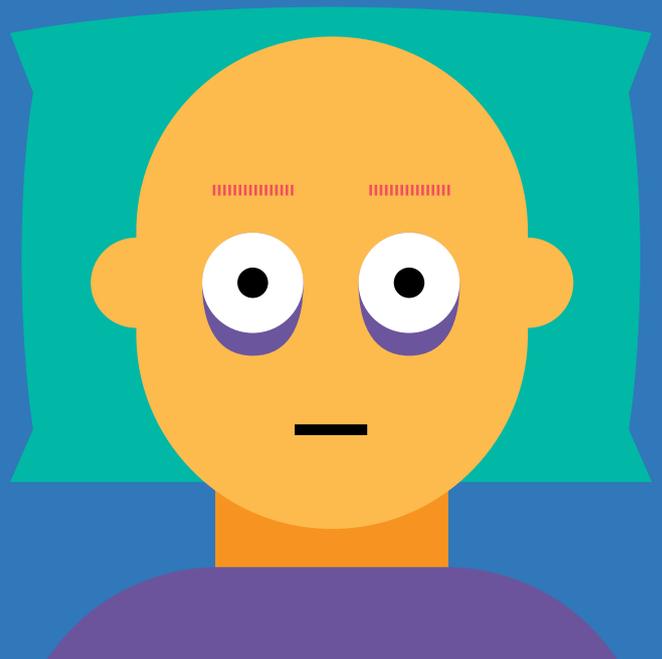


Chronic Insomnia Disorder in Australia

A REPORT TO THE
SLEEP HEALTH
FOUNDATION



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EXECUTIVE SUMMARY

Sleep problems are common and costly to the Australian community. One common sleep condition is insomnia.

Chronic insomnia disorder is broadly defined as a perceived difficulty with sleep initiation, consolidation, duration, or quality despite adequate opportunity to sleep, plus subsequent daytime impairment, that occur at least three times per week, lasting at least three months. The daytime consequences encompass a wide variety of issues, including significant distress or impairment in social, occupational, educational, academic, behavioural or other important areas of functioning.

The prevalence of chronic insomnia disorder is presently unclear, as there are limited studies that have examined the prevalence and correlates of insomnia using definitions which correspond to the contemporary classifications of the International Classification of Sleep Disorders (ICSD-3) and/or the Diagnostic and Statistical Manual of Mental Disorders (DSM-V). The primary aim of this study was to determine the prevalence of insomnia disorder in the Australian population according to established current diagnostic criteria, and examine socio-demographic and other correlates of insomnia in Australia.

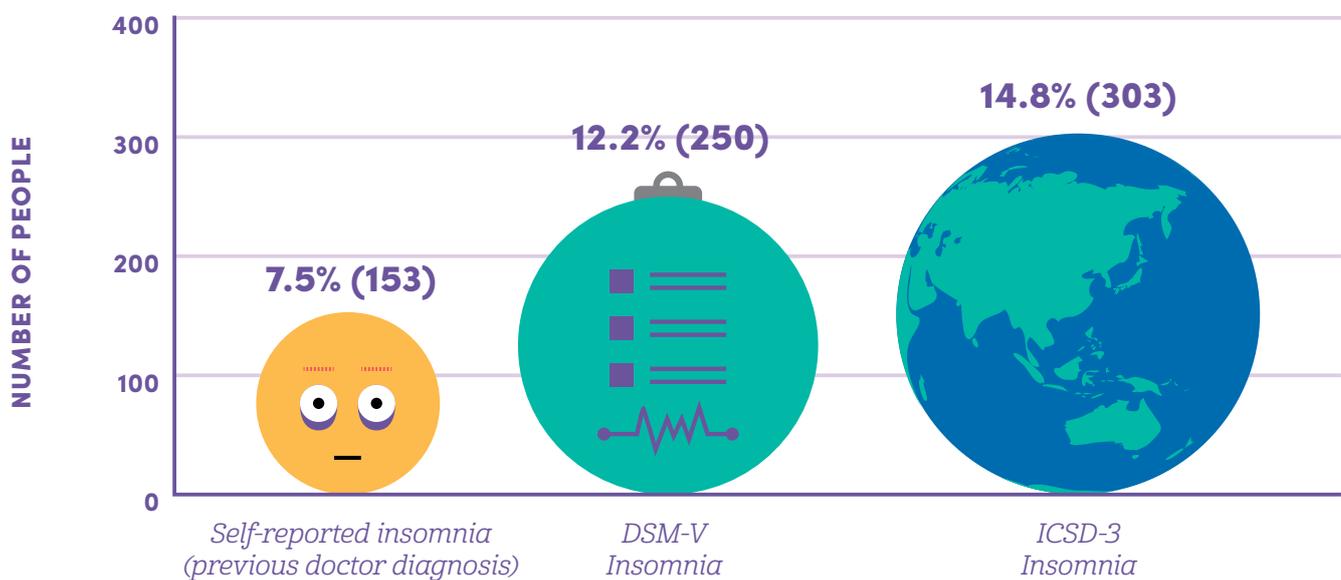
The survey was conducted between March and April 2019 on behalf of the Sleep Health Foundation among 2,044 adults aged 18 years and over across Australia, with representativeness for age, sex, location and an indicator of socio-economic status. Researchers from Flinders University, The University of Adelaide and the Appleton Institute of CQUniversity

were responsible for the survey design and analysis. The survey was conducted online; methodology was approved by the University of Adelaide Office of Research Ethics, Compliance and Integrity's Human Research Ethics Secretariat (H-2018-214).

Sleep problems remain prevalent across the community, irrespective of age and gender. Around 60% of people report at least one sleep symptom occurring 3 or more times per week, and this is consistent across age groups. However, the type of symptom varies with age. Older people are more likely to have difficulty maintaining sleep, while younger adults have trouble initially getting off to sleep. Self-reported daytime impairments related to sleep are more common among female respondents and younger adults.

