

# Group sleep intervention with adolescents attending a pupil referral unit using youth participation methodology: A report of the development of an intervention in practice

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## Abstract

This report of the development of an intervention in practice outlines the design, delivery, and evaluation of a tailored, school-based, group adolescent sleep intervention utilising youth participation methodology and an intervention mapping protocol as a framework. The intervention also included supplementary video support. The intervention was delivered to 5-year 11 students attending a pupil referral unit. This alternative education provision is organised to provide education for young people who cannot participate in school and may not otherwise receive suitable education in Britain. Through co-formulation and cooperative design, the voice of the young people was sought throughout the design, implementation, and evaluation process. The behavioural objectives of the intervention were to increase stress management techniques and reduce technology usage. These were chosen to align with the overall outcomes: improving sleep behaviours and reducing negative sleep hygiene practices. Improvements in sleep behaviour and decreases in negative sleep hygiene practices were achieved post-intervention and at 4-month follow-up. Strengths of the intervention, future intervention optimisation, and implications for practice are considered.

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**KEYWORDS**

adolescent group interventions, school-based sleep intervention, sleep, theory of planned behaviour, youth participation methodology

## 1 | INTRODUCTION

Sleep is a highly complex, active, chemically driven process which is vital for young people's learning, memory processes, educational attainment and overall wellbeing (Espie, 2010). A young person deficient in sleep may not be getting enough sleep, may repeatedly need to sleep at the wrong time of day or may not be getting the required quantities of different stages of sleep. In addition, they could experience a sleep disorder that prevents them from getting sufficient sleep or causes poor quality sleep (Maski & Owens, 2016). The consequences of sleep disturbance can vary from daytime sleepiness to emotional volatility and behavioural problems, or impairment in learning and memory. Sleep disorders can also significantly impact the family of the sleep-deprived child or adolescent (Ophoff et al., 2018). The reported prevalence of sleep problems in children is at least 25%, with over 35% reported for adolescents (Maski & Owens, 2016). Aspects of insomnia, for example, difficulties with sleep onset, night-time awakening, and early morning awakening are among the most typical nonrespiratory sleep issues (Maski & Owens, 2016).

Changes in sleep bioregulatory systems during adolescence in conjunction with psychosocial and societal pressures lead to a "Perfect Storm" of brief and ill-timed sleep patterns (Crowley et al., 2018). Adolescents phase delay their sleep compared to the rest of the population, meaning they begin to wake and fall asleep later naturally (Carskadon, 2002), partly caused by changes in their sleep/wake homeostatic process and circadian rhythm system. The sleep/wake homeostatic process causes the body to sense a need for sleep after prolonged wakefulness (Carskadon, 2002). Sleep researchers found when reviewing adolescents' electroencephalogram results, their sleep/wake pressure system builds more slowly. This contributes to adolescents withstanding the pressure to sleep more readily during this developmental timeframe; thus, delaying bedtimes is typical (Crowley et al., 2018). The circadian rhythm system, genetically regulated fluctuations of more or less sleep propensity across approximately 24 h regardless of prior sleep/wake duration, also begins to shift during adolescence (Crowley et al., 2018). This shift occurs as adolescents in early to mid-puberty show a more significant response to light than other ages (Crowley et al., 2018). Changes in melatonin levels, a hormone involved in sleep, also occur during puberty (Crowley & Eastman, 2017). Environmental influences which promote delayed bedtime (e.g., increased internet connectivity, less parental control), and inadequate sleep hygiene (e.g., circadian shifts at the weekend), also often occur during this stage (Loring et al., 2016). In addition, these changes occur when the number of hours allocated to homework, paid work, sports, and other extracurricular activities increases (Short et al., 2013), and the education system puts increasing demands on adolescents to learn and perform in exams. Studies consistently show that early school starts and increases in extracurricular activities are associated with adolescents having less than the recommended amount of sleep (e.g., Short et al., 2013). Recent longitudinal research (Alfonsi et al., 2020) found an association between school start times, sleep duration, sustained attention, and academic performance in objective and subjective measures measured monthly across an academic year. Delaying start times by 1 h (9 a.m.) led to a significant increase in total sleep duration across the academic year compared to students with an early start time (8 a.m.). In addition, students with the later start time outperformed those with the early start time on tests to measure sustained attention and academic performance. Though more evidence is required to measure the broader effects of delaying school start times, both the Adolescent Sleep Working Group, Committee on Adolescence, Council on School Health (2014) and The American Academy of Sleep Medicine (Watson et al., 2017) have issued policy statements recommending that middle and high schools aim for a start time of 8:30 a.m. or later.

