Project Title

Association between Sleep Quality and Quality of Life in Singapore

Project Lead and Members

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Organisation(s) Involved

Research Division, Institute of Mental Health

Healthcare Family Group(s) Involved in this Project

Clinical research, Allied Health

Applicable Specialty or Discipline

Population Health

Project Period

Start date: July 2016

Completed date: March 2018

Aims

1) To investigate the associations between sleep quality and health-related quality of life in Singapore
2) To examine whether age moderates these associations.

Background

See attachment

Methods

See attachment

Results

See attachment

Lessons Learnt

The association between poor sleep quality and health-related quality of life changes throughout our lifespan. Age-specific interventions can be explored to target specific parameters that adversely affect sleep quality.

Conclusion

See attachment

Additional Information

Singapore Health & Biomedical Congress (SHBC) 2022: Singapore Allied Health Award (Oral category) – (Gold Award)

Project Category

Applied/ Translational Research

Quantitative Research

Care Continuum

Population Health: physical/mental health

Keywords

Sleep Problems, Sleep Quality, Health-Related Quality of Life (HRQOL), Mental Health, Physical Health
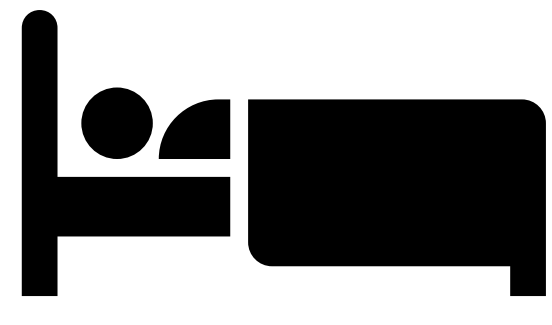
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Association between Sleep Quality and Quality of Life in Singapore Population

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Background

Sleep problems are increasingly common worldwide, with a global prevalence of 1.6% to 56%[1]. This could be detrimental to one's physical and mental health as poor sleep quality increases the risk of type 2 diabetes, anxiety and depression[2-4].

- Several local studies have found a direct relationship between one's sleep quality and health-related quality of life (HRQOL)[5,6]. However, limited studies have investigated this association in a nationwide setting.
- Sleep quality may also differ across lifespan, as older adults were shown to have lower percentage of deep slow wave sleep than younger adults[7].
- As sleep quality is a modifiable factor, understanding this association may allow relevant organisations to mitigate both sleep and health-related problems.

Aims

1) To investigate the associations between sleep quality and HRQOL in a nationwide context.
2) To examine whether age moderates these associations.

Methodology

The dataset were from Singapore Mental Health Study 2016 (SMHS 2016), which was a cross-sectional study intended to estimate the prevalence of mental disorders in Singapore.

- 6126 participants were interviewed between Aug 2016 to Apr 2018, with a response rate of 69.0%. Socio-demographic and chronic conditions were collected.
- **Pittsburgh Sleep Quality Index (PSQI)** was used to measure participant's sleep quality. It has 19 questions which encompassed the 7 subdomains of sleep quality. PSQI sleep quality score can be calculated from the responses, with higher scores indicating a poorer sleep quality.

PSQI Sleep Quality
(Sleep duration, Sleep efficiency, Subjective sleep quality, Sleep disturbance, Daytime dysfunction, Sleep latency, Use of sleeping medication)

- **Short-Form 12 (SF-12)** was used to measure participants' HRQOL. It has 12 questions, with each corresponding to 1 of 8 subdomains of HRQOL. Two main summary scores can be calculated based on the 12 scores: **Physical component summary** and **Mental component summary**, whereby a higher score indicated a better HRQOL.

PCS — General Health, Physical functioning, Role physical, Bodily pain
MCS — Mental Health, Social functioning, Role emotional, Vitality
HRQOL