Most people who fulfill diagnostic criteria for chronic insomnia do not report a prior diagnosis of insomnia. Overall, insomnia according to current diagnostic criteria is more common in older Australians. This occurs despite no apparent change in prevalence in overall sleep symptoms across age, and a decline in daytime symptoms with age, in the population more broadly. The main influence on this is that older adults are far more likely to report adequate opportunity to sleep than younger adults. This indicates that much of the sleep problem among younger adults can be attributed to circumscribed sleep opportunities from external social pressures and behaviour patterns.

Prevalence of insomnia by different definitions



In addition, daytime sleepiness as the only daytime impairment is far more common among older adults. This suggests the insomnia phenotype differs across age groups, with the “hyperarousal” phenotype much less common in the elderly.

Similarly, female respondents are much less likely than male respondents to report adequate opportunity to sleep (43% versus 60%), particularly in the 25 to 44 year age group. This contributes to the lower prevalence of chronic insomnia in female respondents.

One of the primary differences between DSM-V and ICSD-3 Insomnia criteria is the consideration of patients with pain which either prevents sleep onset, or contributes to wake after sleep onset, as the two differ slightly on inclusion criteria.

Insomnia is associated with lower income, financial stress, unemployment, and retirement in the Australian population. In addition, with the ICSD-3 criteria, which are inclusive of people in whom pain affects sleep, insomnia prevalence is higher in those unable to work due to disability.

The prevalence of insomnia is relatively unaffected by activities in the hour before bed, with similar rates in those who routinely use technology, work, eat, drink alcohol or are on social media frequently compared to those who do not.

Single item questions about diagnosed chronic insomnia disorder do not capture all individuals who meet diagnostic criteria and should be avoided as indicators of insomnia in future studies as they likely underrepresent prevalence in the population.

Relatively few Australians speak to healthcare professionals about sleep, despite almost half of the population reporting inadequate sleep. Furthermore, sleep is often only discussed as a secondary issue during a consultation for other reasons. Use of any form of treatment for insomnia is uncommon, even among those who report daytime impairments or who have discussed sleep problems with a health professional. Usage rates identified in this survey indicate a need for greater education or awareness and expanded access, to promote use of the gold standard treatment in insomnia, i.e. cognitive behavioural therapy for insomnia (CBTi), as self-reported usage is low, and cost is a consideration limiting its use.

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INTRODUCTION

Chronic insomnia disorder (insomnia) represents a significant burden for both the individual, and for the Australian healthcare system.

Insomnia is one of a number of sleep disorders which contributes to the \$66.3 billion dollar cost of poor sleep in Australia (2016–17)¹. Insomnia has been associated with increased risk of hypertension^{2–5}, coronary heart disease⁶, heart failure⁷, cardiovascular mortality^{8,9}, impaired glucose metabolism¹⁰ and diabetes¹¹. Epidemiologic data has also shown an association between insomnia and elevated inflammatory markers (CRP)^{12,13}, which has been linked to cardiopulmonary mortality¹⁴. In contrast, a recent meta-analysis found insomnia was not related to overall mortality¹⁵. Insomnia is highly comorbid with a number of psychiatric diseases, particularly depression, and some evidence suggests insomnia may contribute to incident depression¹⁶.

The American Academy of Sleep Medicine (AASM)^{17,18} defines chronic insomnia as a perceived difficulty with sleep initiation, consolidation, duration, or quality despite adequate opportunity to sleep, plus subsequent daytime impairment, lasting at least three months. The daytime consequences encompass a wide variety of issues, including significant distress or impairment in social, occupational, educational, academic, behavioural or other important areas of functioning. Subsequently, classifications of insomnia in both the International Classification of Sleep Disorders (ICSD-3)¹⁹ and the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)²⁰ have been simplified and are largely congruent with the AASM insomnia definition, although both require the symptoms to occur at a frequency of three or more times per week.

PREVALENCE OF CLINICAL INSOMNIA ACCORDING TO CLINICAL DIAGNOSTIC CRITERIA IS UNCLEAR

There is a paucity of studies that have examined the prevalence and correlates of insomnia using definitions that correspond to these contemporary classifications. Globally, prevalence estimates of clinical insomnia vary substantially. In an Australian context, prevalence estimates vary widely between 5–33% of the population²¹. While global indications are that prevalence of insomnia symptoms is rising, the veracity of this statement in the Australian context is unclear. The most recently published Australian estimates from Bin, Marshall and Glozier (2012)²¹ date from the 2007 National Mental Health and Wellbeing Survey (n=8,841) and reported the prevalence of insomnia is 5.6% in Australians aged 16–85. Insomnia was determined from a single response item, and did not account for the duration and frequency of symptoms experienced which makes alignment of symptoms with current diagnostic criteria to establish prevalence difficult.

One of the key challenges in determining the prevalence of chronic insomnia at a population level is the diversity in definitions employed to characterize ‘insomnia’, and the parameters used to identify respondents with insomnia in population studies. Measures can vary from single item assessment of insomnia symptoms, to composite scores based on a variety of scales

such as the Athens Insomnia Scale²². To date, no studies have considered prevalence at a population level comparing current diagnostic criteria (ie the DSM-V and ICSD-3; see Sateia²³ for brief summary). Consistency in establishing prevalence of ‘clinical insomnia’ in the Australian community is poor, and a likely contributor to the large range in published prevalence estimates to date. This can be addressed by asking questions in population studies which allow for identification of insomnia against both clinical diagnostic criteria (DSM-V and/or ICSD-3).