Sleep impacts adolescents' physical, emotional, cognitive, and social functioning, and sleep problems can aggravate any existing medical, psychiatric, or developmental disorder. Improving sleep hygiene and sleep behaviours in adolescents is

essential to help improve educational outcomes and general wellbeing. Cognitive behavioural therapy for insomnia (CBTi) is a technique which has been tested in meta-analyses evaluating its efficacy in parameters salient for insomnia (Smith et al., 2005; van Straten et al., 2018) and randomised control trials for treating adolescents (Clarke et al., 2015). Moderate to large effects sizes are seen on sleep latency, after sleep onset, and sleep after awakening. CBTi has also been shown to have long-term effects (van Straten et al., 2018). Gong and colleagues' (2016) meta-analysis of randomised control trials suggests that the addition of a Mindfulness component can also improve sleep interventions. Previous successful CBTi and Mindfulness-based adolescent sleep interventions such as the Sleep and Education: Learning New Skills Early (SENSE) intervention (Blake et al., 2017, 2019) and Bartel and colleagues' (2018) study, highlight the value of CBT and Mindfulness as a treatment for adolescent sleep problems. However, limitations within these studies have been identified. For example, the SENSE study found that young people with little belief in their ability to change or maintain a new health behaviour did not respond well to the intervention. Furthermore, treatment adherence was also problematic for the success of the intervention (Blake et al., 2017, 2019). Bartel et al. (2018) stated that incorporating adolescent feedback into study design would be imperative to maximise the impact of these types of interventions. Thus, the novel intervention described in this article combines health psychology behavioural change techniques to improve young people's self-efficacy with the utilisation of youth participation methodology to encourage a collaborative approach, and improve ownership, and ultimately adherence.

The intervention was developed in response to sleep disturbances, which had been identified as a concern by the senior leadership team of a large Pupil Referral Unit (PRU) in England. A PRU is an alternative education provision specifically organised to provide education for children and young people who cannot attend school and may not otherwise receive suitable education in Britain. Students are enrolled in PRUs as they may have a short- or long-term illness, are experiencing mental health difficulties, or have been excluded from mainstream education. The senior leadership team believed sleep disturbances impacted the academic performance, attendance, and motivation levels of Year 11 students. Intervention mapping (IM) was used as a framework to develop the intervention, and a youth participation approach was taken involving the voice of the young people throughout the design, implementation, and evaluation process. The aims of the intervention were to improve sleep hygiene and sleep behaviours with specific behavioural objectives of decreasing technology usage and increasing stress management techniques.

## 2 | METHOD

### 2.1 | Participants

The school nurse identified students for referral to the intervention. The criterion for referral was gaining a low score in a sleep subscale of their annual School Health Profiling Questionnaire. This questionnaire was a tool used within the PRU to profile the pupils' health needs and agree, plan, and deliver services, which would help meet those profiled needs. The questionnaire responses were considered confidential, and the scores were not disclosed for the purpose of the intervention. In addition to scoring low on this internal questionnaire, the Head Teacher helped identify young people she was aware of who struggled with sleep due to concerns raised by their parents. The young people included in this sleep intervention had been referred to the PRU for a variety of reasons (see Table 1 for details). These details are included as determinants of behaviours linked to adolescent sleep disturbance are multifarious and complicated (Gruber et al., 2017). Therefore, it is essential to consider the contextual factors of participants, particularly with groups with co-occurring issues. Furthermore, two students were diagnosed with Autism, and diagnostic traits of Autism can adversely affect the formation of sleep-related routines (Loring et al., 2016).

