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Promoting the Optimal Sleep Duration to Reduce All-Cause Mortality: Implications for Achieving Sustainable Development Goal 3

Yitong Sun

School of Business, Lingnan University, Hong Kong, China
yitongsun@Ln.hk

Abstract. This study aims to use the approach of solving the potential risks of sleeping to help the United Nations to achieve its Sustainable Development Goal 3. To achieve this goal, this essay will analyze the relationship between sleep duration and all-cause mortality risk when paying more attention to people having fewer sleeping hours, then providing relevant strategies to ensure this can help to achieve the Sustainable Development goals. A systematic literature review from 2004 to 2024 was conducted to figure out such correlation. After doing this, the search result showed that there is a U-shaped relationship between two factors. This U-shaped correlation indicates that people having 7-8 hours sleep will meet lowest mortal risk, but a higher risk will be experienced by people who have longer (>8) or shorter sleep hours (<7). However, such relationship can be further affected by gender and age- a larger moral risk can be found in males having shorter sleep and females having longer sleep hours. In addition, such U-shaped association can be more visible in 65 and more than 65-year-old age groups, meaning that a medium-sized sleep duration can make them healthier. According to such foundational findings, this study tries to help United Nations to achieve its sustainable goals through emphasizing the significant roles displayed by age and gender in promoting healthy sleep duration.

Keywords: Sleep duration, All-cause mortality, U-shaped correlation, Sustainable Development Goal 3 / SDG 3

1. Introduction

Sustainable Development Goal 3 is a central component of the United Nations Sustainable Development Goals. Within this agenda, Target 3.4 aims to reduce the number of premature deaths from non-communicable diseases through precaution, treatment, and the promotion of physical and mental health by 2030 [1]. In this context, sleep duration emerges as a critical and overlooked, determinant of health outcomes.

20 years ago, substantial evidence showed that there is association between longer and shorter sleep duration negative healthy results, such as all-cause mortality, cardiovascular disease, respiratory disorders, obesity, and poor self-rated health [2]. Due to this, sleep hour is a key factor in leading non-communicable diseases. Addition to this, sleep related problems become more obvious,

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affecting around one in three of the whole population. Poor sleep, sleep difficulty, sleep insufficiency are often reported [3]. All these indicates the significant effect brought by sleep on changing risk factors, also emphasize the necessary to consider sleep during the process to achieve the sustainable goals.

Previous literature has indicated there is a U-shaped correlation between sleep duration and all-cause mortality. Longer sleep hours, such as 9 or more hours, will put people at a higher mortal risk. Pooled analyses also show that shorter sleep hours, such as less than 6 hours, will make people less healthy [2]. Hoever, there is no consensus regarding the effects brought by age and other factors on such shaped relationship. This research hopes to fill the gap through analysing how such factor can influence the correlation between such forces and all-cause mortality risk.

Accordingly, the objectives of this essay are to:

1. Utilize the previous literature to figure out the relationship between all-cause mortality and sleep hours.
2. Examine the roles displayed by age and gender difference in influencing morality risk.
3. Provide suggestions from different levels to spread the importance of optimal sleep hours and help achieve such goal.

2. Methodology

This study employs a systematic literature review to collect and analyse evidence on the link between sleep duration and all-cause mortality. The relevant studies and reports were sourced from peer-reviewed papers, reports from authoritative institutions, and large-scale cohort studies published between 2004 and 2024.

2.1. Search strategy

The data for this paper were obtained from commonly used academic search engines, including Google Scholar and Web of Science. Google Scholar is the main source of the references cited in this essay. The key search terms included *sleep duration*, *all-cause mortality*, *life expectancy*, *non-communicable diseases*, *longer and shorter sleep duration*, *gender difference and mortality risk*, *age differences and mortality risk*,and *SDG 3*.

2.2. Inclusion and exclusion criteria

The inclusion criteria were:

1. Human cohort studies with a follow-up period exceeding 5 years.
2. Studies with clear sleep assessment indicators, including objective measurements of sleep duration or quality, or a standardised questionnaire.
3. Studies that clearly reported mortality risks associated with sleep or life-expectancy data.

