



Smart, Personalized Sleep: The Benefits and Risks of Artificial Intelligence and Wearables in the Consumer Sleep Technology Market

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Dear Editor,

Consumer sleep technology (CST) and artificial intelligence (AI) have both grown significantly in recent years, and their intersection is an exciting space for innovation [1–4]. CST driven by AI has the potential to revolutionize how we sleep while also enhancing our entire health, well-being, and quality of life. With advancements in AI and wearable devices, the CST market has emerged as a promising area to address this need [4].

CTSs are computer-aided devices that are becoming increasingly popular among the general people for the goal of enhancing or self-monitoring rest/activity (or sleep/wake) cycle [6]. They aid in the assessment, management, and improvement of sleep, and they provide the pitch with both a challenge and an opportunity [5, 7]. According to P&S Intelligence, the sleep-aid business was worth \$78.7 billion in 2019, and the COVID-19 epidemic has only increased the amount of attention that it has received from specialists. CSTs have the potential to significantly disrupt the traditional landscape of sleep health and medicine; yet, medical experts have voiced concerns about whether these apps or gadgets may help or damage sleep health management [7].

The development of smart sleep trackers is one application of AI in CST [10]. Sensors in these devices monitor a person's sleep patterns, including duration, depth, and

quality [4, 10]. The data can then be analyzed by AI-assisted algorithms to provide personalized insights and recommendations to improve sleep habits [4]. Another application of AI in CST is in the diagnosis and treatment of sleep disorders [10]. AI algorithms can analyze sleep data to detect anomalies and potential sleep disorders, such as insomnia or sleep apnea [11]. Individuals can then be given personalized treatment plans based on this information (Fig. 1).

AI-powered CST can also be used to create personalized sleeping environments. Smart devices can adjust the temperature, lighting, and noise levels in a room to create a more comfortable and conducive sleeping environment, which can lead to improved sleep quality [10].

Based on preliminary data, this paper examines the benefits and risks of incorporating AI and wearables into CST, focusing on the potential effects on consumer behavior, sleep quality, and data privacy. This paper emphasizes the need for a balanced approach to technology adoption through a comprehensive analysis of the current market landscape, emphasizing the importance of maintaining user trust and addressing potential unintended consequences. Table 1 provides a summary of the benefits and risks of AI and CST in sleep medicine.

The convergence of CST and AI has the potential to significantly improve our sleeping habits and overall health. We can expect to see even more innovative applications of AI in CST as technology advances. The integration of AI and wearable devices in the CST industry provides prospective benefits, such as tailored sleep insights and increased sleep quality. However, the risks of data privacy, overreliance on technology, and sleep data accuracy should be considered. Companies must address these concerns as CSTs expand and ensure that their solutions give accurate and trustworthy data to preserve customer confidence. Individuals who take a balanced approach to technology adoption will be able to reap the benefits of AI-powered wearables while mitigating potential risks. More evidence-based, larger clinical research