HELP-SEEKING BEHAVIOURS AND TREATMENT RESPONSE FOR INSOMNIA ARE NOT WELL UNDERSTOOD

Despite the individual and societal burden from insomnia^{22,24}, studies across countries including Australia have shown relatively few people seek help for insomnia and sleep problems more broadly²⁵. Effective treatment of insomnia is complicated by two important considerations:

- 1) the under-recognition and under-diagnosis of insomnia, and
- 2) heterogeneous treatment pathways for patients who do receive a diagnosis of insomnia

Morin²⁶ highlights that treatment trajectories for patients with insomnia are diverse, and are dependent on a variety of factors unique to the individual. These can include socioeconomic factors,

the type of healthcare provider who initiates treatment, and how accessible treatment options are for patients. Despite this awareness, limited research has considered the help-seeking behaviours of patients with insomnia. There is a clear need for better insight into the treatment options patients with insomnia access, perceived success of these options, and importantly, how regularly gold-standard treatment options are accessed by those who could benefit.

ONGOING MONITORING OF SLEEP PROBLEMS IN THE AUSTRALIAN COMMUNITY

Research commissioned by the Sleep Health Foundation in 2016 identified the prevalence of both clinical and behavioural sleep problems in the Australian community^{27–29}. Findings from this survey have informed the 2017 Deloitte’s report ‘Asleep on the Job’³⁰, and were heavily cited in the first of its kind 2019 Parliament of Australia report on sleep health awareness. The prevalence of sleep problems in the community was striking, and warrants regular and consistent follow-up in order to identify trends over time related to sleep health in Australia.

AIMS

The current research was commissioned by the Sleep Health Foundation in order to:

- 1 Determine the prevalence of insomnia disorder in the Australian population according to established diagnostic criteria
- 2 Compare prevalence rates using both the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) and the International Classification of Sleep Disorders, Third Edition (ICSD-3)
- 3 Identify the sociodemographic correlates of insomnia disorder in Australia (including gender, ethnicity, socioeconomic status, location)
- 4 Determine the prevalence of help-seeking behaviour in Australians who meet diagnostic criteria for clinical insomnia
- 5 Establish the prevalence of alternate sources of sleep disruption (snoring, sleep apnoea and restless legs)

METHODS

The survey was conducted over the period March to April 2019 on behalf of the Sleep Health Foundation, and funded by Merck, Sharp and Dohme. The study was developed, designed and executed by epidemiologists from Flinders University (Professor Robert Adams, Dr Sarah Appleton), The University of Adelaide (Dr Tiffany Gill) and CQUniversity Australia (Dr Amy Reynolds), and distributed online by Dynata (formerly Research Now SSI) as per the 2016 survey²⁷.

Dynata employ a three-stage randomization process when recruiting participants from their panel of >250,000 Australian participants to reduce risk of bias. This process has been reported elsewhere^{27-29,31}. Briefly, participants are randomly invited from panels of eligible Australians, with a small remuneration benefit associated with completion. The survey begins with profiling questions randomly selected for completion. Participants are then matched to suitable surveys, with the sleep survey completed here one of the options, after randomization. Invitations for participants take the form of emails, banners, messaging and text alerts from the operator. Invitation text varies from respondent to respondent, in order to reduce the potential for language to bias participation. The invitation to participate does not disclose the general content of the survey in order to reduce self-selection bias.

The sample closely matched the Australian population for age, gender, area of residence, income and workforce participation, according to ABS data. There were more people with higher education (Bachelor degree or higher 34% vs 22% in the population overall) in the participant sample.

Numerous survey questions were retained from the 2016 Australian Sleep Health Foundation population sleep survey²⁷. The 2016 survey included questions from:

- 2002 US National Sleep Foundation Sleep in Adults survey
- 2005 Australian Sleep in Adults survey

The 2019 Australian Sleep Health Foundation population sleep survey additionally included:

- Detailed questions to facilitate identification of respondents experiencing chronic insomnia disorder according to current, published DSM-V and ICSD-3 definitions;
- Health service use and information specifically for help seeking related to sleep; and
- Questions related to treatment access for sleep disorders.

The questionnaire used is provided at Attachment 1. The survey methodology was approved by the University of Adelaide Office of Research Ethics, Compliance and Integrity's Human Research Ethics Secretariat (H-2018-214).

Results reported in the following report have drawn on existing and new questionnaire items in order to address the intended objectives of the commissioned study. All analyses were conducted using IBM SPSS version 25.0 (IBM Corporation, Armonk, NY, USA). Differences in the distribution of predictors between participants with and without insomnia were explored using the Pearson χ^2 statistic.

DEFINITIONS OF INSOMNIA USED FOR ANALYSES (ICSD-3 AND DSM-V)

ICSD-3 CHRONIC INSOMNIA DISORDER

Patient (or parent/caregiver) reports:

1. One or more of:
 - Difficulty initiating sleep
 - Difficulty maintaining sleep
 - Waking earlier than desired
 - Resisting bed on an appropriate schedule
 - Difficulty sleeping without parent/caregiver intervention
2. Daytime consequences (one or more):
 - Fatigue/malaise
 - Attention, concentration or memory impairment
 - Impaired social, family, occupational or academic performance
 - Mood disturbance/irritability
 - Daytime sleepiness
 - Behavioural problems (e.g. hyperactivity, impulsivity, aggression)
 - Reduced motivation/energy/initiative
 - Proneness for errors/accidents
 - Concerns about, or dissatisfaction with, sleep
3. Adequate opportunity and circumstances to sleep
4. Duration: ≥ 3 months
5. Frequency (symptoms): ≥ 3 times/week
6. The sleep/wake difficulty is not better explained by another sleep disorder

DSM-V INSOMNIA DISORDER

Complaint of dissatisfaction with sleep quantity or quality associated with ≥ 1 of the following:

1. Difficulty initiating sleep
2. Difficulty maintaining sleep (frequent awakenings, or problems returning to sleep after awakenings)
3. Early-morning awakening with inability to return to sleep

Disturbance causes clinically significant distress or impairment (social, occupational, educational, academic, behavioural or other important areas of functioning)

Frequency: ≥ 3 nights per week.

Duration: ≥ 3 months.