Drawing on the social-ecological approach (Stokols, 1996), it is vital to work on multiple levels of influence, as they are interactive and reinforcing. It was salient to have parents involved to increase the efficacy of the intervention. Parents were therefore contacted by phone to assess the needs of the young people from their

**TABLE 1** Demographics of the participants

Age range	Gender	Presentation	Reason for referral to the PRU
15–16 years at time of assessment	3 identified as female, 2 identified as male	2 had a diagnosis of Autism	2 young people were referred due to social, emotional, and mental health difficulties
		1 had a diagnosis of Attachment disorder	1 young person was referred due to suicidal ideation, gender dysphoria, self-injurious behaviour, and anxiety
		1 had a diagnosis of Sensory Processing Disorder	1 young person was referred due to past drug misuse and social issues
		1 had no diagnosis	1 young person was referred due to experiencing diurnal enuresis, child sexual exploitation, and was considered a young carer

Abbreviation: PRU, Pupil Referral Unit.

perspective. The first author used semi-structured interviews for these conversations to gather information. For example, any diagnosis young people had concerning sleep disorders, any medication utilised, and the parents' perspectives of the causes of sleep issues were discussed. In addition, whether their child had difficulties getting to sleep or staying asleep, resistance to going to sleep, or whether they experienced sleepwalking or nightmares were also discussed. All parents were concerned with their children's sleep behaviour, specifically their lack of bedtime routine and difficulties controlling their technology usage at night.

## 2.2 | Measures

Two scales were chosen as appropriate tools to measure the outcomes of improved sleep hygiene and sleep behaviours. The Adolescent Sleep Wake Scale (ASWS) (LeBourgeois et al., 2005) and Adolescent Sleep Hygiene Scale (ASHS) (LeBourgeois et al., 2005) were administered to the group 1 week before session one, after session four, and at follow up, approximately 3 months later. The ASWS is a self-report measure designed to identify the sleep quality of adolescents during the past month and was used to monitor desired behaviour change outcomes. It has 28 items divided into five subscales: Going to Bed, Falling Asleep, Maintaining Sleep, Reinitiating Sleep and Returning to Wakefulness. Response choices are on a 6-point Likert scale ranging from 1 "always" to 6 "never." Scores for each question are summed. Potential scores range from 28 to 168. Increases in scores pre- to postintervention show improvements in sleep quality of adolescents. This scale is shown to be reliable (Cronbach's alpha = 0.87; LeBourgeois et al., 2005) and has been used with both neurotypical and adolescents with Autism (LeBourgeois et al., 2005; Loring et al., 2016).

The Adolescent Sleep Hygiene Scale has 33 items divided into five subscales describing adolescents' sleep hygiene in the past month (physiological, behaviour arousal, cognitive/emotional, sleep environment, and sleep stability). This scale was used to aid the identification of the problem behaviours and environmental conditions associated with the behaviours as well as measuring desired behaviour change outcomes. Response choices are on a 6-point Likert scale ranging from 1 "always" to 6 "never." Scores for each question are summed. Potential scores range from 33 to 198. Decreases in scores pre- to postintervention indicate improved sleep hygiene. It is the only self-report measure related to sleep hygiene identified for young people aged 12 and above. Cronbach's alpha for the total scale is 0.8 (LeBourgeois et al., 2005). The scale has been used with both neurotypical and adolescents with Autism (LeBourgeois et al., 2005; Loring et al., 2016). Qualitative data from both scales were used to inform the design of the intervention (see Table 2), and quantitative data were used as outcome measures to identify changes in sleep hygiene and sleep behaviour postintervention (see Table 5).

**TABLE 2** Self-assessment data from adolescent sleep hygiene scale and adolescent sleep wake scale formulated using a cognitive behavioural therapy model

CBT variables	Physiological	Cognitive	Emotional	Behavioural	Social/environment
Data from ASHS & ASWS	Sleep disruptions: waking up at night Trouble getting back to sleep Difficulties settling down Difficulties falling asleep Restless during the night Difficulties waking in the morning	Rumination (going over events of the day, worrying about the following school day) Gaming/technology 1 h before bed Thinking about things they needed to do	Some were going to bed upset or worried Some experienced strong emotions before bed	Technology usage at night Falling asleep with the television or music on Napping Need help going to sleep (Technology) Some physically active an hour before sleep Some drinking caffeine or energy drinks after 6 pm Prefer to do other activities than go to bed	One sharing a bed with a sibling Room too hot/cold Most did not have stable sleep patterns (significant differences between weekdays and weekends, and staying up or lying in after scheduled times) Some had no regular bedtime.

