Article

Evaluation of a Sleep Education Workshop for Trainee Psychologists Designed to Increase Knowledge and Practical Skills in Sleep and Insomnia Management: A Pilot Study

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Abstract: Despite the strong links between sleep, circadian rhythms, and mental health, sleep education has been neglected in mental healthcare provider training programs. The current pilot study examined the potential efficacy and acceptability of a sleep education workshop for trainee psychologists, called the Sleep Psychology Workshop. Eleven students completing their Master of Psychology degrees (90% female, 24.4 ± 1.6 years old) attended the Sleep Psychology Workshop as part of their Health Psychology course, delivered as three, two-hour lectures (total six hours). Trainees' sleep psychology knowledge quiz scores (% correct) demonstrated significant improvement from pre- (M = 60%, SD = .09) to post-workshop (M = 79%, SD = .08), t (6) = -5.18, p = .002. Trainees also reported increased self-efficacy to use common sleep-related assessment instruments and empirically supported interventions to manage sleep and circadian rhythm disturbances, along with increased confidence to manage insomnia disorder in clinical practice (all p <.02). Trainees also endorsed the workshop as an acceptable sleep education program for trainee psychologists via a post-workshop feedback survey, focus group, and six-month follow-up survey. This pilot study provides preliminary evidence for the Sleep Psychology Workshop as an effective and acceptable sleep education program for trainee psychologists.

Keywords: sleep education; insomnia; training; circadian rhythms; behavioral sleep medicine; psychotherapy; dissemination; implementation science; mental health

1. Introduction

Poor sleep contributes to poor mental health, with higher rates of sleep and circadian rhythm disturbances observed in people experiencing mental health disorders than in the general population [1-6]. Whilst sleep and circadian rhythm disturbances are listed as part of the diagnostic criteria of many mental health disorders (e.g., major depressive disorder, generalized anxiety disorder, bipolar disorder), current clinical guidelines recognize sleep disturbances, such as insomnia, as independent and treatable conditions to co-morbid mental health disorders [7-11]. These changes in diagnostic guidelines were informed by research over the past 20 years, which highlighted how sleep disturbances can predict the onset and exacerbation of mental health conditions [3, 12, 13]. In depression, for example,

sleep disturbances can increase the severity and duration of a depressive episode [14], as well as increase the risk of relapse [15, 16]. Additionally, sleep and circadian rhythm disturbances heighten the overall risk of suicidal thoughts and behaviors [17]. Even just being awake at night increases the risk of suicide and highlights the need to address sleep and circadian rhythm disturbances which contribute to nocturnal wakefulness [18]. Notably, treating sleep disturbances can improve mental health, with a recent meta-analysis demonstrating that improving sleep quality can lead to significant improvements in depression, anxiety, rumination symptoms, and overall mental health [19].

Despite the strong links among sleep, circadian rhythms, and mental health, sleep education has largely been neglected in mental healthcare training programs around the world [20]. In Australia, almost half of trainee psychologists receive no sleep education regarding assessment, diagnosis, or treatment for sleep and circadian rhythm disturbances during graduate school [21]. The story is similar in the U.S., with only 31% of clinical psychology graduate programs offering training in the treatment of sleep disorders [22]. Due to the lack of sleep education during graduate training, many mental healthcare providers do not feel equipped to take a sleep history, nor routinely to screen or provide evidence-based treatment for sleep disorders, such as insomnia [23, 24]. Indeed, Haycock et al. (2022) found that sleep disturbances are not a treatment priority for many psychologists in Australia [25]. Without exposure to sleep education during graduate training, mental health providers, such as psychologists, are ill-equipped to assess and manage common sleep and circadian rhythm disorders that co-occur with the mental health conditions they will routinely see in clinical practice. Therefore, there is an urgent need to increase sleep and circadian rhythm education within graduate psychology training programs to equip the future mental healthcare workforce with the essential knowledge and skills they need to address sleep and circadian rhythm disturbances.

To address this curriculum oversight, the current study created and piloted a sleep education workshop, called the Sleep Psychology Workshop, targeting trainee psychologists in graduate school. In brief, the workshop was informed by a narrative review of the sleep education for healthcare provider literature [20], sleep education survey research with psychology trainees and educators [21], as well as published literature on other sleep education studies for a range of healthcare students and providers (e.g., psychologists, medical doctors, neurologists, nurses, pharmacists) [26-42]. The learning objectives for the Sleep Psychology Workshop were to provide trainee psychologists with the introductory skills they need to assess, diagnose, and manage the sleep and circadian rhythm disturbances that are highly prevalent in mental health populations, such as insomnia (see Section 4.1 and Figures 2, 3 for workshop details). This pilot study aimed to evaluate the Sleep Psychology Workshop, a six-hour program to improve trainee psychologists' knowledge, perceived confidence, and self-efficacy to assess and treat sleep and circadian rhythm disturbances. It also aimed to assess the acceptability (through trainees feedback) of the Sleep Psychology Workshop to trainee psychologists.