Occurs despite adequate opportunity for sleep

Is not better explained by, and does not occur exclusively during, the course of another sleep-wake disorder (e.g. narcolepsy, breathing-related sleep disorder, a circadian rhythm sleep-wake disorder, parasomnia)

Coexisting mental disorders and medical conditions do not adequately explain the predominant complaint of insomnia

Insomnia is not attributable to the physiological effects of a substance (e.g. drug of abuse, medication)

DETAILED NOTES ABOUT IDENTIFYING INSOMNIA IN THE SURVEY

To avoid any bias in self-report of insomnia symptoms, participants were asked a series of detailed questions about difficulties initiating and maintain sleep, chronicity of their sleep difficulties, clinically significant distress or impairment in functioning, and adequacy of their habitual sleep durations.

DIFFICULTIES INITIATING OR MAINTAINING SLEEP (DIMS) (BOX 1)

DIMS occurring at least three nights per week were identified by the following questions: "We are interested in asking you some specific questions about what your sleep has been like over this past month. In the past month how often have you experienced these things? 1) Difficulty falling asleep, 2) Waking a lot during the night, 3) Waking up too early and not able to get back to sleep". Responses options were Rarely or never; A few nights a month; A few nights a week; Every or almost every night.

CHRONICITY OF SLEEP DIFFICULTIES

Chronicity of the sleep difficulty (at least 3 months) was determined with the following question regarding the specific sleep difficulty for those reporting any DIM symptom a few nights/month or more: "You indicated that you've had difficulty with of your sleep in the past month. For about how long have you had this difficulty? Possible response options were: Less than 1 month; At least 1 month but less

than 3 months; At least 3 months but less than 6 months; At least 6 months but less than 1 year; 1 year or more; Refused/Don't know.

For the ICSD-3 definition of insomnia, chronicity of reported specific daytime impairments experienced three or more times per week (see below), were identified with the following question: You indicated that you've had difficulty within the past month. For about how long have you had this difficulty? Possible response options were: Less than 1 month; At least 1 month but less than 3 months; At least 3 months but less than 6 months; At least 6 months but less than 1 year; 1 year or more; Refused/Don't know.

CLINICALLY SIGNIFICANT DISTRESS OR IMPAIRMENT IN FUNCTIONING (BOX 2)

The sleep disturbance causing clinically significant distress or impairment in social, occupational, educational, academic, behavioural, or other important areas of functioning and occurring three or more times per week were identified by the following questions: " We are also interested to hear about your typical daytime feelings over this past month. In the past month how often have you experienced these daytime feelings? Experienced feelings of: 1) Sleepiness that interfered with daily activities; 2) Felt sleepy sitting quietly day/early evening; 3) Fatigue or exhaustion; 4) Irritable or moody; 5) Reduced motivation or energy; 6) Reduced concentration, attention, memory; 7) Hyperactive, impulsive, aggressive; 8) Had little interest/pleasure in doing things; 9) Felt down, depressed, hopeless.

Impairment in occupational function was determined by identifying participants making errors at least one day in past 3 months: "Thinking about the past three months, how many days did you make errors at work because you were too sleepy or you had a sleep problem? Response options were: None; 1 to 2 days; 3 to 5 days; 6 to 10 days; More than 10 days; Refused/don't know.

ADEQUACY OF HABITUAL SLEEP OPPORTUNITIES

Adequate opportunity for sleep was identified with an all/most of the time response to "Does your current work schedule or typical weekday routine, including your duties at home, allow you to get enough sleep?" with other response options being sometimes; rarely/never; don't know/refused.

DSM-V SPECIFIC EXCLUSION OF COEXISTING MEDICAL CONDITIONS

Further classification according to DSM-V required the exclusion of coexisting medical conditions such as pain that explain the predominant complaint of insomnia. These respondents were identified with the following questions: 1) How often does pain stop you from going to sleep at night? 2) How often does pain wake you up at night? Response options were Never/rarely; A few nights a week (1-3 nights/week); Most nights (4-6 nights/week); Every night; Don't know.

Participants responding most nights/ every night to one or both of these questions were removed from the insomnia category for DSM-V definition purposes.

DSM-V REFERENCE TO COEXISTING MENTAL HEALTH CONDITIONS AND SUBSTANCE USE EXPLAINING SLEEP PROBLEMS; RATIONALE FOR RETAINING PARTICIPANTS WITH MENTAL HEALTH AND SUBSTANCE USE IN THE DEFINITION OF CHRONIC INSOMNIA DISORDER

The DSM-V definition of chronic insomnia disorder indicates that diagnosis is appropriate if coexisting mental disorders and medical conditions do not explain the predominant complaint of insomnia. For mental disorders, this is challenging to establish in cross-sectional population data, as many mental health conditions and substance use conditions are preceded by reports of poor sleep (e.g. Jackson et al.³²; Roberts & Duong³³), and this relationship is bidirectional, with lifelong depression and anxiety from childhood linked to subsequent diagnosis of insomnia in middle age (e.g. Goldman-Mellor et al.³⁴). Similarly, there are prospective associations between poor sleep (shorter duration and greater daytime sleepiness) and onset of substance use (alcohol and marijuana) in adolescents³⁵. For this reason, respondents with diagnosed mental health conditions were not removed from the insomnia classification, as it was not possible to establish without interview whether mental health conditions and substance use were driving insomnia symptoms in the sample.

RESULTS

PREVALENCE OF INSOMNIA ACCORDING TO DIAGNOSTIC CRITERIA (DSM-V AND ICSD-3)

In line with previous findings from the 2016 Sleep Health Foundation Sleep Survey, many Australian adults report difficulty initiating or maintaining sleep, or daytime consequences of poor sleep. Specifically, 40.4% (n=826) of respondents indicated sleep onset/maintenance concerns and daytime symptoms consistent with a diagnosis of chronic insomnia disorder according to the DSM-V. This prevalence is marginally lower when applying ICSD-3 criteria for sleep onset/maintenance concerns and daytime symptoms to the sample (38.6%, n=788).