The exclusion criteria were:

1. Studies with a small sample size.
2. Studies that only targeted specific populations or patients with specific illnesses.

2.3. Data extraction and synthesis

Initially, this study identified a large number of relevant articles. After applying the inclusion and exclusion criteria, 30 core articles were selected for in-depth analysis, including publications from authoritative global institutions such as the American Academy of Sleep Medicine and the World

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Health Organisation. The extracted data were categorised according to sleep-duration groups (<6 hours, >8 hours) and the corresponding mortality-risk ratios. These data were then synthesised and presented graphically (Figures 1–3) to illustrate the overall correlation between sleep duration and mortality, as well as the modifying effects of gender and age.

3. Result and discussion

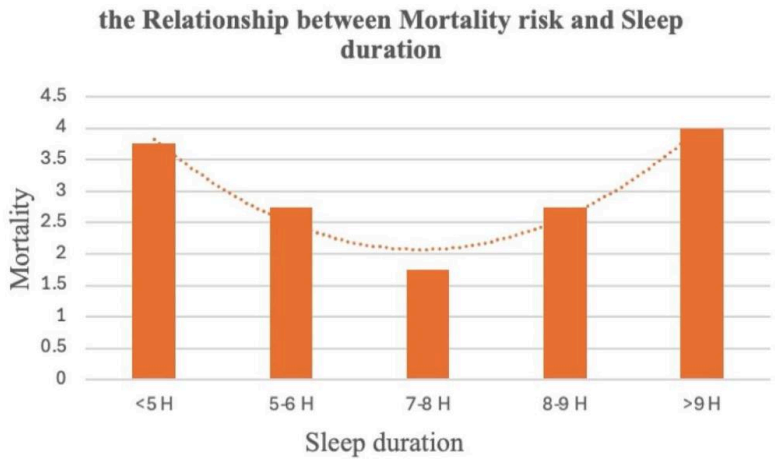


Figure 1. Overall correlation between sleep duration and mortality

A U-shaped relationship is observed between sleep duration and all-cause mortality. Compared with the optimal range of 7–8 hours, both two conditions are associated with a higher risk of mortality, supporting the findings of Cappuccio et al. [2]. This indicates that maintaining 7–8 hours of sleep is related to the better health outcomes and contributes to achieving Sustainable Development Goal 3.

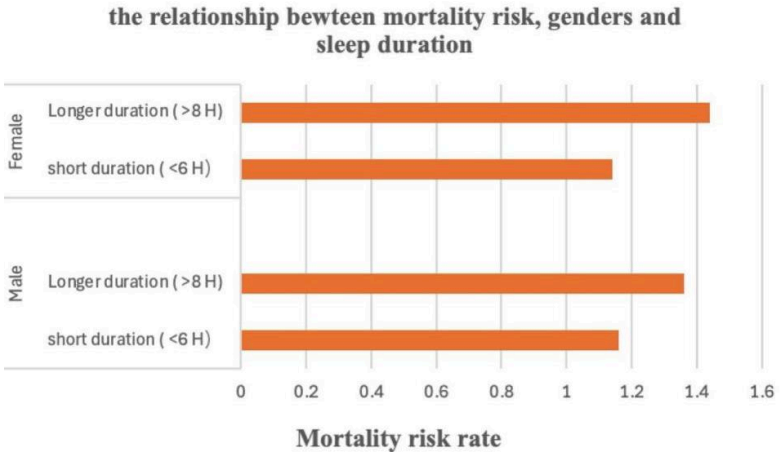


Figure 2. Gender differences in mortality related to sleep hours

For short sleep duration (<6 hours), males experience higher increase in mortality risk compared to that experienced by females. For long-time sleep, females meet a larger increase in morality risk than that met by males. Both findings can be used to support these found by Cappuccio et al. [2], both shorter and longer sleep periods can be linked to a higher possibility of mortality.

However, Åkerstedt et al. [4] report a more detailed pattern, after controlling variables, shorter and longer sleep hours can provide noticeable HRs for all-cause and cardiovascular-disease

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mortality risk. Additionally, higher HRs could only be found in males when they sleep for a longer period, which is consistent with previous finding. Despite considering other gender-related factors, the sleep between 7 to 8 hours is still optimal and put people at a lower morality risk.