Abbreviations: ASHS, Adolescent Sleep Hygiene Scale; ASWS, Adolescent Sleep Wake Scale; CBT, Cognitive Behavioural Therapy

## 2.3 | Intervention development

The intervention was developed utilising an IM protocol as a framework. This is an effective mechanism to delineate the path from identifying needs to outcomes using theory and evidence-based intervention development (Lloyd et al., 2011). IM includes six steps involving several tasks, incorporating theory and evidence. These steps are: (1) conducting a problem analysis or need assessment to identify what changes are needed for each participant; (2) creating matrices of change objectives by identifying personal determinants, behavioural objectives, and beliefs that should be targeted in the intervention; (3) choosing theory-based intervention methods to align with the determinants and identifying practical applications; (4) integrating the methods and practical applications into a programme; (5) planning for adoption, implementation, and sustainability of the programme within the context it will be delivered; and finally (6) generating a means to evaluate outcomes and the process (Bartholomew et al., 2016). Utilising these steps provides an outline for designing, implementing, and evaluating an intervention based on a foundation of theoretical, empirical, and practical information (Bartholomew et al., 2016). The first step was to assess the environment where the intervention was to occur. Then the needs of the young people, from both their and their parents' perspectives and through psychometric tools. Empirical findings in the literature were critically reviewed and relevant theories were appraised (Lloyd et al., 2011). The first author then designed the intervention under clinical supervision, using a CBT approach, health psychology behaviour change techniques, and participative methods.

Formulation can be defined as a theoretically based process encapsulating the presenting issue, the treatment plan, and the proposed outcomes to guide the therapy (Porcheret et al., 2014). Using data from the assessment of needs is a key ingredient in running a successful intervention (Lloyd et al., 2011; NICE, 2007). A working formulation model (see Table 2) was developed regarding the physiological, cognitive, emotional, behavioural, and social/environmental processes that were to be addressed within the intervention methodology based on self-assessment qualitative data from the ASHS and the ASWS results, and discussion with the young people and their parents.

In line with IM, matrices of change objectives were created by identifying personal determinants, behavioural objectives, and beliefs that should be targeted in the intervention. Two behavioural objectives of the intervention were chosen in collaboration with the young people during Session 1 to align with the overall outcomes of the intervention: to improve sleep behaviours and to reduce negative sleep hygiene practices. These were to decrease technology usage and to increase stress management techniques. Evidence from the literature was used to select personal determinants which mapped onto the two behavioural objectives. Firstly, improving knowledge and skills regarding how stress impacts the body, cognition, emotions, and sleep behaviour, and how technology usage can affect sleep was deemed salient to focus on (Blunden et al., 2012). The next personal determinant chosen was self-regulatory behaviour. Self-regulation can be defined as the ability to manage motivation levels, affect, thoughts, body sensations, and behaviours, to meet internal and external demands to our context (Rofey et al., 2013). During adolescence, young people become more autonomous, having more control over decisions about how they spend their time, when they go to bed, and how long to spend on extracurricular activities, leading to the need to develop self-regulation capacities (Kor & Mullan, 2011; Rofey et al., 2013). Finally, personal determinants in terms of beliefs targeted in the intervention were formulated from the Theory of Planned Behaviour and included perceived behavioural control and subjective norms (Ajzen, 1991). Theory of Planned Behaviour (TPB; Ajzen, 1991) postulates that an individual's intention to perform a behaviour is a predictor of their accomplishment of that behaviour. Furthermore, intention is considered a function of their attitudes, perceived behavioural control and subjective norm toward the behaviour. The TPB has been applied to a range of different health behaviours and has been found to be effective at predicting sleep hygiene behaviour (Kor & Mullan, 2011; Strong et al., 2018). Perceived behavioural control is the perceived ease or difficulty of performing the behaviour. Robust sleep routines are positively correlated with behavioural intentions and perceived behavioural control (Lao et al., 2016). Thus, focusing on improving young people's beliefs in their ability to change their sleep and their ability to turn off their devices was thought crucial. Subjective norms are an individual's beliefs about what specific people may think about whether they should or should not perform the behaviour. Subjective norms and group social influences are found to be powerful indicators of the intention to change behaviours in group sleep interventions (Kor & Mullan, 2011). Table 3