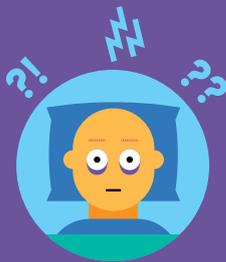
However, in both definitions, one of the criteria for diagnosis is that **participants must experience sleep onset/maintenance concerns and daytime symptoms in the context of adequate opportunity to sleep at night**. Only half of the respondents in the 2019 SHF Insomnia survey (51.2%, n=1047) reported that their daily routine provides adequate opportunity to sleep all or most of the time, which is indicative of social, occupational or other lifestyle related pressures on sleep opportunities. This is an important consideration for appropriately classifying participants with insomnia. Of those with insomnia symptoms (sleep onset/maintenance concerns and daytime symptoms), 60% did not have adequate opportunity to sleep.



48.8%

reported that their daily routine does not provide adequate opportunity to sleep all or most of the time.

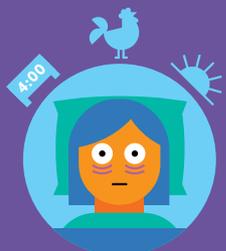
BOX 1:
SLEEP SYMPTOMS
(3 OR MORE
TIMES/WEEK)



*Difficulty
falling asleep*



*Waking a lot
during the night*



*Waking up too
early and can't
get back to sleep*

BOX 2:
DAYTIME SYMPTOMS
(3 OR MORE
TIMES/WEEK)



*Felt
fatigue or
exhaustion*



*Reduced memory,
attention or
concentration*



*Felt
irritable
or moody*



*Sleepiness which
interferes with
daily activities*



*Felt down,
depressed or
hopeless*



*Hyperactive,
impulsive or
aggressive*



*Little interest
or pleasure in
doing things*



*Sleepy sitting
quietly - daytime
or early evening*



*Reduced
motivation
or energy*

PREVALENCE OF SLEEP SYMPTOMS AND DAYTIME MANIFESTATIONS

The prevalence of sleep symptoms and daytime difficulties experienced three or more times a week ('high frequency') was high across the survey population. Over half (59.4%) of respondents overall report at least one sleep symptom experienced with high frequency (see Box 1 for included sleep symptoms). The prevalence of high frequency sleep symptoms did not differ by sex (57.2% of males and 61.4% of females) or age (see Figure 1). There were minor differences across age groups, and no age-related increase in experiencing any sleep symptom three or more times a week.

However, the type of symptom varied, with waking up overnight or early in the morning more common in older people and difficulty falling asleep more frequent in the young. Waking up a lot overnight was reported

by 47% of those 65 years and over, compared with 22% of 18 to 24 year olds. Difficulty falling asleep was reported by 32% of 18 to 24 year olds and 25% of those 65 years and over.

In contrast, experiencing daytime symptoms three or more times a week differed significantly by sex ($p < 0.05$) and by age ($p < 0.001$). This is reflected in higher prevalence in females (71.5%) than males (54.9%) of reporting one or more of the daytime symptoms three or more times per week (see Box 2). There was a significant decline in age-related prevalence of at least one daytime symptom reported 3+ times/week from 80.2% in 18–24 year olds to 45.2% of 65+ year olds. The age-related prevalence can be seen in Figure 2.

WORRY ABOUT SLEEP

Significantly more female respondents than male respondents reported "often or always" worrying about getting a good night's sleep (31% vs 21%) and being overwhelmed by thoughts when trying to sleep (35% vs 25%). These symptoms occurring frequently is more prevalent among younger adults and declines in frequency as people age. Among 18–24 year olds, 43% report being overwhelmed by thoughts when trying to sleep, compared to 18% of those aged at least 65 years.

CHRONICITY

In most people, 'high frequency' sleep symptoms were chronic (having persisted for at least 3 months or more). The prevalence of chronic (≥ 3 months), 'high frequency' (three or more times a week) was 50.4% ($n=1031$). The prevalence of chronic high frequency symptoms did not differ by sex, but did by age; sleep symptoms (DIMS) are more likely to be chronic in older people.

FIGURE 1:

Prevalence ≥ 1 sleep symptoms (3+ times/week) reported by the sample across age groups

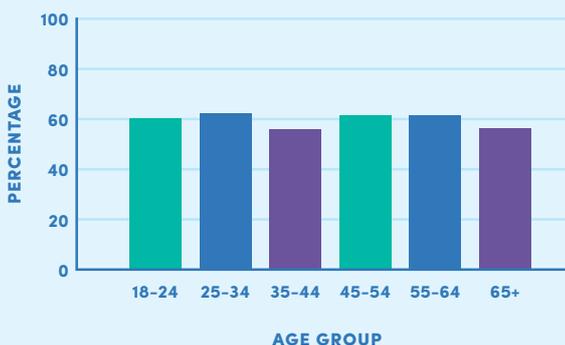


FIGURE 2:

Prevalence of ≥ 1 daytime symptoms (3+ times/week) reported by the sample across age groups

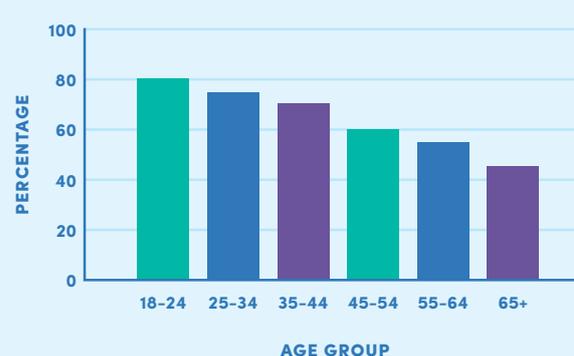
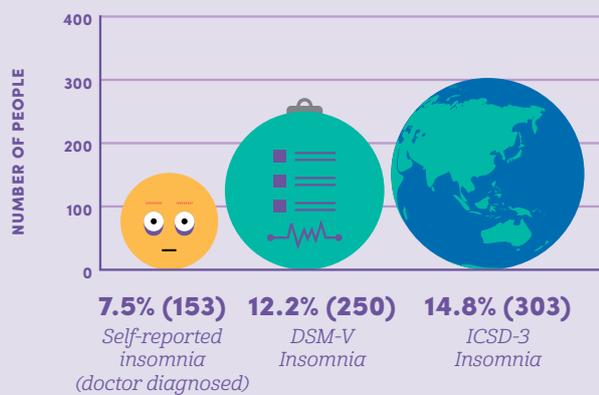


