

SINGAPORE SLEEP REVIEW

SINGAPORE SLEEP SOCIETY NEWSLETTER

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PRESIDENT'S MESSAGE

Happy Lunar New Year to all. We are excited to bring you a new volume of the Singapore Sleep Review in this year of the dragon. We are also looking at a busy programme of events to start off this season, with the [Singapore Sleep Conference](#), [World Sleep Day](#) events and more.



Our mission is to promote awareness, understanding, and research in the field of sleep medicine. In this current Issue of the newsletter, our team has compiled recent research on the link between mental health and sleep. With mental health being pinpointed as [a national priority](#), it is timely to highlight the pivotal role that sleep plays in maintaining good mental health. We hope you find this overview informative. Please feel free to get in touch to share any sleep events, research, or ideas that you would like to see featured in the next issue of the Singapore Sleep Review.

Dr Sridhar Venkateswaran
President, Singapore Sleep Society

Mental Health & Sleep

In this issue of the Singapore Sleep Review, we dive into the area of mental health. There is an intricate relationship between sleep health and mental health. Many sleep disorders are associated with increased anxiety or depression symptoms.

In this issue we discuss a review of global studies reporting that 35% of OSA patients could be suffering from comorbid depression, while 32% of patients may show symptoms of clinical anxiety.

At the same time, intervention studies show that CPAP treatment may help to alleviate these symptoms. A broader review study finds that interventions such as CBTI, aimed at improving sleep in (sub)clinical insomnia, help to improve symptoms across a wide range of mental health conditions, including depression, anxiety, stress, PTSD, and psychosis.

We further highlight Singaporean studies on sleep and mental health in pediatric populations, and interview prof Gooley (Duke-NUS) about the Sleep Health and Wellness Questionnaire from his lab.

SLEEP APNOEA

Depression and anxiety are common comorbidities of OSA, but CPAP treatment can alleviate these symptoms

REVIEW

A meta-analysis of randomized controlled trials finds that sleep interventions aid to improve mental health

INTERVIEW

Duke-NUS researchers developed a short Sleep Health and Wellbeing Questionnaire (SHAWQ)

PEDIATRICS

Sleep-related problems are an often-neglected factor in pediatric anxiety disorders



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Anxiety and depression as common comorbidities of OSA

Reference: Garbarino, et al. (2020) Association of Anxiety and Depression in Obstructive Sleep Apnea Patients: A Systematic Review and Meta-Analysis, *Behavioral Sleep Medicine*, 18:1, 35-57, DOI: [10.1080/15402002.2018.1545649](https://doi.org/10.1080/15402002.2018.1545649)

Obstructive sleep apnoea is often associated with health risks such as hypertension and cardiovascular disease. Some studies also indicate an association between OSA and mental health. This review paper examined the prevalence of depression and anxiety symptoms and patients with OSA.

The paper reviewed studies the literature on OSA and mental health in five different languages up until 2017. A total of 73 studies were identified, including 17,488 patients, 72 studies examined depression symptoms, while 23 studies included anxiety symptoms. The pooled prevalence of depression symptoms was 35% (with 28-41% as 95% confidence interval). For anxiety symptoms the pooled prevalence was 32% (22-42% 95% confidence interval). This indicates that depression and anxiety are common comorbidities of OSA with roughly one in three patients suffering from either. An attempt to compare these prevalence rates to healthy populations did not return significant differences, even though the prevalence rate was 45% higher in patients. This is likely due to the fact that only four studies had included a healthy control sample, and the comparison could only be based on these studies. Further risk factors found were female gender, high BMI, and excessive daytime sleepiness. OSA severity, however, was not significantly associated with depression or anxiety prevalence in most studies.

CPAP improves anxiety and depression symptoms in OSA

Reference: Lundetræ, et al. (2021). Effect of continuous positive airway pressure on symptoms of anxiety and depression in patients with obstructive sleep apnea. *Sleep Breath* 25, 1277–1283. <https://doi.org/10.1007/s11325-020-02234-7>

As comorbidity between OSA and mental health symptoms is high, the question arises if treating OSA can help to improve mental health. Two recent studies assessed the effects of CPAP treatment on depression and anxiety in patients with obstructive sleep apnoea.

In a Norwegian study, 485 OSA patients received CPAP treatment. Participants provided anxiety and depression ratings before treatment initiation and after 3 months follow-up. Results showed that anxiety and depression scores fell, along with improvements in OSA symptoms. While anxiety scores dropped for all patients, depression scores only decreased for those who were adherent to the CPAP treatment, based on their preceding 90 nights (at least 4 hours of CPAP usage per night). In another study from the Czech Republic, 59 OSA patients were tested before CPAP, after 2 months, and upon 1 year follow-up. Depression scores were reduced 2 months after treatment initiation and remained low at 1 year follow-up. Anxiety scores decreased, in particular for participants who remained adherent to treatment. It therefore seems that CPAP treatment does not only improve sleep health, but also has secondary benefits for mental health, depending on treatment compliance.