**TABLE 3** Behavioural objectives and personal determinants matrix

Behavioural objectives	Knowledge/skills	Self-regularity ability	Perceived behaviour control	Subjective norms
1. Improve stress management techniques	<p>Link how stress impacts body, cognitions, emotions, and sleep behaviour.</p> <p>Application: CBT worksheets; Body mapping exercise, FEAR plans</p>	<p>Self-regulatory ability necessary for the execution of health protective behaviours</p> <p>Application: Sleep diaries to monitor sleep patterns, Mindfulness &amp; grounding exercises; Deep breathing techniques</p>	<p>Good sleep routines linked with behavioral intentions and perceived behavioural control</p> <p>Application: Problem solving techniques to improve young people's belief in their ability to manage stress.</p>	<p>Subjective norms are an indicator of behavioural intention in group sleep interventions</p> <p>Application: Group cohesion improved by facilitating learning and modelling from each other. Reinforce this in videos (use of young peoples' names—e.g., X made good use of his diaries today to show Y).</p>
2. Reduce technology usage	<p>Understand the impact of light on circadian rhythms.</p> <p>Application: Identify barriers, wind-down action planning, and problem solving.</p>	<p>Psychoeducation about habit formation</p> <p>Application: Focus on SMART goals (Specific, Measurable Achievable, Relevant, and Time-bound) and WOOP technique.</p>	<p>Improve self-efficacy about ability to turn off their devices</p> <p>Application: Reflective practice on barriers and facilitators of change</p>	<p>Group social influences are a significant indicator of behavioural intention</p> <p>Application: Group cohesion improved by facilitating learning and modelling from each other. Reinforce this in videos (use of young peoples' names- e.g., X made good use of his diaries today to show Y).</p>

below includes information regarding the activities undertaken in the intervention, which were linked to these four personal determinants.

## 2.4 | Procedures

The first author (AC) met with the head teacher of the PRU to develop an understanding of the context in which the intervention would be delivered to tailor the intervention to the PRU environment. Intervention assessment procedures, recruitment, retention, and a plan to deal with student absenteeism during the intervention were discussed. During this meeting, Fridays were identified by the head teacher as the only days that would suit the participants' timetables for face-to-face group intervention. As adolescents' sleep patterns change at the weekend (Carskaden, 2002) and AC had observed the motivation and energy levels of the students in the PRU were lower on Fridays, this was not considered optimal. As a result of this meeting, AC decided to use supplementary videos which would be created after each Friday session and emailed to all participants the following Monday. These would summarise the content of weekly sessions, act as a prompt for homework activities, inform parents about intervention content, and potentially help engender the parents' support. Individual training sessions were provided to each young person regarding videos and email usage to access their ability level, provide guidelines, and pilot the style of videos.

Sleep disturbances can significantly contribute to a vicious cycle of increasing vulnerability and heightened risk amongst adolescents (Harvey, 2016). There were two critical considerations of risk. First, the young people referred to the group were not only experiencing sleep disturbances but a range of co-occurring conditions (see Table 1). For supplementary video support to be safe, software ensured that young people were restricted to emailing internally. A profanity filter was set up to capture any concerning activity (e.g., bullying). Parents were issued with login and password details and were asked verbally and within the consent forms to monitor the young people's activities.