FIGURE 3:

Overall prevalence of chronic insomnia disorder in the Australian population from the 2019 SHF Study (n=2,044)



OPPORTUNITY TO SLEEP BY AGE AND SEX

Male respondents are far more likely than female respondents to report adequate opportunity to sleep (all/ almost all of the time) – 60.4% compared with 42.7% of female respondents. The difference is most marked in the 25 to 44 year old age bracket. Adequate opportunity to sleep increases significantly with age, being reported by 40.5% in the 18–24 year age group and 74.2% in those 65 years and older. Given that the frequency of insomnia-related sleep symptoms varies little across age groups, it is apparent that a greater proportion is attributable to the weekday routine limiting sleep opportunity among younger adults than it is in those older, and in female respondents than in male respondents, with corresponding effect on overall insomnia prevalence.

OVERALL PREVALENCE OF CHRONIC INSOMNIA DISORDER IN THE AUSTRALIAN POPULATION

The prevalence of insomnia in the general Australian adult population differs dependent on the diagnostic criteria applied, and is noticeably higher when defined using a composite score based on symptoms than when relying on individual self-report of a diagnosis (see Figure 3). There are clinical, practical and methodological considerations associated with these differences.

KEY MESSAGES

- 1 Older age is not synonymous with higher prevalence of sleep symptoms commonly associated with insomnia. The prevalence of at least one sleep symptom 3+ times/ week is consistent across age, although the type of symptom varies with age.
- 2 Sleep symptoms are more likely to be chronic with age.
- 3 One of the primary differences between DSM-V and ICSD-3 Insomnia criteria is the consideration of patients with other medical conditions which either prevents sleep onset, or contributes to wake after sleep onset.
- 4 There is a need to use consistent definitions for identifying insomnia if we are to adequately map changes in prevalence and success of future treatments across time.
- 5 Single item questions about diagnosed chronic insomnia disorder do not capture all individuals who meet diagnostic criteria and should be avoided as indicators of insomnia in future studies as they likely underrepresent prevalence in the population.

SOCIODEMOGRAPHIC CHARACTERISTICS OF INDIVIDUALS MEETING DIAGNOSTIC CRITERIA FOR CHRONIC INSOMNIA DISORDER IN AUSTRALIA

Prevalence of chronic insomnia disorder relative to the sociodemographic characteristics of respondents from the 2019 Insomnia Survey are provided by both definitions (DSM-V and ICSD-3) in Table 1. These data suggest chronic insomnia disorder is greatly influenced by sociodemographic factors, irrespective of diagnostic criteria used to define prevalence.

In brief, insomnia was more prevalent in males than females (17.1% v 12.7%) according to the ICSD-3 insomnia criteria. No sex differences were observed when DSM-V diagnostic criteria were used with both males (13.0%) and females (10.9%) reporting similar prevalence of insomnia. Females are less likely than males to report adequate opportunity to sleep. This largely accounts for the lower prevalence of chronic insomnia in female respondents compared with male respondents.

Prevalence according to both definitions varied significantly according to age group, increasing significantly among those 55 years and older.

Adequate opportunity to sleep is lower among young adults. As this is an essential criterion for defining and diagnosing insomnia, this influences insomnia prevalence rates in younger age groups. In addition, daytime sleepiness as the only reported daytime impairment is significantly higher among those aged 65 years and older. Consequently, prevalence of insomnia is inflated in older age groups, and lower in younger age groups. It is plausible that insomnia rates could be higher in younger age groups than we routinely see (i.e. an insomnia phenotype) which would become more apparent if adequate sleep opportunity were routinely available. The importance of recognizing this is that the

treatment of the sleep problem likely differs if the cause is restricted sleep (inadequate sleep opportunity) versus chronic insomnia disorder.

Prevalence of chronic insomnia disorder was higher in rural/regional areas compared with metropolitan areas, and in households that spoke English as the primary language at home, according to both diagnostic criteria. Insomnia was significantly less common among people who reported they were born in North, South, or East Asia (5%). Highest education level attained was associated with prevalence, but only according to ICSD-3 diagnostic criteria, where prevalence was highest in individuals who identified a trade qualification (20.9%) and lowest in respondents who left school after 16 but were presently still studying (7.9%).

Work status and household income were both associated with prevalence of chronic insomnia disorder by definitions. Groups reflecting highest prevalence did differ according to diagnostic criteria applied. For DSM-V criteria, the lowest prevalence of insomnia was observed in volunteers (8.3%) and full-time workers (8.5%) while the highest prevalence was in unemployed (16.6%) and retired (17.5%) workers. In contrast, according to ICSD-3 criteria, the lowest prevalence was in full-time workers (9.8%) and current students (11.9%), while highest prevalence was in retired respondents (21.9%) and those unable to work due to disability (22.9%). This difference is likely a reflection of the definition differences around existing medical conditions experiencing pain.

Prevalence of insomnia differed across household income brackets. According to both definitions, prevalence was highest in the \$40–\$60,000 per annum bracket. Prevalence differed in the lowest household income bracket by definition, with 6.6% of respondents experiencing DSM-V chronic insomnia, while over double (13.2%) in this bracket met ICSD-3 criteria.

Prevalence differed by both financial stress and marital status according

to ICSD-3 criteria, but not DSM-V criteria. Highest prevalence rates were in those who indicated they spend more than they earn/receive (17.8%, ICSD-3), and in those who indicate they 'get by' (17.0%, ICSD-3). In contrast, prevalence rates were relatively consistent between 11.6–13.1% according to DSM-V criteria; the exception being lower rates in those who responded that they 'don't know' (7.8%, DSM-V; 6.8%, ICSD-3). For both definitions, prevalence was higher in those who were not partnered (13.7% DSM-V, 17.2% ICSD-3) but the difference compared to partnered relationships was only significantly different according to the ICSD-3 diagnostic criteria.

