SINGAPORE SLEEP REVIEW

SINGAPORE SLEEP SOCIETY NEWSLETTER

VOLUME 3 | ISSUE 2 | MAY | 2025

Singapore Sleep Society

WEARABLE SLEEP TRACKERS: WORLD SLEEP SOCIETY RECOMMENDATIONS

The market for wearable consumer health trackers (CHTs) that measure sleep has expanded massively over the recent years. At an estimated global valuation of USD 2.2 Billion in 2024, sleep trackers provide millions of users over the world with insights into their sleep quantity, quality, and timing each night. Numerous researchers have adopted CHTs, and increasingly often sleep trackers are brought into the clinic to inform treatment decisions.

Along with their widespread adoption, these trackers bring about challenges regarding the accuracy, clinical validity, and interpretability of the provided metrics. In an effort to offer guidance, the World Sleep Society instated an international expert task force to formulate recommendations for the use of CHTs by consumers, clinicians, and researchers.

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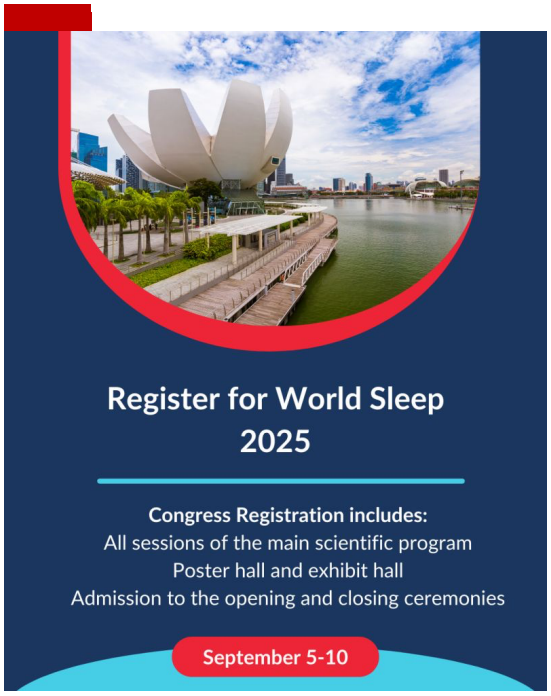

SSS NEWS

We are happy to present the May issue of the Singapore Sleep Review. As the year progresses, the World Sleep Congress is steadily nearing. The programme is quickly filling up with exciting courses, symposia, and keynotes. Do also check out the Asian Society for Sleep Medicine (ASSM) pre-conference (5-6 Sept).

Lastly, the SSS Annual General Meeting (AGM) will also be held during the World Sleep Congress (9 Sept) to allow for the most convenient attendance. We hope to see many of our members during this event.

Singapore Sleep Society
Sleep Apnea Support Group

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TECHNOLOGY

World Sleep Society Sleep Tracker Taskforce publishes recommendations for the use of consumer wearables

RESPIRATORY MEDICINE

Review estimates the impact of PAP treatment on all-cause mortality and cardiovascular mortality

WOMEN'S HEALTH

Poor sleep increases risk of type 2 diabetes in women with gestational diabetes

CHRONOBIOLOGY

New study examines how adolescent circadian biology is affected by social schedules

TRAVEL & JETLAG

Large-scale analysis shows circadian and non-circadian factors affect sleep during travel

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Once primarily used for fitness tracking, CHTs are now used by many as a means to monitor sleep timing, regularity, and duration. Used regularly, CHTs serve as a "sleep minder," offering a continuous diary of sleep habits, providing insights into sleep patterns over extended periods on a scale previously not possible. By doing so they can assist in the maintenance or improvement of mood, heart health, brain function, and immunity for millions.

However, the accuracy of different devices can vary significantly, depending on the quality and/or configuration of their sensors, and the algorithms used to interpret the data. The measures used are also not standardised. The reasons behind clinician's concerns are revealed and some solutions are proposed.

"If manufacturers align to common principles and standards for sleep measurement, consumer health trackers could significantly enhance their value as tools for improving health and wellbeing. We emphasised the benefits of co-operation between clinicians and industry and provided actionable suggestions for this", said Professor Michael Chee, Director of the Centre for Sleep and Cognition at NUS Yong Loo Lin School of Medicine (NUS Medicine), the lead author of the work.

Key takeaways for consumers would be to purchase a device that suits their use case, focus on fundamental sleep measures (among a growing array of these)—such as sleep timing and regularity which can be directly acted on—rather than obsessing over nightly measurements of specific stages like Deep or Rapid Eye Movement (REM) sleep which are not.