2. Results

A class of 11 trainee psychologists, all Master of Clinical Psychology students in their sixth year of training completing a Health Psychology subject, were invited to take part in the Sleep Psychology Workshop evaluation study. All participants consented to take part over the course of the study, with seven completing both the pre-and post-workshop knowledge quiz, eight completing the post-workshop evaluation survey, 10 participating in the focus group, and all 11 completing the six-month follow-up survey. Participants were 23 to 28 years old ($M = 24.44$, $SD = 1.59$), and the majority identified as female (90%). Students reported a median of 6 hours of sleep education during their undergraduate psychology training and zero hours during their graduate degree up to the date of this study.

2.1. Potential efficacy

Pre- to post-intervention sleep psychology knowledge quiz scores are presented in Figure 1. There was a significant improvement in trainees' sleep psychology knowledge quiz scores from pre- to post-workshop, t (6) = -5.18, p = .002 (two-tailed), with large effect size (Cohen's d = 1.96).
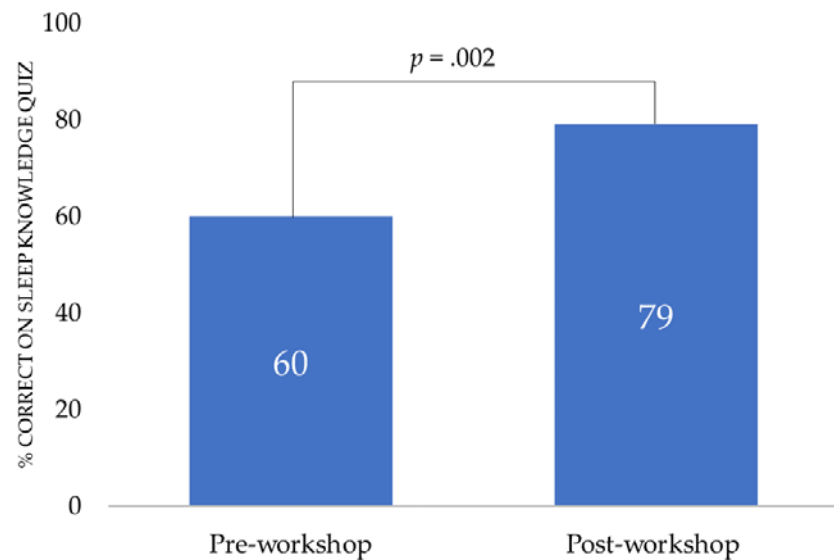

Figure 1. Sleep psychology knowledge quiz scores from pre- to post-workshop

Wilcoxon Signed Rank Tests revealed that trainees reported a significant increase in their self-efficacy to use common sleep-related assessment instruments and empirically supported interventions to manage sleep disturbances, with large effect sizes (r = .58 - .64; see Table 1). They also reported an increase in their perceived skills to assess and diagnose common sleep and circadian rhythms disorders and knowing where to access further training in sleep, sleep disorders, and circadian rhythms if required. There was also a significant increase in trainees' preparedness to treat sleep disturbances using an evidence-based approach from pre- to post-workshop (r = .06 -.65; see Table 2). Moreover, trainees reported significantly increased confidence in managing insomnia disorder and obstructive sleep apnea using evidence-based therapy post-workshop.

2.2. Training Acceptability

Acceptability of the Sleep Psychology Workshop to trainee psychologists was high. Post-workshop, more than 75% of participants responded that they agreed or strongly agreed across all content, learning, and training experience survey items (Table 3). Additionally, 88% of participants rated the workshop as excellent, with 12% rating it as very good.

Table 1. Trainees' self-efficacy to address sleep disturbances in clinical practice from pre- to post-workshop (*n* = 7)

Item	Pre-Workshop (Med)	Post-Work-shop (Med)	z	p	r
As of today, I feel comfortable using common sleep-related assessment instruments to assess sleep disturbances	3.0	6.0	-2.38	.018	.63
As of today, I feel comfortable using empirically-supported interventions to treat sleep disturbance	3.0	5.5	-2.38	.017	.64
I have the skills to assess and diagnose common sleep disorders	4.0	5.5	-2.39	.017	.64
I know the common sleep disturbances seen in various mental health disorders	6.0	6.0	-.71	.480	.19
I know where to go to access further training in sleep, sleep disorders, and circadian rhythms if required	3.0	6.0	-2.39	.017	.64
I know more about sleep and circadian rhythms than most other postgraduate psychology students	4.0	6.0	-2.16	.031	.58

* Items were rated on a 7-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). Statistical tests used = Wilcoxon Signed Ranks Test.

