

The Association between Sleep Quality, Emotional Stress, Diseases and PM2.5 Exposure among Residents in Taipei Metropolitan Area

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Introduction

Air pollution may lead to sleep disorders, but whether it affects the sleep quality in the early stages is still unclear. Sleep quality is often influenced by personal emotions and even diseases. Therefore, this study aims to explore the relationship between sleep quality, emotional stress, diseases, and PM2.5 exposure.

Methodology

- We recruited study subjects without major illnesses and conducted questionnaire in outpatient of family medicine in Taipei City Hospital from 2022 to 2023.
- We applied the Pittsburgh Sleep Quality Index and Depression Anxiety Stress Scales 21 on study subjects. The daily average PM_{2.5} concentration over the past one year for each study subject was estimated by local monitoring data and modeling.
- The Wilcoxon signed-rank test was used to analyze the associations between sleep quality, stress, anxiety, depression and disease. Furthermore, it was used to compare the differences on normal or bad sleep quality and PM2.5 exposure after eliminating emotional problems and diseases problems.

Result

Figure 1. Differences in Average Sleep Scores Between Those With and Without Various Diseases.

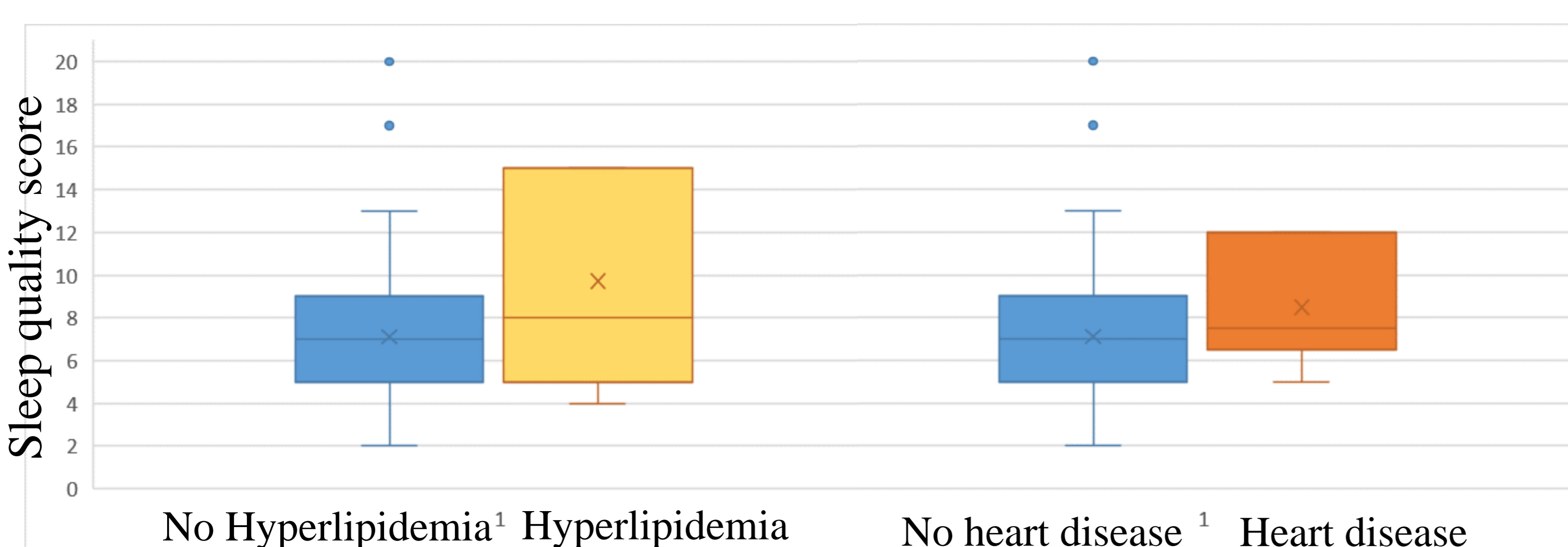
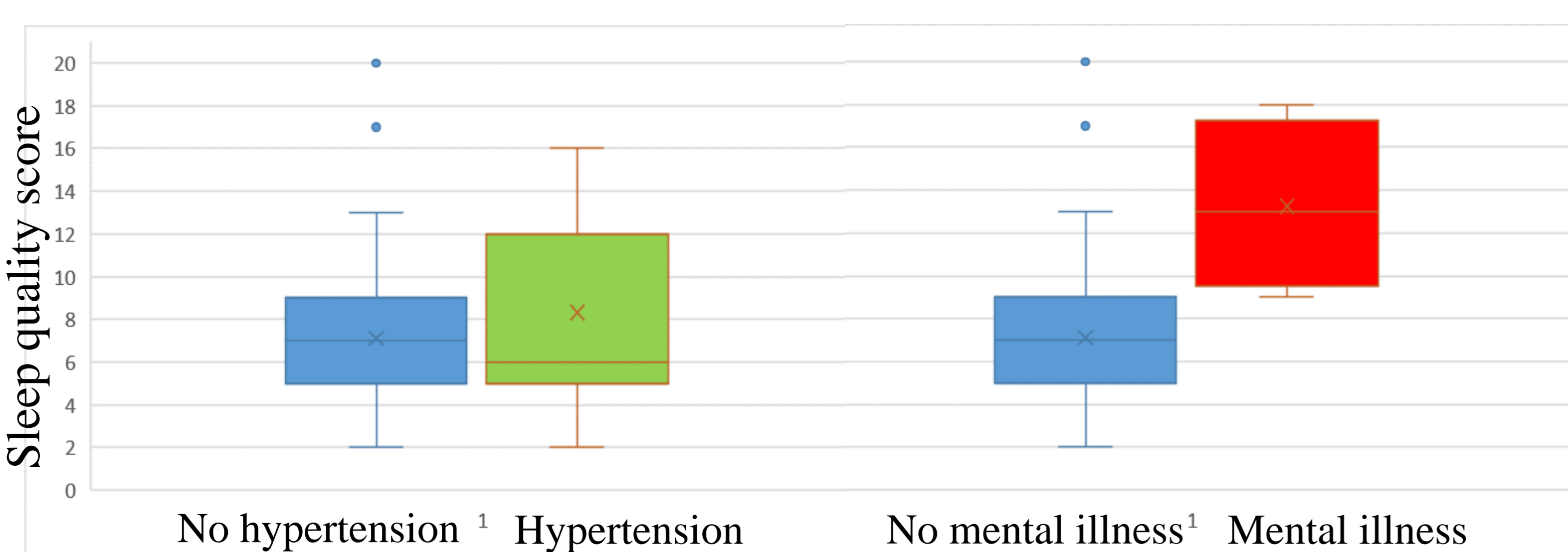