No significant differences were observed between states by either definition.

Prevalence of insomnia by activities in the hour before bed was consistent across both definitions (Table 2). The prevalence of insomnia was lower with higher frequency of some activities before bed, including work relating to their job, and hot bath or shower before bed. In contrast, prevalence was higher in those who frequently watched TV during the hour before bed.

PREVALENCE OF SEEKING HELP FOR SLEEP FROM A HEALTHCARE PROVIDER

Less than a third (30.0%, n=613) of respondents overall reported that they have discussed sleep with any doctor or healthcare professional in the past year. Of this subgroup, 21.7% (n=133) met the ICSD-3 criteria for diagnosis with chronic insomnia disorder. There were no differences in frequency of conversations about sleep with a doctor or other health professional between those who did and did not meet criteria for insomnia diagnosis. Most people who had spoken about sleep with a doctor or health professional indicated they had discussed sleep 2–5 times in the last year. This frequency did not vary significantly by whether they met ICSD-3 insomnia criteria (63.2%) or did not have insomnia (58.8%).

TABLE 1:

Distribution of insomnia (% , n) classified by DSM-V and ICSD-3 criteria in relation to participant demographics

		DSM-V insomnia		ICSD-3 insomnia	
		%	n	%	n
Sex	Male	13.7	136	17.1*	170
	Female	10.9	114	12.7	132
	Other	0.0	0	0.0	0
Age (years)	18 to 24	11.2	26	11.6	27
	25 to 34	10.3	39	11.6	44
	35 to 44	7.6	30	9.3	37
	45 to 54	11.4	39	14.6	50
	55 to 64	15.4	48	20.3	63
	65 to 74	16.1	40	20.5	51
	75+	20.9***	28	23.1***	31
State	ACT	6.3	2	9.4	3
	NSW	9.9	58	12.9	75
	NT	0.0	0	0.0	0
	QLD	14.4	58	17.2	69
	SA	13.5	30	17.5	39
	TAS	16.9	12	21.1	15
	VIC	11.3	58	12.9	66
	WA	15.2	32	17.1	36
Region	Metro	11.2	159	13.5	191
	Rural/ regional	14.5*	91	17.8*	112
Language at home	English	13.0*	243	15.7*	294
	Other	4.1	7	5.3	9
Highest education	Still at school	8.0	2	12.0	3
	High school or less	14.6	67	17.0	78
	Left after 16 still studying	7.9	3	7.9	3
	Trade	15.2	25	20.6***	34
	Certificate/Diploma	13.6	86	17.5	111
	Bachelor degree/higher	9.4	65	10.4	72
Work status	Full-time	8.5**	52	9.8***	60
	Part-time	12.6	50	13.5	55
	Student	10.3	12	11.9	13
	Homemaker	12.2	23	14.4	27
	Unemployed	16.6	24	17.6	24
	Retired	17.5	73	21.9	93
	Unable to work due to disability	10.7	11	22.9	24
	Volunteer	8.3	1	17.9	1
	Other	15.4	4	18.8	6
Household income	<\$20K	6.6**	10	13.2***	20
	>\$20k-\$40k	15.8	62	20.2	79
	>\$40k-\$60k	17.3	60	21.4	74
	>\$60k-\$80k	12.8	31	16.5	40
	>\$80k-\$100k	10.1	22	11.5	25
	>\$100-\$150k	11.1	33	10.7	32
	>\$150k	7.5	11	8.2	12
Financial stress	Spend more than earn/get	12.9	29	17.8*	40
	Get by	13.1	74	17.0	96
	Bit left over (saved or spent)	12.2	110	14.0	126
	Saves a lot	11.6	29	13.5	34
Marital status	No partner	13.7	115	17.2*	143
	Partner	11.3	135	13.3	159

Note: * p<0.05; ** p<0.01; *** p<0.001 within each diagnostic criterion.

KEY MESSAGES

- 1** Sociodemographic correlates of insomnia differ according to the diagnostic criteria applied to determine chronic insomnia disorder. It will be important to use consistent criteria over time to meaningfully determine changes in prevalence and correlates of insomnia in future studies.
- 2** Lower income, financial stress, unemployment, and retirement are associated with highest prevalence rates of insomnia in the Australian population; and when the ICSD-3 criteria are applied, rates are higher in those unable to work due to disability.
- 3** Rates of insomnia are higher according to both criteria in older Australians; despite no apparent change in prevalence in overall sleep symptoms, and a decline in daytime symptoms with age, in the population more broadly.
- 4** Daytime sleepiness as the sole daytime impairment is far more common among older adults. This suggests the insomnia phenotype differs across age groups, with the “hyperarousal” phenotype much less common in the elderly.
- 5** Prevalence of insomnia is relatively unaffected by activities in the hour before bed, with similar rates in those who routinely use technology, work, eat, drink alcohol or are on social media frequently compared to those who do not.

SELF-REPORTED DOCTOR-DIAGNOSED INSOMNIA

The prevalence of self-reported doctor-diagnosed insomnia varied little across age groups (25 to 34 years – 7.4%; 65 to 74 years – 6.8%), although it was higher in 18 to 24 year olds (12.5%). Doctor-diagnosed insomnia was more common in female respondents (8.6%) than male respondents (6.2%).

MOTIVATIONS FOR SEEKING HELP FOR SLEEP

Of the respondents in our sample who met ICSD-3 diagnostic criteria, less than half (43.9%, n=133) indicated they had discussed sleep with any healthcare provider in the preceding 12 months. Of the 133 respondents who had discussed sleep, over half (56.4%) indicated that discussions about sleep problems with health practitioners were initiated by the healthcare professional. Respondents who met criteria for chronic insomnia disorder were more likely than those who did not to report they were aware of feeling sleepy/unfocussed (43.6% versus 31.5%, p=0.009). Other factors prompting participants to discuss sleep problems are summarized in Table 3; however these did not differ significantly in those with and without ICSD-3 insomnia.