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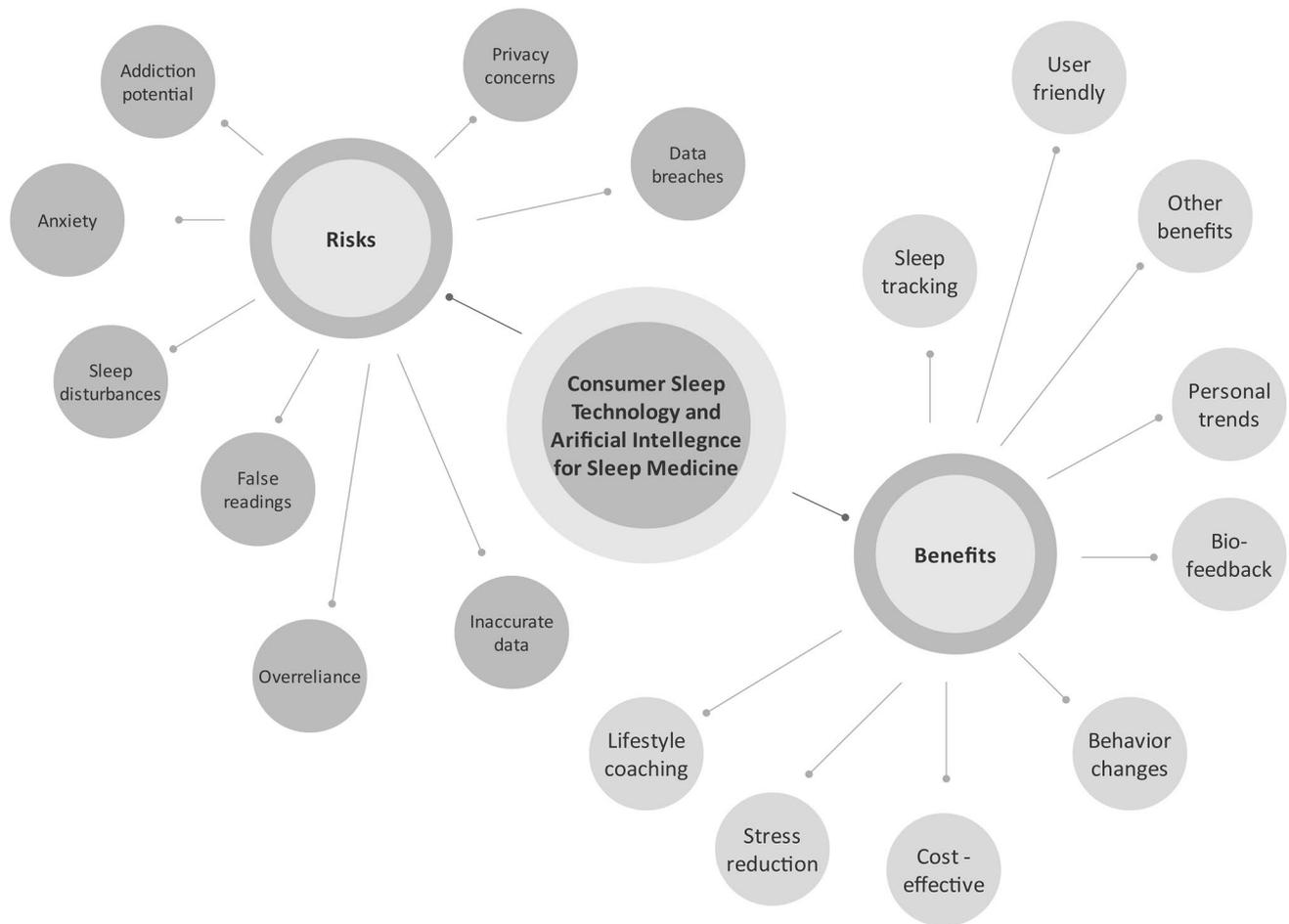


Fig. 1 The benefits and risks of AI and wearables in the CST market

Table 1 Summary of the benefits and risks of AI and CST in sleep medicine

Benefits	Risks
<p>Personalized sleep insights: AI-powered CSTs can provide personalized insights into individual sleep patterns, allowing users to better understand their sleep habits and make informed decisions about their sleep hygiene. These technologies can identify sleep disturbances, track sleep quality over time, and provide users with actionable feedback by analyzing data collected from wearable devices [3]</p>	<p>Concerns about data privacy and security: the collection and analysis of personal sleep data raise questions about data privacy and security. Because CSTs rely on continuous data collection, sensitive information may be compromised. To maintain user trust, businesses must implement strong data protection measures and be transparent about their data collection practices [9]</p>
<p>Possible improvements in sleep quality and duration: the primary goal of CSTs is to improve sleep quality and duration. According to research, personalized feedback and recommendations can result in positive behavioral changes, resulting in improved sleep hygiene and overall sleep quality. AI-powered wearables may promote healthier sleep habits by providing users with data-driven sleep improvement strategies [1]</p>	<p>Overdependence on technology: while AI-powered wearables can provide valuable insights, over-dependence on technology may cause people to ignore their internal signals of sleepiness and fatigue. Users must strike a balance between using technology and listening to their bodies [4]</p>
<p>Accessible and affordable: because of the integration of AI algorithms and wearable devices, sleep monitoring is now more accessible and cheaper. CSTs are less costly and less intrusive than typical clinical sleep tests, making them an intriguing choice for those wishing to improve their sleep quality [8]</p>	<p>Sleep data accuracy and reliability: the accuracy and reliability of sleep data collected by consumer wearables may fall short of clinical-grade sleep monitoring equipment. This can result in incorrect sleep data interpretation and recommendations. Users should exercise caution when solely relying on CSTs to diagnose or treat sleep disorders [2]</p>

AI artificial intelligence, CST consumer sleep technology

is needed, as well as collaboration between industry and academics, to get the desired outcomes.

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Declarations

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