Table 2. Trainees' preparedness and confidence to work with sleep disturbances from pre- to post-workshop (*n* = 7)

Item	Pre-Workshop (Med)	Post-Workshop (Med)	z	p	r
Preparedness: When a client reports symptoms of a sleep disturbance, such as difficulty falling or staying asleep:					
How prepared do you feel to conduct a thorough evaluation of their sleep?	2.0	3.0	-1.89	.059	.51
How prepared do you feel to treat the sleep disturbance using an evidence-based approach?	2.0	3.0	-2.43	.015	.65
Confidence: How confident do you feel about treating the following sleep problems/disorders using evidence-based therapy?					
Insomnia disorder	1.0	3.0	-2.43	.015	.65
Circadian rhythm disorders (e.g., delayed sleep-wake phase disorder)	1.0	3.0	-1.93	.053	.52
Disorders of central hypersomnolence (e.g., Narcolepsy)	1.0	2.0	-1.73	.083	.46
Parasomnias (e.g., sleepwalking, nightmare disorder)	1.0	1.5	-1.41	.157	.38
Obstructive sleep apnoea	1.0	2.0	-2.24	.025	.60
Comorbid sleep disturbances in mental health conditions (e.g., sleep disturbances commonly seen in depression)	3.0	3.0	-1.89	.059	.51

* Items were rated on a 4-point Likert scale (1 = Not at all, 2 = A little, 3 = Somewhat, 4 = Very). Statistical tests used = Wilcoxon Signed Rank Test.

Table 3. Observed sample proportions for the Sleep Psychology Workshop acceptability items from the post-workshop survey (*n* = 8)

Item	Disagree/ Strongly Disagree	Neither agree nor disagree	Agree/strongly agree
The workshop objectives were clear	0	0	100
The instructional materials (i.e., readings, handouts, videos) increased my knowledge and skills in the subject matter	0	0	100
The workshop increased my interest in sleep and circadian rhythms	0	0	100
The workshop corresponded to my expectations	0	0	100
The workshop has helped me to develop practical skills in sleep and circadian rhythms	0	0	100
The workload and requirements associated with the workshop were appropriate for the course level	0	0	100
The workshop was organized in a manner that helped me understand underlying concepts	0	0	100
The workshop gave me the confidence to do more advanced work on the subject	0	0	100
I believe that what I was asked to learn in this workshop is important	0	0	100
Expectations for my learning were clearly defined	0	0	100
The homework exercise of completing a sleep diary was useful	0	12.5	87.5
The class exercise of role-playing the two-process model of sleep regulation as a client and therapist was useful	0	12.5	87.5
The class exercise of taking a sleep history was useful	0	12.5	87.5
The class audio and case formulation of the patient with insomnia "John" was useful	0	25	75
Practicing sleep restriction therapy calculations in class was useful	0	0	100

[1] Percentage reported reflects the valid percentage of *n* = 8 completed post-workshop surveys received. This table reports the 5-point Likert scale collapsed into agreement, mid-point and disagreement items

2.3. Focus Group Feedback

Reflexive thematic analysis of trainees' feedback from the focus group (*n* = 10) supports the Sleep Psychology Workshop as an acceptable training program for improving trainee psychologists' sleep assessment, diagnosis, and management skills. The following themes were identified from the focus group discussion:

Theme 1. Developing practical skills in behavioral sleep medicine. Trainees identified that the Sleep Psychology Workshop was very helpful for developing their practical skills in behavioral sleep medicine. They valued the practical application of the workshop and enjoyed having strategies and techniques to use directly with clients experiencing sleep and circadian rhythm disturbances. The exercises helped trainees to develop insight and awareness into their own, and their clients' sleep. For example, several students reported that using a sleep diary to record their own sleep was helpful and alerted them to potential sleep interfering behaviors, like excessive caffeine use and irregular sleep patterns, that may be impacting their sleep quality. Trainees discussed that the workshop helped them to know what to do (i.e., "I get it"), if they encountered a client experiencing

a sleep disturbance. They discussed having a better sense of knowing what questions to ask clients about their sleep than before the workshop.