Reference: Vanek, et al. (2023). Cognitive Functions, Depressive and Anxiety Symptoms After One Year of CPAP Treatment in Obstructive Sleep Apnea. *Psychology Research and Behavior Management*. 16:2253-2266. <https://doi.org/10.2147/PRBM.S411465>



18.1% of adults in Singapore suffer from sleep apnea with **91% undiagnosed and untreated.***

Reference: Tan A, Cheung YY, Yin J, Lim WY, Tan LW, Lee CH. Prevalence of sleep-disordered breathing in a multiethnic Asian population in Singapore: a community-based study. *Respirology*. 2018;23(5):943-950.

Collaborate with us for **World Sleep Day**. We would like to hear from you soonest, before March 15.

Improving sleep quality leads to better mental health

Reference: Scott, et al. (2021). Improving sleep quality leads to better mental health: A meta-analysis of randomised controlled trials. *Sleep medicine reviews*, 60, 101556. <https://doi.org/10.1016/j.smrv.2021.101556>

Many mental health conditions are accompanied by sleep problems and, vice versa, sleep problems are often associated with mental health issues. In order to effectively intervene, it is important to understand the causality of this relationship. A recent meta-analysis aimed to shed light on this issue, by analysing randomized controlled trials (RCTs) of sleep interventions that included measurement of a mental health condition.

All studies included in the meta-analysis were clinical trials where a sleep intervention was compared to a control condition, and patients were randomly assigned to either condition. Moreover, only studies were included where the intervention was specifically targeted at sleep, with no intervention elements focussed on improving the mental health condition directly. This ensured that the outcomes were not confounded by selection bias, and all effects could be attributed to improvements in sleep rather than other aspects of the intervention.

In total, 65 studies were identified, describing 72 trials, including 8,608 individual patients. The majority of studies examined Cognitive Behavioral Therapy for insomnia [CBTI] as an intervention, but other interventions were also included (e.g. acupuncture, sleep hygiene, and pharmacological treatments). Mental health conditions assessed were mostly anxiety and depression, but also stress, burnout, rumination, psychosis, post-traumatic stress syndrome, and suicidal ideation. Across 61 studies examining depression, a medium-sized reduction in symptoms was found after sleep intervention. A small-to-medium sized reduction in anxiety was identified over 35 studies. Small-to-medium Reductions in stress were found across 6 studies, and reductions in rumination in 4 studies.



For psychosis, three studies reported a reduction in overall symptoms, and five studies found a reduction in positive symptoms (e.g. delusions and hallucinations). A small but non-significant decrease in negative symptoms (e.g. blunted affect, avolition, anhedonia) was found. For PTSD and suicidal ideation only two studies were identified for each condition. While results for PTSD indicated consistent reductions, findings were mixed for suicidal ideation. Statistical comparison, however, was non-significant for both conditions given the small number of studies included.

Importantly, studies that reported larger improvements in sleep quality reported larger reductions in mental health problems. Similarly, interventions that were delivered face-to-face by a mental health professional reported larger reductions in symptoms than those that were self-administered.

Conclusion

These data show that interventions that improve sleep quality causally contribute to improvement of mental health. This implicates sleep to be a viable intervention target to be incorporated in mental health treatment.



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Interview: Development of the Sleep Health and Wellness Questionnaire (SHAWQ)

Reference: Loke, et al. (2023). Development and testing of the Sleep Health And Wellness Questionnaire (SHAWQ) in adolescents and university students: Composite SHAWQ scores are associated with sleep problems, depression symptoms, and academic performance. *Frontiers in Sleep 2*: 1188424. <https://doi.org/10.3389/frsle.2023.1188424>

Poor sleep and depression are intricately linked. Can signs of poor sleep health be used to identify individuals at risk of depression? A team from the Chronobiology and Sleep laboratory at Duke-NUS Medical School, led by Associate Professor Joshua Gooley developed a short sleep health questionnaire (Sleep Health And Wellness Questionnaire; SHAWQ).

The paper describes a thorough process of questionnaire development. The items were first identified in a sample of N = 1,733 adolescents and later validated in a sample of N = 1,777 adolescents and two samples of undergraduate university students (N = 2,040 and N = 3,017). In all samples, poorer scores on the SHAWQ (poorer sleep health) were associated with higher depression scores. Associations with daytime sleepiness, sleep quality, anxiety, and insomnia were also found in the different samples. Furthermore, poor sleep health was predictive of poorer academic grades in university students. The scale consists of 6 items: gender, sleep quality, daytime sleepiness, self-rated health, frequency of staying up until 3am, school day sleep latency. These items represent a diverse spectrum of sleep health factors that might contribute to mental health issues.