- Multivariable linear regressions were used to analysed the associations while adjusting for control variables. Moderation effect was examined by including interaction terms individually.
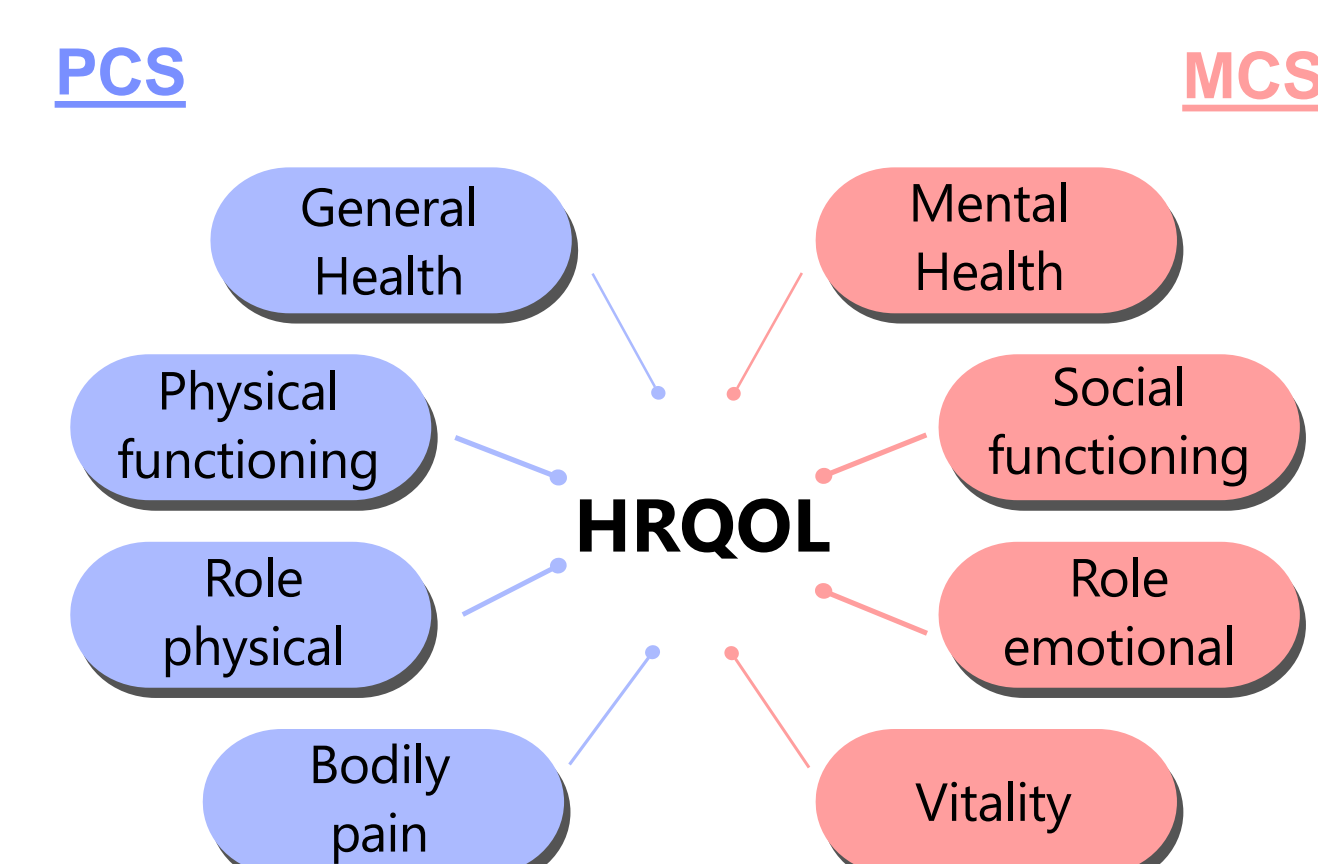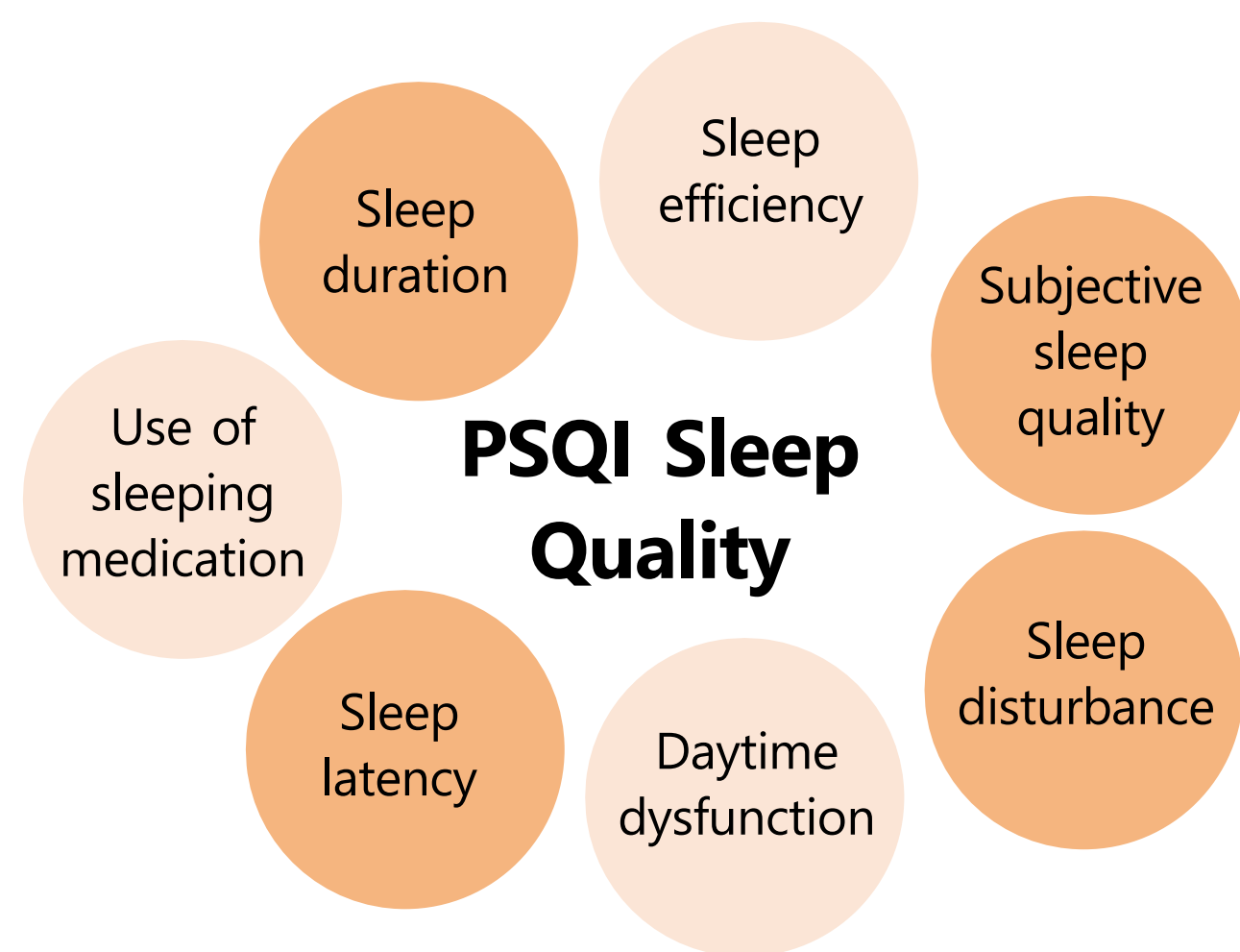
Results