TABLE 2:

Prevalence of insomnia (% , n) by diagnostic criteria in relation to activities conducted in the hour before attempting sleep.

		DSM-V insomnia		ICSD-3 insomnia	
		%	n	%	n
Did work relating to job	3 nights/month or less	13.2	221	15.8	265
	≥3 nights/week	8.6*	26	11.2*	34
Were on internet	3 nights/month or less	11.2	74	13.8	91
	≥3 nights/week	12.8	176	15.5	212
Used social media: FB, Twitter, Instagram	3 nights/month or less	12.8	125	16.0	157
	≥3 nights/week	12.0	125	13.9	145
Watched TV	3 nights/month or less	9.1*	46	10.9**	55
	≥3 nights/week	13.4	203	16.3	247
Read	3 nights/month or less	11.7	158	14.0	189
	≥3 nights/week	13.5	91	16.6	112
Drank alcoholic beverage	3 nights/month or less	12.5	204	14.7	239
	≥3 nights/week	11.8	46	16.2	63
Took hot bath, shower	3 nights/month or less	13.6*	175	16.5*	213
	≥3 nights/week	10.2	75	12.3	90
Had meal/snacks	3 nights/month or less	13.3	166	15.6	195
	≥3 nights/week	11.1	83	14.2	106

Note: * p<0.05; ** p<0.01.

TABLE 3:

Factors prompting participants (n=613) to discuss sleep problems with a health practitioner comparing those without insomnia to those with ICSD-3 criteria insomnia.

	No insomnia		ICSD-3 insomnia	
	%	n	%	n
I felt unwell physically	28.1	135	30.1	40
Felt unwell emotionally (moody, etc)	36.0	173	38.3	51
Aware of feeling sleepy/unfocussed	31.5	151	43.6**	58
Worried about ability to do tasks (e.g. job, other tasks, driving)	27.1	130	25.6	34
Family member or friend suggested speak to a health professional	16.9	81	14.3	19
Health professional initiated discussion on sleep	36.7	176	56.4***	75
Worried about sleep, although wasn't feeling tired during the day	11.5	55	6.8	9
Other	9.0	43	7.5	10

Note: ** p<0.010; *** p<0.001.

USE OF SLEEP AIDS, APPS AND THERAPEUTIC APPROACHES IN AUSTRALIANS WITH CHRONIC INSOMNIA DISORDER

Sleep aid, app use and therapeutic engagement is relatively consistent in Australia irrespective of whether a person meets the criteria for insomnia or not. However, prescription sleep medication usage ≥ 3 nights/week was significantly higher in participants who met the ICSD-3 diagnostic criteria (12.3%) than in those who did not (7.8%).

Use of online modules or sleep apps was low across the sample, with usage $< 10\%$ overall for those with and without insomnia. Similarly, cognitive behavioural therapy (CBTi) from a healthcare professional was low, with 6.8% of those with no insomnia, and 8.7% of those who met the insomnia criteria indicating they had used CBTi for insomnia either a few nights/month, or more.

TABLE 4:

Prevalence of sleep aid, app, and therapeutic engagement by insomnia status in the Australian population.

		No insomnia		ICSD-3 insomnia	
		%	n	%	n
Herbal supplements such as Valerian	never/rarely	91.5	1561	89.7	270
	few nights/month	4.6	78	5.3	16
	≥ 3 nights/week	3.9	67	5.0	15
Sleep medication prescribed by a doctor (e.g. temazepam, valium)	never/rarely	86.4	1478	80.8*	244
	few nights/month	5.8	100	7.0	21
	≥ 3 nights/week	7.8	133	12.3	37
Online modules or sleep apps, including insomnia apps	never/rarely	92.3	1568	91.0	274
	few nights/month	4.1	70	3.3	10
	≥ 3 nights/week	3.6	61	5.6	17
Cognitive behavioural therapy (CBTi) techniques for insomnia from a health care professional	never/rarely	93.3	1584	91.3	274
	few nights/month	3.4	57	5.0	15
	≥ 3 nights/week	3.4	57	3.7	11

Note: * $p < 0.05$.

SLEEP DISRUPTION IN THE BROADER COMMUNITY

Monitoring of sleep disruption is important to highlight areas requiring public education and future intervention in the field of sleep health. The prevalence of frequent sleep disruptions self-reported in our representative sample of the Australian population are provided in Table 5.

TABLE 5:

*Prevalence (% , n) of sleep disruption (experienced \geq a few nights/week).**

	Prevalence	
	%	n
Doctor diagnosed sleep apnoea (with sleep study)	6.4	131
Frequent or loud snoring	17.1	351
Breathing pauses in sleep	10.0	203
Restless legs (\geq few nights/week)	19.7	402
Prescribed medication use	10.7	219
Failure to get adequate or satisfactory sleep'	64.9	1326

Note: *Can have more than one.

KEY MESSAGES

- 1 Relatively few Australians speak to healthcare professionals about sleep, despite almost half of the population reporting inadequate sleep.
- 2 Even amongst patients who meet diagnostic criteria for chronic insomnia disorder, sleep is often only discussed as a secondary issue during a consultation for other reasons.
- 3 Concern about competency (at work, and on the road) is one of the least frequent motivations for discussing sleep with a healthcare professional in the small sub-sample who had discussed sleep in the last year. This is despite awareness of feeling sleepy or unfocussed.
- 4 Treatments for insomnia are rarely/never used; there is untapped potential for increasing usage, particularly of gold standard CBTi if engagement with healthcare providers can be increased.
- 5 Usage rates suggest a need for greater education or awareness to promote use of gold standard treatment (CBTi) in insomnia, as self-reported usage is low.

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