“ORTHOSOMNIA” AND SLEEP WEARABLES: HOW DIGITAL TRACKING AFFECTS PHYSIOLOGICAL WELL-BEING

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Annotation: This paper examines how consumer sleep trackers work, their main benefits and limitations, and the effects of digital sleep monitoring on human psychological and physical well-being. It describes the main signals used by smartwatches, fitness bands, and mobile apps to estimate sleep and explains the differences between these technologies and medical polysomnography. Special attention is given to orthosomnia, which is an excessive focus on achieving perfect sleep scores. This focus may increase anxiety and negatively affect sleep quality. The paper also discusses how inaccurate tracker results, negative expectations, and changes in sleep habits may influence a person’s well-being. The study highlights the importance of using digital technologies responsibly, paying attention to personal well-being, and seeking medical advice when sleep problems continue.

Keywords: Sleep trackers, sleep monitoring, orthosomnia, sleep quality, digital health, well-being.

Introduction. Today, many people use smartwatches, fitness bands, smart rings, and mobile apps to track their sleep and learn more about their daily habits. However, because these devices cannot measure all sleep processes directly, some users become too focused on achieving perfect sleep scores. This strong desire for perfect tracker results leads to a problem called orthosomnia, where worrying about sleep data actually makes a person's sleep worse. Therefore, the aim of this study is to explain how consumer sleep trackers work, describe their main limitations, and

examine how digital sleep monitoring affects human well-being.

Medical sleep studies use a special method called polysomnography. This method records brain activity, eye movements, breathing, and muscle work. This helps doctors see sleep stages and find possible illnesses. Home sleep trackers work very differently. They collect information from sensors that measure your movements, heart rate, heartbeat changes, blood oxygen, and skin temperature. Then, a computer program uses these signals to estimate your sleep time, moments you wake up, and sleep stages, like deep and REM sleep. These devices are very useful for checking your daily habits. For example, they help you notice short nights, changes in your bedtime, or sleep problems after stress, traveling, or late exercise. However, it is important to remember that their results are just estimates, not direct measurements of brain activity. Trackers are good at calculating your total sleep time, but they are not so good at finding exact sleep stages or short times when you are awake. Also, they cannot diagnose medical problems like insomnia or sleep apnea. So, if you have signs of a serious sleep disorder, a doctor may advise you to take a real professional sleep study.

Sleep tracking can have a big impact on human well-being. Sleep is a natural process that needs relaxation, but some people treat it as a task to get a high score. This creates stress before bedtime, which makes it harder to relax and causes a negative cycle: worry leads to poor sleep, and poor sleep leads to more worry. Additionally, trackers can sometimes show incorrect results. A person might wake up feeling rested, but become tired and worried after seeing a low sleep score in their app. This is called the nocebo effect, where negative expectations make you feel worse during the day. Because of this, researchers introduced the term "orthosomnia" to describe people who are too focused on getting perfect sleep scores from their devices. These users often trust their trackers more than their own feelings or even real medical tests. To improve their scores, they might spend too much time in bed awake or change their sleep schedule very often. However, these habits actually weaken the connection between the bed and sleep, disrupt the body's natural daily rhythm, and lead to lower sleep quality with more waking periods during the night.

Over time, this constant stress and poor sleep can harm your physical health, causing possible problems with blood pressure, blood sugar, and the heart. While orthosomnia still needs more research, experts advise using sleep trackers only to observe general habits, not exact sleep stages. Sleep data should help you build healthy routines, not cause extra stress. It is always best to pay attention to how you actually feel during the day and use a simple written sleep diary along with your tracker data.

Sleep trackers can be useful when people use them carefully to avoid unnecessary stress. Instead of worrying about one night's score or trying to get perfect results every night, it is better to focus on your general sleep patterns over several weeks. You should pay attention to how you actually feel during the day, rather than looking only at the data in an app. To help with this, you can keep a regular sleep schedule, practice healthy sleep habits, and use a written sleep diary together with your tracker data. If tracking your sleep causes you strong worry, it is a good idea to take a break from the device. Finally, always remember to talk to a healthcare professional if sleep problems continue or start to affect your daily life.

Conclusions. Consumer sleep trackers can help people understand their sleep habits and notice changes over time. However, they estimate sleep stages using movement, heart rate, and other body signals. They do not measure brain activity in the same way as medical sleep studies. The main risk is that users may trust their sleep scores too much. This can increase stress, create negative expectations, and lead to unhealthy sleep habits. The cases described by Baron et al. (2017) show that some people continue to trust their trackers even when medical sleep study results are different. This supports the importance of understanding the limitations of consumer devices. Orthosomnia shows that digital health tools can sometimes cause problems when people focus too much on their results.

Therefore, sleep trackers should be used as tools for observing general patterns, not as a final measure of sleep quality. A balanced approach should combine tracker data, personal well-being, healthy sleep habits, and professional medical advice when needed.

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