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Peer Review

Review of: "Exploring the Multidimensional Influences on Sleep and Active Heart Rate Dynamics: A Comprehensive Study"

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I would like to express my gratitude for the opportunity to provide a review of this article, the aim of which is to explore the factors influencing heart rate dynamics during sleep and wakefulness among college students.

Allow me to highlight some key aspects:

The article presents an in-depth longitudinal study examining the influence of social, personal, psychological, environmental, and behavioural factors on sleep and waking heart rates. Utilising data collected from 487 participants over 637 days via wearable devices, the study employs latent growth curve models to analyse heart rate trajectories and their associations with various factors.

One of the study's strengths is its multidimensional approach, considering a wide range of potentially influential factors. However, it should be noted that some results appear to be reported in the methods section rather than the results section, which could create confusion for the reader. It is recommended that the authors undertake a thorough review of the article's structure to ensure that the results are presented in a clear and organised manner, and that the appropriate section is used for this purpose. For example, this "*A significant majority of the participants (98.55%) reported their health as ranging from fair to excellent"* is written in the methods, but it's a result, so it should be inserted in the right section.

In the Materials and Methods section, it is written "*Data accuracy was ensured through meticulous collection protocols",* and it could be better to explain which protocols were used.

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Another area that merits attention is the impact of diet and physical activity on heart rate. While the study examined physical activity, it did not appear to consider the influence of diet and specific nutrient intake. It is acknowledged that diet exerts a considerable influence on cardiovascular health and heart rate, and it is therefore recommended that future studies in this field include a detailed analysis of participants' dietary habits.

Furthermore, while the study explored the association between physical activity and heart rate, it is recommended that the impact of different types and intensities of physical activity on heart rate regulation be further investigated. For example, a comparison of the effect of aerobic exercise versus resistance training or light physical activity could provide more detailed insights into optimal strategies for improving cardiovascular health.

This study provides a comprehensive examination of the factors that influence heart rate dynamics during both sleep and wakefulness. However, as suggested, greater attention to the impact of diet and a more detailed analysis of physical activity could further enhance our understanding of this crucial topic for cardiovascular health.

Dietary choices can significantly impact cardiac activity and heart rate regulation through various mechanisms. Excess caloric intake leading to obesity increases the workload on the heart, potentially elevating resting and active heart rates. High sodium consumption promotes fluid retention, raising blood volume and heart rate. Stimulants like caffeine directly stimulate the sympathetic nervous system, increasing heart rate. Diets high in saturated and trans fats contribute to arterial stiffness and hypertension, straining the heart. Nutrient deficiencies, particularly in potassium, magnesium, and B vitamins, can disrupt normal cardiac function and heart rate regulation. Furthermore, pro-inflammatory diets rich in processed foods and unhealthy fats may promote chronic low-grade inflammation, adversely affecting cardiovascular health and heart rate patterns.

Declarations

Potential competing interests: No potential competing interests to declare.