> *"There were a lot of things that now we know what to be looking for, like time spent in bed or like those sort of [sleep] latencies that we need to be looking out for. At least we know now what to be looking or asking because I don't think we had that. Like it was more like are you waking up on time? Are you sleeping the same amount of time? But whereas now it's like, what time do you get to bed and how long does it take to fall asleep? There's better questions and we understand that now" – (Participant 9)*

Theme 2. Knowledge Building/Understanding. The workshop helped trainees to build their knowledge and understanding of sleep and circadian rhythms. Trainees discussed how the workshop consolidated their theoretical understanding of sleep psychology and that they were better equipped to understand client's perspectives. They also endorsed that completing sleep diaries and questionnaires themselves was advantageous to understanding barriers that may get in the way of clients completing these exercises. Many trainees reported learning about CBT-I for the first time. Trainees also reported being quite surprised to learn that sleep hygiene was not an empirically supported treatment for chronic insomnia and appreciated this increased understanding of insomnia interventions. They valued understanding the referral process to sleep physicians, knowing where the limits of their skills might be and the type of sleep problems that would be best to refer on. Students also acknowledged some limitations of the Sleep Psychology Workshop, namely that they would encounter many clients in their general psychology practice who would not meet explicit criteria for a sleep disorder, but instead, display more subthreshold symptoms. They were curious about how to address the unique types of sleep disturbances that occur in different types of mental health disorders (e.g., depression *vs.* anxiety) and how to mix and match strategies when they would not have a full 4-6 sessions to work on sleep. Trainees also identified the need to attend further training to learn about sleep disorders not covered extensively in the workshop (e.g., hypersomnolence disorders).

> *"Like the sleep diary was not only helpful in understanding our sleep, like Participant 5 was saying it was, but also like so you are aware of the barriers that come up if I ask a client to do that. Like some days, I completely forgot, or like Participant 2 was saying, that you did it for a few days and then thought too much about it so then you didn't really want to do it anymore. And so, it's like those sorts of things where it is really important to be so familiar with what you are asking your clients to do" (Participant 1)*

Theme 3. Professionally relevant and level appropriate. Overall, trainees felt that the Sleep Psychology Workshop was professionally relevant and met their current needs. They liked that it had a balance of both theoretical and practical components. They found the workshop relevant to the types of clinical presentations they would see, enjoyed the integration of sleep topics/subjects across the workshops (e.g., introducing the two-process model of sleep regulation in Workshop 1, and then using this model to explain sleep restriction therapy as part of CBT-I in Workshop 3), and felt they had learned useful content that was appropriate to their current level of development as trainee psychologists.

> *"I like how the workshops kind of built on each other. I think it was the first one where [the presenter] talked about the two-process model and she continued to kind of reference them throughout when talking about the interventions and things like that. Which for me was helpful and I guess trying to understand not only why it was useful but how you can communicate it to clients as well." (Participant 5)*

Theme 4. Developing clinical sleep skills/judgement. Trainees appreciated the opportunity to problem solve and discuss challenges with implementing sleep assessment and management skills in the workshop. They also utilized their reflection skills, integrating the information learned with the understanding of their own sleep and that of their

clients. Overall, trainees endorsed that the Sleep Psychology Workshop helped to build their confidence to assess and manage sleep disturbances in clinical practice, although they were still cognizant of the need to work with their supervisors to hone their sleep knowledge and skills.

> *"I think coming out of it, we felt like we have the foundation of skills to be able to work with sleep issues, and obviously you are not going to be the expert in all the different areas, but now having the foundation we can build on it with the extra bits that we might need." (Participant 10)*

Theme 5. Practical and engaging style of delivery. Lastly, trainees enjoyed the practical and engaging delivery style of the Sleep Psychology Workshop. The practical focus of the workshop was highlighted, with students finding the role-play activities of the two-process model of sleep, taking a sleep history, and sleep-restriction therapy calculations useful for developing their skills. Trainees also appreciated the engaging presentation style, enjoying the interactive nature of the workshop and the benefits of being able to ask questions and chat with the workshop facilitator on breaks about their own experiences integrating sleep psychology work with their clients.

> *"I thought having us, um, role play and explain the two-process model was really good because it can be tricky to wrap your head around. So, practicing how you would say it to a client was really helpful because I know, at least myself, I probably wouldn't go and do it in my spare time (laughs). So, it was good to do it." (Participant 1)*

2.4. Long-term follow-up survey.

All 11 trainees completed the six-month follow-up survey. All endorsed using the knowledge learned in the Sleep Psychology Workshop over the past six months and that it had been helpful for their clinical practice. Specifically, 100% routinely asked their clients about sleep, 91% had used psychoeducation about sleep with a client, 82% had administered sleep questionnaires to their clients, 82% had discussed the two-process model of sleep regulation with a client, and 73% reported that they had used a sleep diary with a client.