Users are encouraged to reflect on their pre-sleep routines and experiment with changes, with regular tracking enabling them to discover which habits lead to better fundamental sleep measures. Over time, and in recognition of inter-individual differences in sleep need, a person could learn how to customise their sleep beyond what general guidelines suggest. Beyond individual benefits, wearable sleep trackers will redefine what "normal" sleep looks like.

By collecting data over long periods and across diverse communities, these devices reveal how factors like culture, work schedules, and even nighttime light or noise affect sleep. Advances in big data analysis and artificial intelligence will further enable the personalisation sleep recommendations, moving beyond one-size-fits-all advice.

The document touched on existing and promising clinical applications but also cautioned that CHTs are not primarily designed for clinical diagnosis and care. This will change but to develop properly, stronger partnership between clinicians and industry is needed.

"With the right focus, and approach wearables can help people make meaningful choices for better sleep and better health. These recommendations are an important step in that direction" according to Professor Chee.

Reference: Chee et al. 2025. World Sleep Society recommendations for the use of wearable consumer health trackers that monitor sleep. Sleep Med. 2025 Apr 5;131:106506. https://doi.org/10.1016/j.sleep.2025.106506.

World Sleep Society Recommendations for the Use of Wearable Consumer Health Trackers That Monitor Sleep

CONSUMERS

- A sufficiently good-quality CHT can provide valuable sleep and health information
- Focus on trends and patterns, not individual 'scores'; Use scores to motivate, not compete
- Sleep data is less reliable if sleep is significantly delayed, very short or fragmented

RESEARCHERS

- Harness CHT to broaden, deepen and diversify sleep norms and their relationship to health and disease
- Work with manufacturers to curate quality standards and a set of unified measures for different sleep health applications

CLINICIANS

- Distinguish between 'fundamental' and 'exploratory' metrics
- Appreciate growing uses of CHT as well as their limitations in support of clinical diagnosis and monitoring
- Stay in touch with evolving best practices for usage

MANUFACTURERS

- Implement common definitions of fundamental sleep measures to allow incorporation of sleep data into health records
- Support industry-wide quality standards for different applications
- Continue investing in sleep-themed features

Michael WL Chee, Mathias Baumert, Hannah Scott, Nicola Cellini, Cathy Goldstein, Kelly Baron, Syed Anas Imtiaz, Thomas Penzel, Clete Kushida

PAP Treatment and Mortality Rates: Meta-analysis

Reference: Benjafield AV, et al.; medXcloud Group. Positive airway pressure therapy and all-cause and cardiovascular mortality in people with obstructive sleep apnoea: a systematic review and meta-analysis of randomised controlled trials and confounder-adjusted, non-randomised controlled studies. Lancet Respir Med. 2025 May;13(5):403-413. https://doi.org/10.1016/S2213-2600(25)00002-5.

Positive Airway Pressure (PAP) therapy is recommended as the first-line treatment for patients with Obstructive Sleep Apnea (OSA). PAP can effectively reduce the apnea-hypopnea index and symptom burden. However, mixed evidence exists about how strongly this is associated with reduction of long-term health risks.

A recent meta-analysis evaluated the findings from randomised controlled trials (RCTs) and observational studies (non-randomised controlled studies; NRCSs) examining the effects of PAP therapy on all-cause and cardiovascular mortality. A total of 30 original studies were included in the meta-analysis, with a combined 1,175,615 participants. All studies compared a group of patients receiving PAP therapy for at least 1hour/night, to a group that received no treatment, sham treatment, used PAP for < 1hour/night, or discontinued treatment.

For the all-cause mortality analysis, 10 RCTs (5685 patients) and 17 NRCSs (1,166,471 patients) were included. All-cause mortality was lower in the PAP groups than in the control groups (Hazard ratio [HR] = 0.63). Analysis of cardiovascular mortality including 6 RCTs (5223 patients) and 5 NRCSs (20,559 patients), showed that cardiovascular mortality was lower in the PAP groups compared to the control groups (HR = 0.45).

The average treatment adherence per study did not significantly moderate the risk for cardiovascular or all-cause mortality. However, the reduction of risk for both all-cause mortality and cardiovascular mortality was moderated by the duration of PAP treatment per night in a dose-response fashion. Longer usage of PAP per night (6 hours) was associated with lower hazard ratios compared to shorter usage (2 hours per night).

These data suggest that PAP therapy would not only have beneficial acute effects on respiratory sleep symptoms but can also potentially contribute to improved long-term health outcomes such as mortality outcomes from cardiovascular or any causes.

It should be noted that the effects were only significant in the NRCSs and not in the RCTs. This is a significant limitation. NRCSs are suspectable to the effects of known and unknown confounding variables, which may influence the results. Therefore, the results of the RCTs are usually given more weight compared with the results of NRCSs. On the other hand, inclusion of NRCSs expands the finding to larger sample sizes, longer clinical follow-up periods, and potentially more severe cases.

