optimal settings for quality sleep. Smart lighting systems can be programmed to simulate natural light cycles, gradually dimming as bedtime approaches and brightening gently in the morning to mimic a sunrise. This supports the body's circadian rhythm, helping to regulate sleep-wake cycles. Similarly, smart thermostats like Nest allow users to control room temperature remotely, ensuring the bedroom stays at an ideal temperature for sleep, which experts say should be between 60-67°F (15.6-19.4°C).

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**Received:** 31-Jul-2024, Manuscript No. JSDT-24-34451; **Editor assigned:** 02-Aug-2024, PreQC No. JSDT-24-34451 (PQ); **Reviewed:** 16-Aug-2024, QC No. JSDT-24-34451; **Revised:** 23-Aug-2024, Manuscript No. JSDT-24-34451 (R); **Published:** 30-Aug-2024, DOI: 10.35248/2167-0277.24.13.574

**Citation:** Dan N (2024). Improving Adequate Sleep Duration with Advanced Technology. J Sleep Disord Ther. 13:574.

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## Circadian rhythm and chronotherapy

Understanding and aligning with your body's natural circadian rhythm—the internal clock that dictates when you feel awake and when you feel sleepy—is important to achieving proper rest. Misalignment with this biological rhythm, often caused by irregular sleep schedules or shift work, can lead to sleep disorders and poor sleep quality. Technology offers tools to help regulate circadian rhythms through the use of light therapy and chronotherapy techniques. This technology helps particularly for those who suffer from Seasonal Affective Disorder (SAD) or experience difficulties waking up due to lack of morning light. Chronotherapy apps use data-driven approaches to help individuals gradually shift their sleep schedules to more natural patterns, improving sleep timing and quality over time. These

tools help users wake up and fall asleep in alignment with their circadian rhythms, which is essential for achieving consistent and restorative sleep.

## CONCLUSION

While technology can often be a distraction from sleep, it also holds the key to improving sleep quality when used mindfully. From sleep trackers and apps to smart environments and AI-driven insights, advanced technology offers a wealth of tools that can help individuals optimize their sleep routines and environments. By understanding the ways in which technology can both harm and help sleep, we can take a balanced approach to enhance our rest.