Figure 1. Summary statistics of sample population

N= 6126

Age groups: 18-34, 30.44%; 35-49, 29.61%; 50-64, 26.87%; 65+, 13.08%
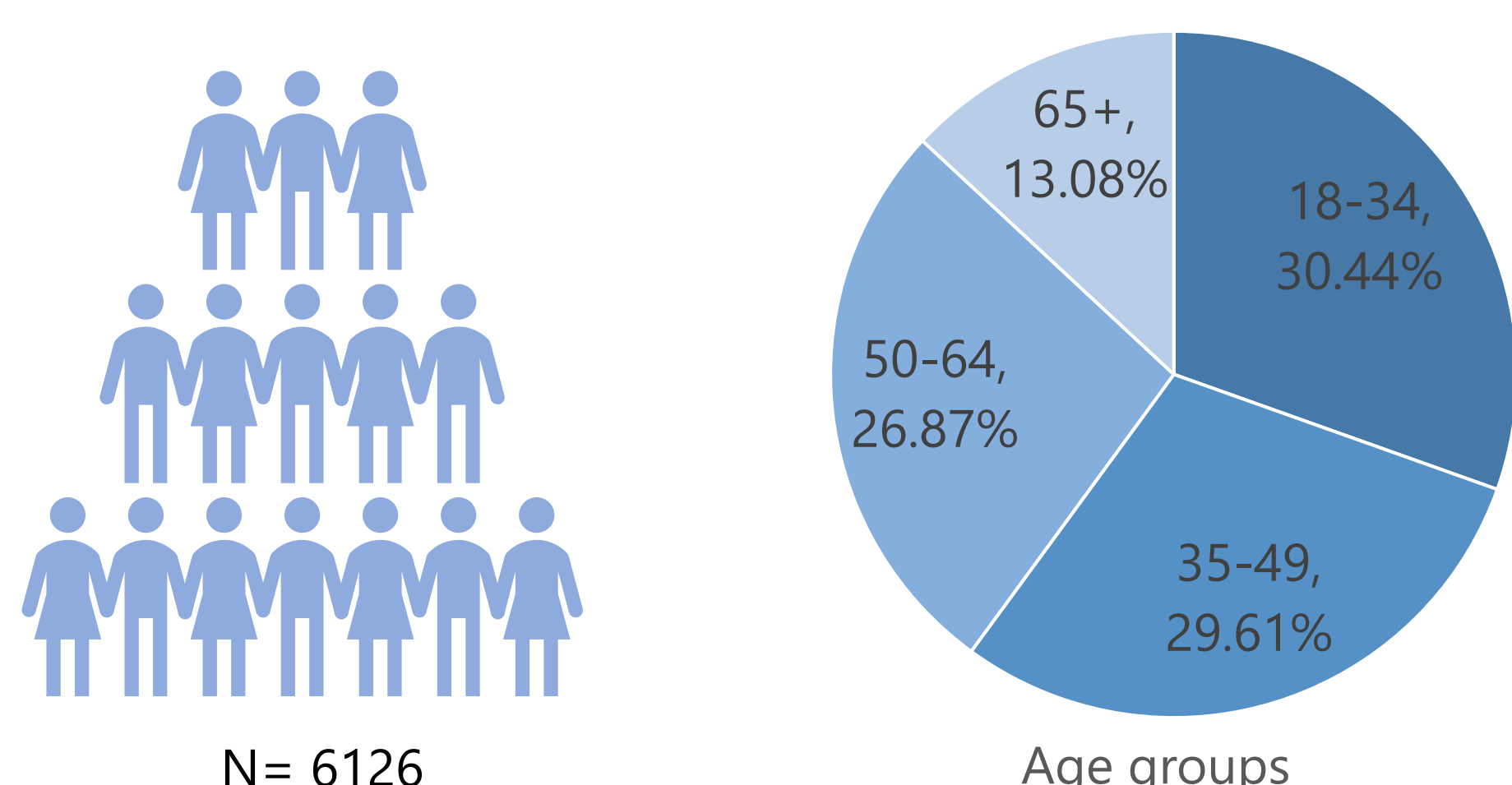
- Most of the participants were aged 18-34 years old (30.44%), female (50.42%), of Chinese ethnicity (75.72%), currently married (59.76%), with a monthly household income of SGD6000 – 9999 per month (21.80%), had university educational qualification (29.42%), non-smoker (73.37%), non-drinker (50.37%), had normal body mass index (53.99%), no chronic condition (46.16%) and no mental illness (86.09%)

Results (cont.)

Table 1. Linear regressions examining associations between sleep quality score with PCS and MCS

	PCS [#]		MCS [#]	
	β (95% CI)	p-value	β (95% CI)	p-value
PSQI Sleep Quality score	-0.44 (-0.52 to -0.35)	< 0.001	-0.73 (-0.82 to -0.64)	< 0.001
Components of PSQI				
Subjective sleep quality	-1.06 (-1.47 to -0.64)	< 0.001	-1.36 (-1.81 to -0.92)	< 0.001
Sleep latency	0.05 (-0.11 to 0.21)	0.562	-0.24 (-0.41 to -0.06)	0.008
Sleep duration	-0.30 (-0.49 to -0.11)	0.002	0.07 (-0.13 to 0.26)	0.499
Sleep efficiency	0.01 (-0.005 to 0.02)	0.200	-0.001 (-0.02 to 0.01)	0.879
Sleep disturbance	-0.33 (-0.41 to -0.24)	< 0.001	-0.16 (-0.25 to -0.08)	< 0.001
Use of sleeping medication	-0.54 (-1.33 to 0.25)	0.178	-1.12 (-1.97 to -0.27)	0.010
Daytime dysfunction	-0.75 (-1.09 to -0.42)	< 0.001	-2.08 (-2.51 to -1.65)	< 0.001

Table 2. Linear regressions examining associations between sleep quality and its component with PCS and MCS, moderated by age