Figure 2. Differences in Average Sleep Scores Between Those With and Without Stress, Depression and Anxiety.

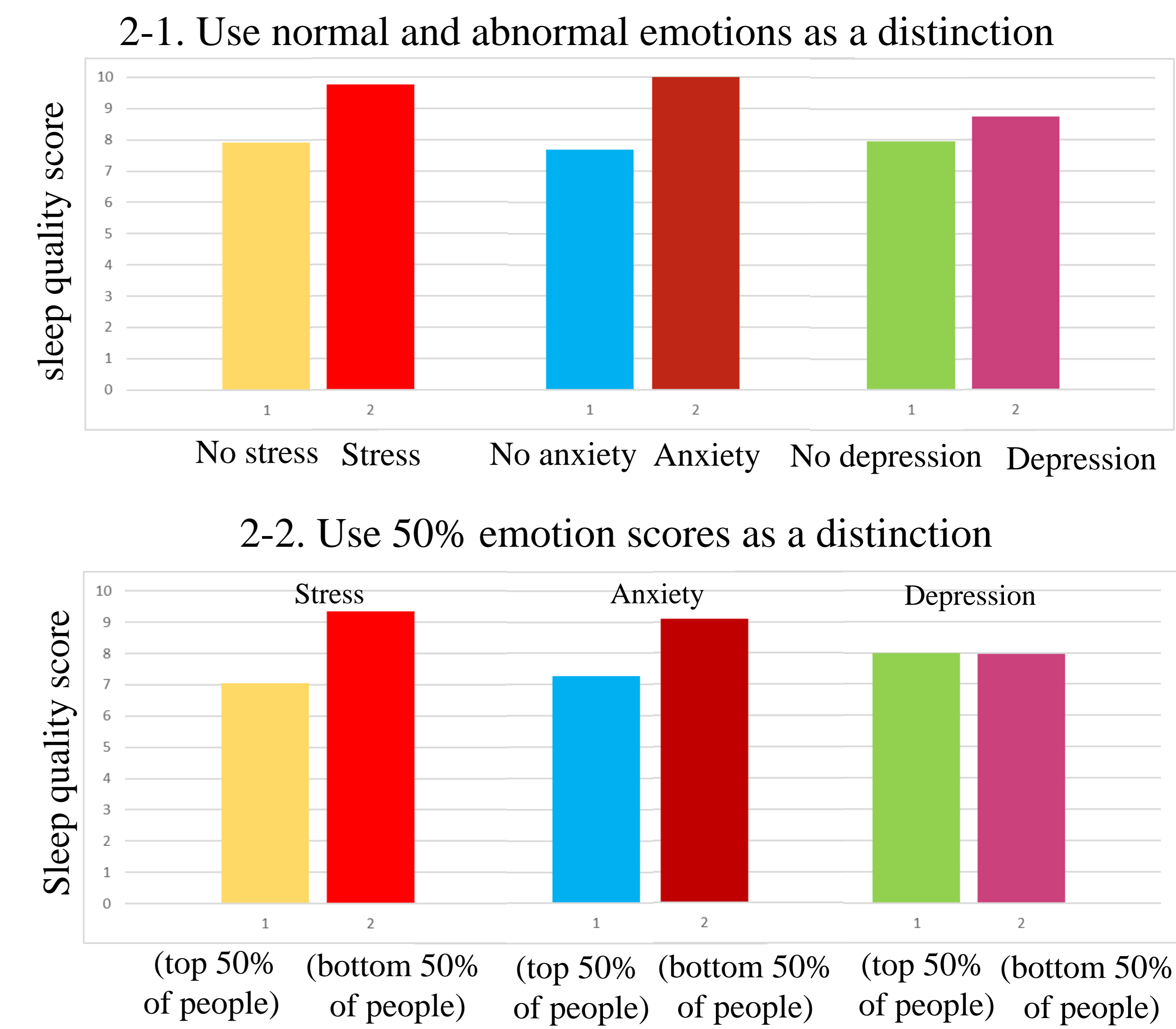
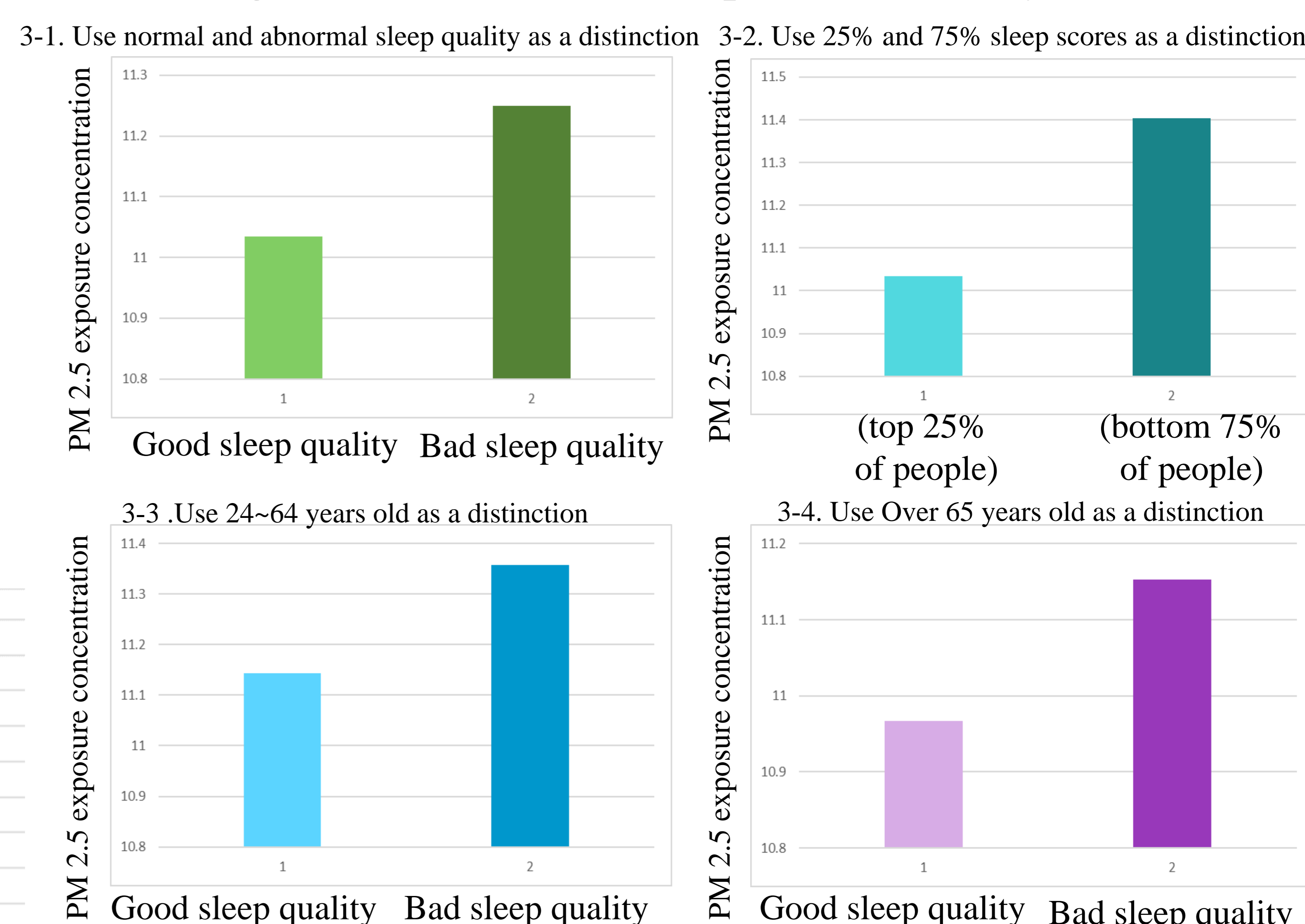


Figure 3. The Relationship Between Sleep and PM2.5 after Excluding the Effects of Stress, Depression, Anxiety, and Diseases.



Conclusions

- Stress, anxiety, depression, and four diseases may cause bad sleep quality scores.
- Exposure to PM 2.5 may cause poorer sleep quality, even after controlling for stress, anxiety, depression and 4 diseases
- Age above or below 65 were both found that those with bad sleep quality were exposed to significantly higher PM2.5 concentrations when compared to normal ones.
- This study provides evidence of the impact of air pollution on sleep quality, and longer-term causal relationships can be further explored.