Such results demonstrate that gender also plays a significant role, emphasizing the requirement to design gender-related sleep guidance to speed up the progress to achieve the Sustainable Development Goal 3.

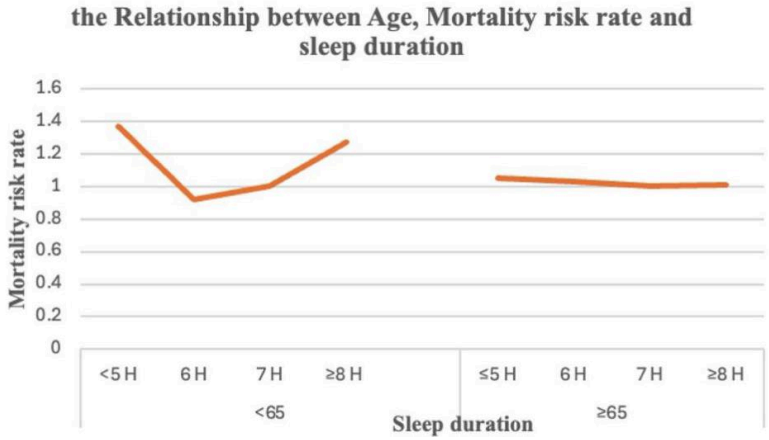


Figure 3. The age differences in all-cause mortality risk related to sleep duration

Among adults aged under 65, sleep duration and mortality show a clear U-shaped relationship. When they sleep exceed 7 hours, the morality risk will increase dramatically, which supports previous results [2].

Among adults aged over 65, there is no longer a U-shaped relationship exists. Åkerstedt et al. [5] also got the same result. This means that the morality risk is not influenced by sleep hours. Such phenomenon may be caused by the changes in age-related structure, lacking sleep is just a step of being old and has no correlation with diseases. So for older people, the first choice is to help them fall in sleep rather than forcing them sleep for 7 to 8 hours.

These findings demonstrate a consistent correlation between sleep duration and all-cause mortality. Sleep duration can help cut the mortality risk, 7–8 hours can be healthier more people below 65 years old. Although gender and age modify the strength of the association, 7–8 H consistently provides lowest risk. Promoting this optimal sleep duration is therefore an important strategy for meeting Sustainable Development Goal 3 (SDG 3).

4. Limitations

First, this study does not fully account for potential confounding factors, as variables such as socioeconomic status, mental health, and other relevant influences were not consistently considered across the included studies. Second, the most selected references cited were carried out in Western populations, which may restrict the generalisability of such findings to other cultural and demographic contexts.

5. Recommendations

Adults aged 18–65 should set 7-8 sleep hours as their primary goal. To help them achieve such goal, there is a suggestion for them, they need to develop the sleeping hygiene habits, such as sleeping

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without using electronic devices, keeping routine sleeping schedule and creating comfortable sleeping atmosphere.

For younger adults, the promotion emphasis should be on helping them notice the importance of sleeping sufficiency. For young males, they need to recognize the negative effects related to their insufficient sleep hours caused by late-night gaming and working. For older adults, they need to pay more attention on sleep quality rather than sleep period.

Shifting the perspective from individuals to community, the awareness of healthy sleep could be increased through distributing sleep-related information through social media and promotional brochures. The promotional concepts should also be tailored to specific groups. For young people, the consequences of insufficient sleep need to be focused. For older people, the importance of sleep quality and the potential health risks should be emphasised.

A cooperation can be established by communities and local hospitals, such as setting sleep-assessment points, offering free sleep-evaluation services and integrating sleep duration into routine health resident checks.

6. Conclusion

The findings illustrate that there is a U-shaped correlation between sleep hours and all-cause mortality, the lowest risk can be found at 7-8 sleep hours and a higher risk at longer and shorter sleep hours. This pattern is consistent among people below 65 years old.

This essay also transform these findings into detailed suggestions that help people notice the importance of having optimal sleep duration to help United Nations to achieve its Sustainable Development Goal 3.

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