Prof Gooley explains how he came to initiate the development of this new scale: "Prior studies have shown that sleep problems during adolescence often precede the development of depression. This got our team thinking about which aspects of sleep health are most important for mental health. We therefore set out to design a short instrument that can be used for assessing sleep health characteristics that are related to depression symptoms."

Although there are several existing instruments to measure sleep health and/or mental health, the SHAWQ is unique in its focus on adolescent and emerging adult sleep behaviors.



Assoc prof Joshua Gooley

"...we developed a scoring system that gives more weight to items that are more strongly correlated with depression symptoms in student populations. Using this approach, we think that our questionnaire may be better at identifying adolescents or university students with sleep problems who may be especially vulnerable to effects of poor sleep health on mental well-being. At the moment, we have only tested our questionnaire in adolescents and university students. In principle, it could be modified for use in younger or older populations, but it was developed primarily for use in adolescents and young adults."

When asked how researchers and practitioners can use the SHAWQ questionnaire in the future, Gooley explains: "Our questionnaire could be used by schools or health professionals to identify individuals who are at greatest risk of disordered sleep and mental health problems. This could help institutions to direct their limited resources (e.g., health counselling and behavioural treatments) to students who would benefit the most."

"Researchers may find our questionnaire useful for investigating factors that contribute to poor sleep health (e.g., in population health studies), or for investigating relationships between sleep health with other health outcomes. Our questionnaire could also be used as an outcome variable to assess interventions that target sleep health or mental wellbeing."

Conclusion

The Sleep Health and Wellness Questionnaire (SHAWQ) is a short instrument that can practically be deployed to screen for sleep health and depression risk in adolescents and young adults.



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Sleep as an overlooked factor in pediatric anxiety disorders

Reference Tan, et al. (2023). Treatment Implications of Sleep-Related Problems in Pediatric Anxiety Disorders: A Narrative Review of the Literature. *Child psychiatry and human development*, 54(3), 659–664. <https://doi.org/10.1007/s10578-021-01277-5>

Pediatric anxiety disorders are a category of disorders that first present in childhood/adolescence. While sleep-related problems are a common symptom among many these disorders, clear consensus is missing in research and practice.

This review by a team from Duke-NUS Medical School reports that there are indications of bi-directional links between pediatric anxiety disorders and sleep-related problems. Most existing intervention studies have focused on treating anxiety symptoms, with no specific treatment of sleep problems. Some studies found improvement in sleep problems as a result of anxiety-based treatment, but others did not find such beneficial effects. More recent studies have started to integrate sleep improvement techniques into anxiety interventions. While these studies are promising, they are very few, and robust conclusions cannot yet be drawn from them. Pediatric studies, however, do often not include a thorough assessment of sleep problems. Moreover, a clear consensus as to what constitutes a sleep-related problem and how to measure it in pediatric populations may be lacking. Survey items adapted from clinical questionnaires developed for adults may not always directly translate to pediatric sleep problems.

Conclusion

Sleep-related problems are a common symptom of pediatric anxiety disorders, however, more consensus on measurement and definition is warranted to further research and treatment.

Poor sleep as a risk factor for depression in adolescents

Reference: Goh, et al. (2023). Risk and protective factors associated with adolescent depression in Singapore: a systematic review. *Singapore medical journal*, 10.4103/singaporemedj.SMJ-2021-192. Advance online publication. <https://doi.org/10.4103/singaporemedj.SMJ-2021-192>

Adolescence is a vulnerable period for the development of mental health conditions. This review aimed to understand the risk and protective factors for adolescent depression in a Singaporean context.

A systematic review examined studies that assessed depression outcomes in Singaporean adolescents. Eight studies published between 2008 and 2019 were included. The qualitative synthesis of these papers identified four factor categories: sociodemographic, psychological, coexisting chronic medical conditions, and lifestyle factors. Sociodemographic factors included gender and ethnicity. Psychological factors included maltreatment exposure, and personal dispositions such as optimism and hope. One study examined asthma as a chronic medical condition that was associated with higher depression. Lifestyle factors included excessive use of digital media and sleep insufficiency. From the studies examining sleep, one was an observational study, indicating that sleeping less than 8-10hours on school nights was associated with depression. An interventional study delayed school start time by 45 minutes and found a sustained increase sleep duration and improvement in depressive symptoms.

