Associations between sleep and mental health outcomes in the Newcastle Thousand Families Study

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Introduction

- Poor sleep quality is a risk factor for poor mental health, and the different aspects of sleep quality may each contribute to poor mental health
- Few studies have been done in the elderly
- This study aimed to establish the association between sleep quality and mental health scores and determine effect sizes in the Newcastle Thousand Families birth cohort, and whether there were sex differences

Methods

- Sleep quality and mental well-being data taken from a birth cohort aged 60
- Sleep quality and mental well-being were measured by the Pittsburgh Sleep Quality Index with 7 subdomains (PSQI) and General Health Questionnaire-28 with 4 subdomains (GHQ-28)
- Linear and fractional polynomial regression models were created to assess the association and effect sizes between sleep quality and mental health for both global and subdomain scores.
- Multivariable linear regression was performed on potential confounders sex, socioeconomic status, BMI, smoking status, pack years smoked, chronic pain, and pain severity

Results

- 434 respondents returned questionnaires, 357 remained after excluding respondents with missing data
- Baseline sleep quality and mental health were on average worse in women compared to men. (6.13 vs. 4.79 for PSQI, 17.43 vs. 14.98 for GHQ-28)
- PSQI scores and GHQ-28 scores were significantly associated ($\beta = 0.91$, $p<0.001$)
- Most of the 7 subdomains of sleep quality as assessed by the PSQI were significantly associated with 4 of the GHW-28 subdomains
- The effect sizes of the association between the subdomains were larger for the subdomains “subjective sleep quality”, “sleep disturbance”, and “daytime dysfunction”
- No sex interaction was found, but a possible albeit non-significant (p=0.1292) interaction was found with smoking status.
- Pain severity was independently significantly associated with mental well-being. (p<0.001) It was also found to be a confounder

Linear Regression Analysis of Total PSQI Score and Subdomains with Total GHQ scores

Variable	Overall GHQ Score		
	Unadjusted [95% C.I.] *p-value*	**Adjusted for pain severity [95% C.I.] *p-value***	**Adjusted for all potential confounding [95% C.I.] *p-value***
Total PSQI score	1.17 [0.94,1.40] *p < 0.001*	1.02 [0.80,1.25] *p < 0.001*	0.91 [0.66,1.15] *p < 0.001*
Subjective sleep quality	5.54 [4.39,6.68] *p < 0.001*	4.80 [3.70,5.89] *p < 0.001*	5.02 [3.73,6.31] *p < 0.001*
Sleep latency	2.61 [1.81,3.41] *p < 0.001*	2.10 [1.29,2.91] *p < 0.001*	1.99 [0.98,3.00] *p < 0.001*
Sleep duration	3.07 [1.82,4.33] *p < 0.001*	2.66 [1.57,3.76] *p < 0.001*	2.45 [1.16,3.75] *p < 0.001*
Sleep efficiency	2.92 [2.11,3.74] *p < 0.001*	2.44 [1.69,3.20] *p < 0.001*	2.16 [1.19,3.14] *p < 0.001*
Sleep disturbance	6.94 [4.92,8.96] *p < 0.001*	5.66 [3.61,7.71] *p < 0.001*	4.53 [2.27,6.78] *p < 0.001*
Use of sleep medication	2.15 [0.78,3.51] *p = 0.002*	1.17 [-0.25,2.59] *p = 0.107*	1.16 [-0.33,2.65] *p = 0.126*
Daytime dysfunction	7.26 [5.84,8.67] *p < 0.001*	6.63 [5.23,8.02] *p < 0.001*	5.86 [4.32,7.41] *p < 0.001*

Table 1. Linear regression coefficients of PSQ and its subdomains with GHQ

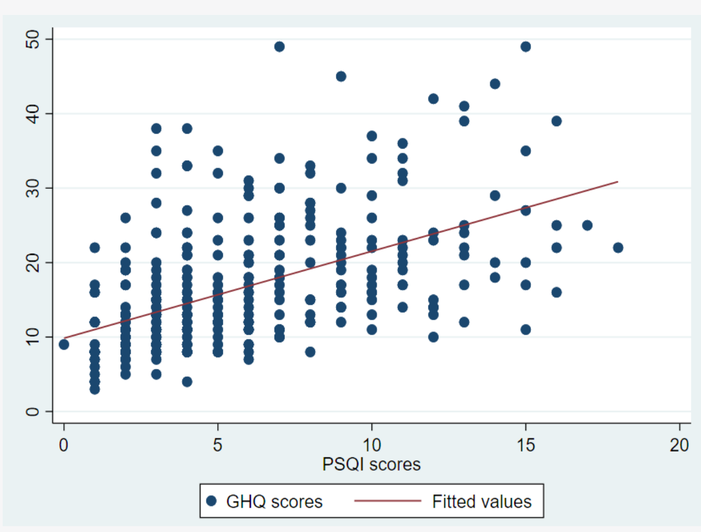

Figure 1. Linear fit of the association between GHQ and PSQI

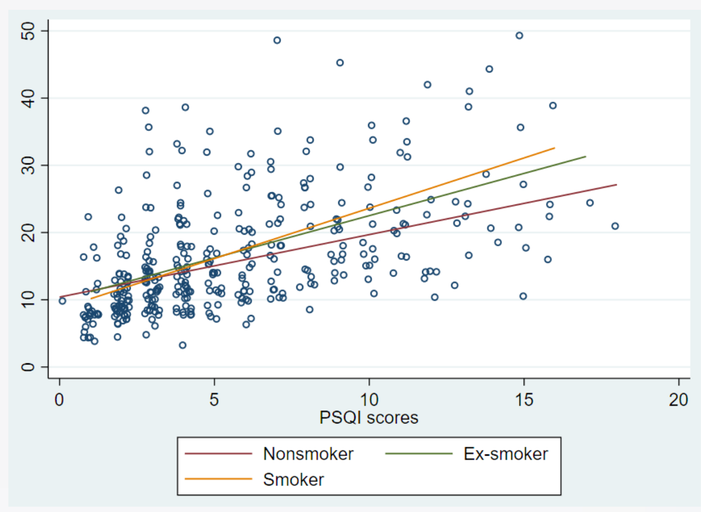

Figure 2. Potential effect modification in smokers

Discussion

- The results are in line with the literature suggesting women typically have worse sleep quality and mental health.(1)
- The results support that poor sleep quality is significantly associated with poor mental health. However, assessing causality is not possible due to the cross-sectional study design
- The exception to the associations was the subdomain “use of sleep medication” which was not found to have a significant association with the four subdomains after adjusting for confounders. This may be due to low power as there were only 35 respondents taking medication.
- Lack of power was also an issue when assessing the GHQ subdomain “severe depression”
- Sleep quality may have a stronger impact on overall mental health compared to sleep duration. The subdomains with larger effect sizes mainly concerned sleep quality.
- A sex interaction was not found in the study, however a previous study reported that there may be an interaction(1), it may have not been detected in this study.
- Smoking status as a possible interaction term was not expected. Due to the small number of current smokers in the cohort (n=44), the insignificant result may be due to a lack of power.

Conclusion

- Women experience worse baseline sleep quality and mental health relative to men
- Sleep quality is significantly associated with mental health. The subdomains of sleep quality are also significantly associated with the subdomains of mental health
- Smoking is a likely effect modifier in the association between sleep quality and mental health.

Future Work

Further work focusing on smoking as a possible effect modifier, or with cohorts taking sleep medication or hose with clinical depression may help in addressing the shortcomings of this study.

References

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