Overall, 91% felt more confident to take a sleep history and screen for sleep apnea, whilst 82% felt more confident to diagnose a sleep-wake disorder. Notably, all students reported that they better understood the common perpetuating factors of insomnia (e.g., spending too long in bed when they can't sleep) and 91% agreed they felt more confident to treat insomnia using an empirically supported treatment (e.g., CBT-I). Additionally, 91% reported that they now know where to refer clients who require more support with their sleep.

Of particular interest, 82% reported that their own sleep had improved from attending the Sleep Psychology Workshop. In free-text responses, students identified helpful factors that positively impacted their sleep as: (1) increased awareness of the factors that influence sleep; (2) importance of keeping consistent sleep-wake schedules; (3) challenging their own beliefs about sleep (e.g., it is normal to wake up in the night); (4) improved sleep hygiene; (5) greater awareness of their own sleep patterns/habits; and (6) implementing stimulus control.

In regard to recommended improvements for the workshop, 63% of trainees identified ways to support their learning from the Sleep Psychology Workshop into clinical practice. Trainees' free-text responses included: (1) supervision from appropriately trained supervisor; (2) support to implement interventions, such as sleep restriction therapy, with clients; (3) further training sessions in CBT-I; (4) increased training for clients who are resistant to change; (5) longer term training/support.

Lastly, 100% of trainees agreed that sleep and circadian rhythms education should be on the curriculum for all psychology graduate training programs and that they would recommend the Sleep Psychology Workshop to other graduate psychology students.

3. Discussion

This pilot study provides preliminary evidence for the Sleep Psychology Workshop as an effective and acceptable sleep education program for trainee psychologists. Trainees reported increased knowledge, confidence, and preparedness to assess and manage sleep and circadian rhythm disturbances in clinical practice. They also provided overwhelmingly positive feedback about their practical learning experiences from the workshop and endorsed the importance of sleep education for psychologists. These results reflect the relevance and unmet educational needs of trainee psychologists to learn practical, evidence-based strategies to address sleep and circadian rhythm disturbances that so commonly occur alongside mental health conditions in psychology contexts.

A strong indicator of the workshop's potential efficacy was the observed increase in trainees' sleep psychology knowledge from pre-to post-workshop, with sleep knowledge quiz scores increasing from 60% to 79%, demonstrating significant learning and retention of sleep psychology knowledge. Sleep education studies across psychology [21, 27] and medical students [31, 43] show low levels of sleep knowledge without specific sleep education training. Whilst knowledge does not equal competency, these results demonstrate that the Sleep Psychology Workshop greatly increased trainees' awareness of the relationship between sleep and mental health and that students retained important information about evidence-based sleep assessment and management skills post-workshop.

Another indicator of potential efficacy was trainees' increased confidence and preparedness to address and treat sleep disturbances. Focus group feedback highlighted trainees developing practical skills in behavioral sleep medicine. They reported that the workshop taught them important sleep assessment questions, tools (e.g., sleep diary) and knowledge about evidence-based treatments for insomnia (i.e., CBT-I). These increases in sleep psychology knowledge and self-efficacy parallel the findings observed by Peachey and Zelman [27] after a more intensive 10 week, 15 module online sleep education program. Our results demonstrate that even a short, three-week (six hour) workshop can go a long way to bridging the gap between evidence and practice for sleep and circadian rhythms in the mental health field.

Highlighting the acceptability of the workshop, trainees provided extremely positive feedback about their learning experiences in the Sleep Psychology Workshop. This likely reflects the thoughtful and well-researched blended learning design of the workshop. The workshop was developed based on behavioral sleep medicine theory and used blended learning principles [44] to integrate practical role play exercises (e.g., taking a sleep history, describing the 2-process model of sleep regulation, sleep restriction therapy calculations), homework exercises (e.g., completing a sleep diary), video (e.g., two-process model of sleep regulation), audio case study, web resources and readings. After the training, all trainees endorsed that sleep and circadian rhythms education should be included in graduate psychology curriculum and that all graduate psychology students should attend the Sleep Psychology Workshop. Taken together, trainees' increased sleep knowledge and self-efficacy, acceptability ratings, and positive feedback, provided important preliminary data to support a wider rollout of the Sleep Psychology Workshop to trainee psychologists.