It should also be noted that this study was sponsored by ResMed. The medXcloud group is an academic-industry collaboration involving ResMed and global academic leaders in sleep and respiratory medicine. The sponsor was involved in study design, data collection, data analysis/interpretation, writing, and funding the study. This involvement was declared in publication.

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Sleep Health Affects T2D Risk after Gestational Diabetes

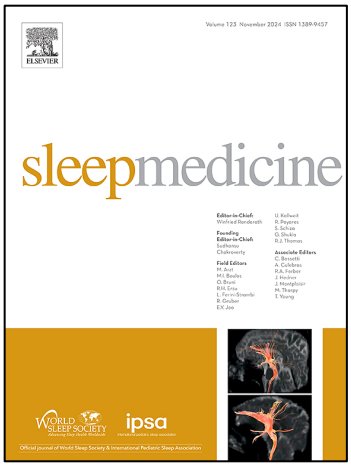
Reference: Yin X, Bao W, Ley SH, et al. Sleep characteristics and long-term risk of type 2 diabetes for women with gestational diabetes. *JAMA Netw Open*. 2025;8(3):e250142. https://doi.org/10.1001/jamanetworkopen.2025.0142

Gestational diabetes is a condition that affects about 14% of pregnant women and is characterised by elevated blood glucose levels during pregnancy, where no prior diabetes was present. Importantly, research demonstrates that women with a history of gestational diabetes face a 287% higher age-specific risk of developing type 2 diabetes (T2D) within six to fifteen years after the affected pregnancy. Consequently, regular screening for T2D and management of modifiable risk factors is recommended for these women even decades after childbirth.

A new study lead by the Global Centre for Asian Women's Health, Yong Loo Lin School of Medicine, National University of Singapore examined the risk of developing T2D in a sample of female nurses who were diagnosed with gestational diabetes upon pregnancy. Biannual follow-up for an average of 17.3 years, assessed health and lifestyle factors as well as the development of any health conditions. A one of these health factors, respondents were queried about their sleep habits (sleep duration, snoring, daytime sleepiness/fatigue).

Results showed that out of 2981 nurses who had a history of gestational diabetes and had sleep data available, 563 (19.5%) developed T2D. Moreover, women who regularly snored had an increased risk of developing T2D compared to women who almost never snored (hazard ratio [HR] = 2.17 for occasional snoring, HR = 2.66 for frequent snoring). Similarly, women who slept less than 6 hours habitually, had increased risk of T2D compared to women who slept 7-8 hours (HR = 1.32). In contrast, longer sleep (≥ 9 hours) was not associated with higher T2D risk. Daytime sleepiness was also associated with higher T2D risk, however, that did not survive correction for covariates such as race, oral contraceptive use, menopausal status, ever night shift work, respiratory illnesses, depression, antidepressant use, use of other medications known to affect sleep.

A subset of women (N = 527) also had blood samples taken to examine metabolic biomarkers. Occasional and frequent snoring were associated with elevated HbA_{1c}, C-peptide, and insulin levels, particularly in patients with short sleep duration (≤6 hours).



As an associate member society of the World Sleep Society, SSS members have free access to Sleep Medicine

Find out how to claim your access here

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Suboptimal Circadian Timing of Sleep in Adolescents

Reference: Charoenthammanon RS, Gooley JJ. The adolescent circadian clock entrains to social time rather than sun time. Curr Biol. 2025 May 5;35(9):2100-2111.e5. https://doi.org/10.1016/j.cub.2025.03.059

Sleep behaviour in adolescents is constrained by their early school start times. It is widely thought that adolescents' circadian clock does not align with their early-short sleep pattern during the school week (often referred to as social jet lag). However, this has never been tested directly my comparing the circadian timing of sleep during school periods and holiday periods. A recent study from the Duke-NUS Medical School addressed this question, which is important because the circadian timing of sleep is an important determinant of cognitive performance and health.

The study followed 112 adolescents (aged 13-18 years; 59 girls) attending local schools in Singapore. Sleep behaviour was tracked by wrist actigraphy for 1 week during school periods, and 1 week during holidays. At the end of the sleep tracking week, participants reported to the laboratory to assess the circadian phase of their melatonin rhythm. The circadian timing of sleep onset, sleep midpoint, and sleep offset were measured relative to adolescents' melatonin onset (Dim Light Melatonin Onset; DLMO).

Adolescents woke up much earlier during the school week, resulting in sleep that was shorter by about 90 minutes (Mean=6.26 hours) compared with the holidays (Mean=7.85 hours). The earlier sleep-wake pattern on school nights was associated with an earlier pattern of dark-light exposure. The timing of melatonin onset was tightly coupled with adolescents' earlier sleep-wake/dark-light cycle, shifting about 2 hours earlier relative to the holidays.