Conclusion

Besides sociodemographic, psychological, and medical factors, significant sleep insufficiency is a risk factor for depression in Singapore adolescents.

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Sleep problems and externalizing behaviors in clinically referred youth in Singapore

Reference: Lamoureux, et al. (2023), The role of anxiety and callous-unemotional traits in the relationship between externalizing behaviors and sleep problems in clinic-referred youth. *Clin. Child Psychol. Psychiat.*, 28: 654-667. <https://doi.org/10.1177/13591045221076643>

In recent years, anxiety and callous-unemotional traits have been identified as potential factors that could elucidate the relationship between sleep problems and externalizing behaviour. Previous research explored the role of anxiety and callous-unemotional traits within this relationship, in an adult population. Anxiety, which commonly co-occurs with sleep problems and externalizing behaviours, partially mediated this association. Callous-unemotional traits, on the other hand, moderated this association, whereby the relationship between externalizing behaviours and sleep problems was more robust in individuals with low levels of callous-unemotional traits. With the existing literature on this area largely focused on adult populations, this study aimed to determine if these associations could be generalized to youth populations.

Data was collected and analysed from 239 clinic-referred youth in Singapore, aged 6 to 17, who were diagnosed with Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, or both. These participants and their parents completed questionnaires assessing sleep habits, sleep problems and behavioural problems, extracted from the child-rated *School Sleep Habits Survey*, the *Callous-Unemotional traits subscale* from the parent-rated *Antisocial Process Screening Device*, as well as the *sleep composite*, *Externalizing Problems and Anxious/Depressed subscales* from the parent-rated *Child Behavior Checklist*.

The results demonstrated that externalizing problems were positively associated with higher parent-rated sleep problems, callous-unemotional traits and anxiety. As is consistent with previous literature, anxiety was positively associated with parent-rated sleep problems and externalizing problems, and partially mediated the association of sleep problems and externalizing problems. Notably, callous-unemotional traits had no correlation with anxiety or parent-rated sleep problems and did not moderate this association. This finding mirrored previous studies indicating that youth with callous-unemotional traits can be grouped into those with and without co-occurring anxiety. In addition, the authors suggested that the moderating role of callous-unemotional traits found in previous research likely resulted from its large sample size.

As such, the authors posit anxiety, rather than callous-unemotional traits, as a central factor underlying the association between externalizing behaviours and sleep problems. While this cross-sectional study could not indicate directions for this association, it was proposed that children who engage in externalizing behaviours experience anxiety over their actions, which then disrupts their sleep. Alternatively, children with inadequate sleep may experience poor emotion regulation and impulse control, resulting in anxiety or externalizing behaviours. Further research exploring other potential mediating factors, like poor emotion regulation, may broaden the understanding of concurrent sleep problems and externalizing behaviours.

Conclusion

This study demonstrates the mediating role of anxiety between externalizing behaviours and sleep quality in a youth population, and pinpoints anxiety as a vital factor to consider during the development of interventions aimed at improving sleep to mitigate externalizing issues.



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Disclaimer: This publication is not intended as a replacement of regular medical education. The reviews are a summarized interpretation of the published studies and reflect the opinions of the writer rather than those of the research group or the scientific journal. It is suggested that the reader reviews the full trial data before forming a final conclusion on its merits.

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CALENDAR

21 FEB

Centre for Sleep & Cognition Seminar (hybrid)

“Adding Sleep and Circadian Rhythms to Clinical Medicine”
prof Elizabeth Klerman (Harvard Medical School)

Time: 11am-12pm

“Developing Tools for Evidence-Based Circadian Medicine”
prof Till Roenneberg (LMU Munich, Chronosulting)

Time: 1-2pm

Venue: National University of Singapore, MD11, auditorium; Online: [Zoom](#)

29 FEB

SingHealth Duke-NUS x NLB Webinar

“Sleep 3-2-1 | Mind Your Body” with Ms. Koay Way Inn (SGH)

Date: Thursday, 29 Feb 2024, 12:30-2pm (online)

<https://for.sg/sdsleepnlbwebinar>

16 MAR

SingHealth Duke-NUS Sleep Centre Public Forum

“Sleep Well, Live Well” at Sengkang General Hospital

Date: Saturday, 16 March 2024, 12-2pm

Venue: Sengkang General Hospital

Register: <https://form.gov.sg/65a789f5f3fcbf356a4b0763>

22-23 MAR

Singapore Sleep Conference 2024

“Better Sleep for a Healthier Life”

Venue: Academia, 20 College Road, Singapore 16856

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<https://www.sgsleepconference2024.com/>

Singapore Sleep Society

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\$10/year – any person involved in the field of sleep disorders without the above qualification.

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