3.1 Limitations

One concern with rolling out didactic sleep education to trainees is that they may assume expertise, without demonstrating the commensurate clinical competency to manage sleep and circadian rhythm disturbances in practice. However, we did not find this to be the case. Trainees were aware of the need to continue their learning journey with further sleep education and seek supervision from appropriately qualified psychologists to assist them with building their competency in sleep and circadian rhythms (e.g., implementing CBT-I). Trainees also reported being aware of the need to refer to sleep physicians when appropriate.

Additionally, we only collected self-report data about improvements in sleep psychology knowledge and self-efficacy, rather than assessing students' skills directly. Assessing students' practical skills through competency-based assessments would have been ideal [45], however time, staffing, and supervision constraints of the research project precluded this [46]. Lastly, the small sample size precludes broader generalizations about the efficacy of the Sleep Psychology Workshop.

3.2 Summary

This pilot study provides preliminary support for the Sleep Psychology Workshop as an effective and acceptable sleep and circadian rhythms training program for trainee psychologists. This workshop provides the foundation to improve trainee psychologists' knowledge and skills to treat sleep and circadian rhythm disturbances in clinical practice, with potential positive flow on effects to improve their clients' mental health by improving sleep. A wider roll-out of the study with a control group is required to assess the workshops' efficacy and acceptability to a broader group of trainee psychologists.

4. Materials and Methods

4.1. Sleep Psychology Workshop Content Development

The content for the Sleep Psychology Workshop was designed by the research team, all registered psychologists with expertise in sleep and circadian rhythms, mental health, and/or clinical psychology. The development of the workshop was informed by the completion of a narrative review into sleep education for healthcare providers [20], a survey study into sleep education in graduate psychology programs in Australia [21], and other published sleep education for trainee psychologists and healthcare providers [26-42]. In addition, resources and education guidelines from professional psychology and sleep organizations (e.g., Society for behavioral Sleep Medicine, Sleep Research Society, Australian Psychological Society, Australasian Sleep Association, American Academy of Sleep Medicine, European Sleep Research Society) were reviewed, along with Australian Psychological Accreditation Council guidelines, to ensure competency requirements for graduate clinical psychology students were met [47]. The workshop was designed to provide foundational knowledge of the relationship between sleep, circadian rhythms, and mental health, and highlights common sleep and circadian rhythm disturbances in a broad range of mental health settings. The workshop introduced sleep assessment, diagnosis and evidence-based treatment to trainees, with a focus on treating insomnia disorder due to its high prevalence rate. The workshop was six hours in duration, delivered as three, two-hour interactive lectures, designed as an introduction to sleep psychology rather than a specialty training program, which utilized blended learning and problem-solving activities.

The principles of a modified Delphi Method [33] were used to achieve consensus within the research team regarding the sleep and circadian rhythms content that would be covered within the Sleep Psychology Workshop. Instead of the researchers generating the initial list of key sleep and circadian rhythms knowledge and skills to be covered, the first author developed the initial list based on the literature, professional sleep association websites regarding core sleep and circadian rhythms competencies (e.g., Society for Behavioral Sleep Medicine), as well as research and clinical training manuals in behavioral sleep medicine. This list then went through two rounds of review with three members of the research team (HM, ICR, ML), who made additional suggestions and revisions to the list of topics to be included in the workshop. Once the revised list of key knowledge, skills, and competencies to be covered, the workshop curriculum and learning objectives were developed and made into PowerPoint slides. The workshop slides contained didactic sleep education, along with interactive/blended learning activities, role-play exercises, video (e.g., two-process model of sleep regulation), web-based resources, readings from evidence-based literature and textbooks, and handouts with sleep psychology exercises for clients. The workshop slides, activities, resources and readings were then reviewed by

the remainder of the research team and their feedback was incorporated into the final version of the workshop.

The workshop was facilitated by the first author, a registered psychologist with master-level qualifications in psychology, internationally certified as a Diplomat in Behavioural Sleep Medicine, with 5 years clinical experience working as a psychologist in sleep disorder clinics and 10 years of sleep research experience. Author 4, a professor in clinical psychology with extensive experience and expertise in training psychologists in sleep, oversaw the delivery of the sleep psychology workshops to the trainee psychologists. The learning content, class exercises, and homework exercises for the Sleep Psychology Workshop are outlined in Figure 2. Learning objectives for the Sleep Psychology Workshop are listed in Figure 3.