Although adolescents' circadian clock aligned with their early behavioural dark-light cycle by end of the school week, they nonetheless went to sleep and woke up at suboptimal times relative to their circadian clock. Relative to holiday periods, most adolescents went to sleep at a later circadian phase (~40 min), suggesting that they were "biologically ready" to go to bed substantially earlier. Additionally, they woke up at an earlier circadian phase of their melatonin rhythm (~50 min), closer to the expected circadian minimum of alertness.

Instead of going to sleep more in phase with their melatonin rhythm on Friday night (i.e., earlier) adolescents went to sleep later and woke up much later to pay back their sleep debt. Therefore, adolescents likely slept even more out of synch with their circadian clock on the weekend. The study findings challenge the popular view of social jet lag which asserts that we sleep more in synch with our circadian clock on free days compared with work or school days.

In summary, school start times influence the circadian timing of sleep by altering adolescents' behavioural dark-light cycle. Advancing bedtimes and delaying school start times would likely enable more adolescents to get more sleep and wake up at a biologically-appropriate circadian phase. While it may be possible for adolescents to entrain to early school schedules, it is important to solve the problem of short sleep so that they go to bed and start their day at the right times relative to their melatonin rhythm.

Travel-Related Sleep Disruption: 1.5 Million Nights of Travel Data

Reference: Willoughby AR, Vallat R, Ong JL, Chee MWL, Insights about Travel-Related Sleep Disruption from 1.5 Million Nights of Data, *Sleep*, 2025; zsaf077, https://doi.org/10.1093/sleep/zsaf077

Jet lag is a known cause of sleep disturbance during travel, but it is not the only factor. Travellers often wake up early to catch flights, shortening sleep the night before departure. This restricted sleep typically results in early bedtimes and extended recovery sleep the next night. However, crossing time zones complicates this recovery by disrupting the ability to fall asleep at the appropriate local time.

A collaborative study conducted by researchers at the Centre for Sleep and Cognition at the NUS Yong Loo Lin School of Medicine (NUS Medicine) and ŌURA analysed sleep during 60,000 trips of over 1000km and utilised 1.5 million nights of de-identified data from the Oura Ring to provide the first large-scale, real-world study of jet lag recovery to date.

The study found that sleep duration generally recovers quickly, aligning within 15 minutes of habitual sleep duration within the first few days post-travel. Jet lag is more severe following eastward travel, especially for shorter trips (up to three time zones). There was a minimal difference between males and females, however, older travelers were less affected than younger ones.

Bedtime Procrastination, Planning, and Sleep Health

Reference: Pu, et al., 2025. Failing to Plan: Bedtime Planning, Bedtime Procrastination, and Objective Sleep in University Students. *Sleep Medicine*, p.106556. https://doi.org/10.1016/j.sleep.2025.106556

Bedtime procrastination is a common behavioral phenomenon where people go to bed later than intended. However, very little is known about how people make and stick to bedtime plans in the first place. A recent study examined the frequency of having and the persistence of executing a bedtime plan in a sample of students (N=119) from the National University of Singapore.

For 2-4 weeks, students were asked daily whether they had a specific bedtime planned the previous night, and whether they managed to follow the plan. Furthermore, their actual sleep patterns were tracked with a wearable sleep tracker to verify their sleep timing and continuity.

Results showed that the NUS student only very rarely had a specific bedtime planned (< 1 day/week), and that even when they had a time planned, they frequently overran that plan (on average by > 46 minutes). Students quoted unfinished study work and electronic leisure as the main activities that kept them from going to bed on time.

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CALENDAR

16-18 MAY

2025 AADSM Annual Meeting

Annual Meeting of the American Association of Dental Sleep Medicine
Las Vegas, NV, USA, https://www.aadsm.org/aadsm_annual_meeting.php

8-11 JUN

Sleep 2025

The 39th annual meeting of the Associated Professional Sleep Societies, LLC (APSS)
Seattle, WA, USA, https://www.sleepmeeting.org

9 SEPT

SSS AGM 2025

The Annual General Meeting of the Singapore Sleep Society to be held during the World Sleep Congress
Wed 9 September, 4-6pm, Suntec Convention Centre, Singapore

5-10 SEPT

Singapore 2025 WORLD SLEEP September 5-10

Singapore Sleep Society

Membership Application and Fees

Ordinary members
$30/year – sleep professionals with a medical degree, PhD or equivalent.

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

Supporting members:
Corporations and individuals supporting the society financially.

Complete the application form and email to:
singaporesleepsociety.sg@gmail.com

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