	PCS [#]		MCS [#]	
	β (95% CI)	p-value	β (95% CI)	p-value
PSQI Sleep Quality score				
18-34 years old	-0.16 (-0.28 to -0.05)	0.005	-0.90 (-1.07 to -0.74)	< 0.001
35-49 years old	-0.40 (-0.53 to -0.28)	< 0.001	-0.77 (-0.96 to -0.58)	< 0.001
50-64 years old	-0.65 (-0.84 to -0.47)	< 0.001	-0.62 (-0.78 to -0.47)	< 0.001
65+ years old	-0.71 (-0.95 to -0.46)	< 0.001	-0.45 (-0.67 to -0.24)	< 0.001
Subjective sleep quality				
18-34 years old	0.004 (-0.52 to -0.53)	0.989	-2.07 (-2.80 to -1.35)	< 0.001
35-49 years old	-0.87 (-1.46 to -0.28)	0.004	-0.88 (-1.56 to -0.20)	0.011
50-64 years old	-1.78 (-2.60 to -0.96)	< 0.001	-1.51 (-2.26 to -0.77)	< 0.001
65+ years old	-2.84 (-4.09 to -1.59)	< 0.001	-0.20 (-1.10 to 0.70)	0.666
Sleep disturbance				
18-34 years old	-0.16 (-0.28 to -0.05)	0.005		
35-49 years old	-0.34 (-0.48 to -0.20)	< 0.001		
50-64 years old	-0.42 (-0.57 to -0.28)	< 0.001		
65+ years old	-0.61 (-0.86 to -0.36)	< 0.001		
Daytime dysfunction				
18-34 years old	-0.04 (-0.47 to 0.38)	0.846		
35-49 years old	-0.78 (-1.39 to -0.17)	0.012		
50-64 years old	-1.66 (-2.34 to -0.97)	< 0.001		
65+ years old	-2.02 (-3.08 to -0.95)	< 0.001		

[#] Controlled for age group, gender, ethnicity, marital status, employment, monthly household income, education, BMI category, number of chronic conditions and number of mental illnesses

A poorer PSQI sleep quality score was significantly associated with lower PCS and MCS scores. Age also significantly moderated these associations as well.

- The association between PSQI sleep quality score and PCS was stronger in older adults than younger individuals. While the association between PSQI sleep quality score and MCS was stronger in younger individuals than older adults.

Discussion & Conclusion

Our study investigated the associations between sleep quality and HRQOL and found that better sleep quality resulted in higher PCS and MCS scores. Moreover, age moderated the association between sleep quality and HRQOL as well. Age-specific interventions can be designed to target sleep quality domains that adversely affect HRQOL. Future research can examine the mechanisms involved in age-related differences of the associations between sleep quality and HRQOL.

Since our data is from a nationwide survey, our findings can be generalisable to healthy individuals. However there are some limitations:
1. SMHS2016 is a cross-sectional study. Thus, causality between sleep quality and HRQOL cannot be concluded.
2. Study was completed before the start of COVID-19, hence the data might not accurately represent the current situation.

Acknowledgement

References

1. Stickley, A., Leinsalu, M., DeVylder, J. E., Inoue, Y., & Koyanagi, A. (2019). Sleep problems and depression among 237 023 community-dwelling adults in 46 low- and middle-income countries. *Sci Rep*, 9(1), 12011. doi:10.1038/s41598-019-48334-7
2. Medic, G., M. Wille, and M.E. Hemels, *Short- and long-term health consequences of sleep disruption.* Nat Sci Sleep, 2017. 9: p. 151-161.
3. Zou, P., et al., *Poorer sleep quality correlated with mental health problems in college students: A longitudinal observational study among 686 males.* J Psychosom Res, 2020. 136: p. 110177.
4. Zhai, K., X. Gao, and G. Wang, *The Role of Sleep Quality in the Psychological Well-Being of Final Year UndergraduateStudents in China.* Int J Environ Res Public Health, 2018. 15(12).
5. 1. Ong, W.J., et al., *Association between sleep quality and domains of quality of life amongst patients with first episode psychosis.* Health Qual Life Outcomes, 2020. 18(1): p. 114.
6. 1. Clement-Carbonell, V., et al., *Sleep Quality, Mental and Physical Health: A Differential Relationship.* Int J Environ Res Public Health, 2021. 18(2).
7. Van Cauter, E., R. Leproult, and L. Plat, *Age-related changes in slow wave sleep and REM sleep and relationship with growth hormone and cortisol levels in healthy men.* Jama, 2000. 284(7): p. 861-8.

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