4.2. Participants

Participants were trainee psychologists completing a Master of Clinical Psychology at RMIT University in Australia. Trainees were in their 6th year sequence of psychology study. The Sleep Psychology Workshop was delivered as a part of trainees' Health Psychology subject. All students taking this course in 2019 ($n = 11$) were invited to participate in the evaluation of the Sleep Psychology Workshop via email early in semester. Participants were advised that they were required to attend the workshop as part of their normal lecture requirements, but that their participation in the evaluation study was not compulsory and would in no way impact the performance outcomes of their course. Ethics committee approval was obtained from RMIT University's College Human Ethics Advisory Network (CHEAN; 05-19/21939).

4.3. Measures and Outcomes

The study used a shortened version of the Graduate Psychologists Knowledge, Attitudes and Practice Scale (GradPsychKAPS), developed by the research team in a previous study [21]. The original 97-item survey was administered to 152 trainee psychologists around Australia and assesses trainees' sleep education and clinical experiences. Some sleep education items were omitted from the current version of the survey to reduce the survey length, but the self-efficacy, preparedness and treatment confidence subscales were retained. These scales demonstrated good internal consistency in the original and current studies (self-efficacy in behavioral sleep medicine, original study $\alpha = .90$; current study $\alpha = .82$;, preparedness to assess and treat sleep disturbances, original study $\alpha = .91$; current study $\alpha = .75$; treatment confidence in sleep disorders, original study $\alpha = .85$; current study $\alpha = .80$).

In addition, the bespoke sleep psychology knowledge quiz (35 items) was retained and used as the primary efficacy outcome measure. The multiple-choice sleep psychology knowledge quiz contained items about general sleep and circadian rhythms knowledge (e.g., Current guidelines from the American Academy of Sleep Medicine and Sleep Research Society recommend that per day adults need: A) at least 6 hours of sleep, B) at least 7 hours of sleep*, C) at least 8 hours of sleep, D) at least 9 hours of sleep; According to Borbely's Two-Process Model of Sleep Regulation, homeostatic sleep drive (also known as Process S): A) Increases during wakefulness and decreases during sleep*, B) Increases during a daytime nap, C) Is regulated by melatonin, D) Is synchronized by the Earth's 24-hour rotation cycle) and behavioral sleep medicine items (e.g., When applying Sleep Restriction Therapy, which is the best response for the Sleep Efficiency (SE) threshold used for increasing prescribed time in bed? A) 100%, B) ≥85%*, C) ≥75%, D) ≥50%; What is one strategy that could assist a person with delayed sleep-wake phase disorder to re-align their circadian rhythms to an earlier/more desired time? A) Recommend they get bright light exposure in the evening, B) Recommend they get bright light exposure in the morning*, C) Recommend they set an alarm clock to the desired wake time ASAP, D) Recommend they see their doctor for antidepressant medication). The quiz was timed, allowing students 45 seconds to answer each question, to reduce the chance of them searching for

answers in their notes or on the internet. In the original GradPsychKAPS study, trainee psychologists ($n = 112$) scored an average of 57% on the sleep psychology knowledge quiz [21]. The GradPsychKAPS was administered in this study to trainees via Qualtrics before and after the Sleep Psychology Workshop. The order of quiz items was changed for the post-workshop quiz.

In addition, trainees provided feedback about the workshop via evaluation questions on the post-workshop survey. A focus group was also held for trainees' post-workshop to provide verbal feedback about their training experience. Lastly, a six-month online follow-up survey was administered to trainees to provide additional information about the usefulness of the Sleep Psychology Workshop in their clinical practice.

4.4. Procedures

The Sleep Psychology Workshop was presented to 6th year Master of Clinical Psychology students as part of their Health Psychology Subject in Semester 1, 2019 at RMIT University, Melbourne, Australia. All 11 trainees in the class were required to attend the workshop as part of their course, but all research activities (pre-post GradPsycKAPS surveys, workshop evaluation, focus group, long-term follow-up survey) were optional. Students could opt-in at any point of the study if they wished to participate. Students were sent an email early in Semester 1 with information about the study along with the Participant Information and Consent Form. Author 1 provided an overview of the study in person early in the semester to introduce the research study and answer any study questions. Trainees were advised that if they participated in the study and scored 50% on the Sleep Knowledge Quiz post-workshop, they would receive a Certificate of Completion for the workshop.

Trainees completed the online pre-GradPsychKAPS questionnaire via Qualtrics in the week prior to the delivery of the Sleep Psychology Workshop. Directly after the running of the third workshop, trainees were invited to attend an in-person focus group to evaluate and provide feedback about the workshop. Trainees were provided with lunch and the opportunity to win a $100 gift card for participating. The focus group was facilitated by a psychology tutor external to the research project. Trainees then completed the post-workshop GradPsychKAPS questionnaire online via Qualtrics in their own time up to two-weeks post-workshop. Lastly, six-months post completion of the workshop, trainees were invited to complete an online long-term follow-up survey via Qualtrics. Students who completed the long-term follow up survey also had the opportunity to win a $100 gift voucher.

4.5. Data Analysis

Data were analysed using SPSS 28.0. Descriptive statistics were calculated to describe the sample. Workshop acceptability items reported on a 7-point Likert scale were collapsed into overall agreement, midpoint (neither agree or disagree) and disagreement to assist with data visualization. For continuous data, repeated measures t-tests were used to compare results from pre- to post-workshop (e.g., sleep knowledge quiz). For ordinal data, Wilcoxon Signed Rank Tests were used (e.g., self-efficacy data, confidence, preparedness scales), with effect size r ($r = z / \sqrt{N}$). The focus group was audio recorded and data transcribed verbatim for the qualitative analysis. Reflexive thematic analysis was used to identify, analyze and report themes within the focus group data [48, 49]. Two members of the research team (Author 1 and 2) analyzed the focus group data, using an inductive, data driven approach to identify codes and themes. This allowed for discussion and collaborative decision making around codes and themes, following the six-phase process as outlined by Braun and Clarke [48]. Codes and themes were then reviewed and refined by a senior researcher with extensive qualitative methods experience (Author 4).

Workshop 1: Sleep Psychology – The Basics	Workshop 2: Sleep Assessment, Diagnosis, and Case Formulation	Workshop 3: Evidence-based treatment – Cognitive Behavioral Therapy for Insomnia (CBT-I)
Why do psychologists need to know how to manage sleep problems? • Relationship between sleep and mental health • Improve sleep to improve mental health • Bio-psychosocial mechanisms underlying association between sleep and mental health Basics of sleep • Normal sleep physiology • Busting myths about sleep • Two-process model of sleep regulation • Sleep across the lifespan • Causes and consequences of behavioral sleep issues/inadequate sleep • *Class exercise* • Role play explaining the 2-Process Model of Sleep Regulation to a client • *Homework* Complete a sleep diary for the week • Workshop 1 reading list/videos	Diagnostic Criteria for Common Sleep Disorders • Insomnia • Obstructive Sleep Apnoea • Hypersomnolence Disorders • Circadian Rhythm Disorders • Restless Legs Syndrome • Parasomnias Assessment • Taking a sleep history • Common sleep questionnaires • Referral to a sleep physician Case formulation for insomnia • Spielman's 3 P Model of Insomnia **Class exercise:** • Taking a sleep history in pairs • Case formulation exercise of an insomnia client (Audio of "John") • *Homework* Complete the Insomnia Severity Index and STOP-BANG questionnaires Workshop 2 reading list/video	Cognitive Behavioural Therapy for Insomnia overview • Sleep restriction therapy (SRT) • Stimulus Control (SC) • Cognitive therapy • Sleep Hygiene Counter indications for SRT/SC • e.g., bipolar disorder Improving adherence to CBT-I Review of Workshop Where to access more sleep info/further training **Class exercise** • Sleep restriction therapy calculation exercise for case "John" • *Homework* Workshop 3 reading list/videos Review sleep psychology workshop resources and where to access further training

Figure 2. Overview of the Sleep Psychology Workshop

1. Recall basic sleep knowledge including:
   - Normal sleep physiology
   - Sleep across the lifespan
   - 2-Process Model of Sleep Regulation
     - Homeostatic sleep drive
     - Circadian rhythms
2. Understand and apply sleep knowledge relevant to psychologists including:
   - The relationship between sleep and mental health
   - The causes and consequences of behavioural sleep issues/inadequate sleep
   - Bio-psychosocial mechanisms of sleep disturbances
   - The role of a psychologist in the management of sleep disturbances
3. Understand and apply sleep assessment and diagnostic processes including:
   - Conduct a sleep history
   - Appropriately score and interpret data from sleep diaries and sleep questionnaires (e.g., Insomnia Severity Index)
   - Recall DSM-5 sleep-wake disorder diagnostic criteria
   - Construct an initial diagnosis and clinical formulation of a client experiencing insomnia
   - Recall risk factors for obstructive sleep apnea
4. Understand and apply evidence-based treatments for sleep disturbances:
   - Recall how to refer clients with suspected sleep disorders to a sleep physician for assessment and management (e.g., obstructive sleep apnea)
   - Cognitive Behavioral Therapy for Insomnia
   - The need for further behavioral sleep medicine training and ongoing supervision

Figure 3. Sleep Psychology Workshop Learning Objectives for Trainee Psychologists

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