The voice of the young people was sought throughout the implementation and evaluation process. In line with Article 12 of the United Nation's Conventions on the Rights of the Child (UN General Assembly Convention on the Rights of the Child 20 November, 1989), all procedures in which the young people were heard were clear and enlightening, autonomous, respectful, applicable to their lives, in a child-friendly environment, inclusive, safe, and sensitive to risk. The salience of the young people's voices in education and prioritising their participation in decision-making is fundamental to developing a democratic education (Martin et al., 2015). This is also important when engaging young people in behaviour change interventions. Participative practices improve young people's self-esteem and confidence and enhances their sense of autonomy, independence, interpersonal skills, and resilience (Martin et al., 2015). The approach was based on the Lundy (2007)'s Model of Youth Participation, which highlights the components of space, voice, audience, and influence. Firstly, a safe and inclusive space for the young people to express their views was created. The young people contributed to the layout of the physical space in which the intervention was delivered. They were empowered to share their opinions throughout the intervention and given a variety of methods to ensure their voices were heard. The young people were asked questions, provided with weekly feedback sheets, an anonymous ideas box was designed, and they were also encouraged to provide weekly email feedback if that was preferable. The first author explained from the start by having open and honest communication with her that their ideas would not just be heard but given due weight and incorporated into the intervention. As this was a pilot intervention, they would also influence the design of future sleep clinics within their PRU.

## 2.5 | Delivery of the intervention

Four 50-min sessions followed by one booster session seven weeks after the start of the intervention were delivered by the first author (see Table 4 for an overview of the intervention). A particular emphasis was placed on group discussion to enable young people to relate new ideas to their own experiences and support positive social



**TABLE 4** Intervention overview

Session number	Overview of intervention	Mode of delivery
1	<ul style="list-style-type: none"> <li>(a) The negative effects of not sleeping, and beliefs and attitude towards sleep</li> <li>(b) Biological changes that occur in adolescence that effects sleep</li> <li>(c) Negative effects of not sleeping made personal</li> <li>(d) Cognitive behavioural therapy (CBT) formulation</li> <li>(e) Theory of planned behaviour formulation</li> <li>(f) Identification of sleep goals</li> <li>(g) Session evaluation and young people ideas</li> </ul>	<ul style="list-style-type: none"> <li>(a) Group brainstorm-answers on white board</li> <li>(b) Psychoeducation delivered by First author</li> <li>(c) Young people added personal consequences of not sleeping to the board</li> <li>(d) First author labelled different consequences as thoughts, feelings, bodily reactions, behaviours, or relationships on the board. Discussed CBT circle</li> <li>(e) First author used white board and large post with a diagram of the Theory of Planned Behaviour using young people's beliefs and attitudes about sleep</li> <li>(f) Young people supported to create SMART sleep goals</li> <li>(g) Young people completed a session evaluation worksheet and ideas box provided</li> </ul>
2	<ul style="list-style-type: none"> <li>(a) Review of sleep goals</li> <li>(b) Sleep diaries</li> <li>(c) Impact of stress on the body</li> <li>(d) Impact of stress on cognitions</li> <li>(e) Session evaluation &amp; young people ideas</li> </ul>	<ul style="list-style-type: none"> <li>(a) Group discussion about previous week's goals. Barriers and facilitators discussed</li> <li>(b) Sleep diary sheets provided, explained and practice diary completed</li> <li>(c) Body mapping exercise</li> <li>(d) Worksheets provided to identify negative thinking traps</li> </ul>
3	<ul style="list-style-type: none"> <li>(a) Review of sleep diaries</li> <li>(b) Habit formation</li> <li>(c) WOOP technique</li> <li>(d) Mindful breathing</li> <li>(e) Grounding techniques</li> <li>(f) Circadian Rhythms and technology</li> <li>(g) Session evaluation &amp; young people ideas</li> </ul>	<ul style="list-style-type: none"> <li>(a) Data mining of sleep diaries completed, and young people's individual insights discussed</li> <li>(b) Psychoeducation provided by first author</li> <li>(c) Worksheets provided to the young people</li> <li>(d) Mindful breathing group activity and Mindful Gnats App recommended</li> <li>(e) Young person led group grounding activity</li> <li>(f) Psychoeducation delivered by first author. You-tube video 'What makes you tick?' utilised.</li> <li>(g) Young person explained how to set dim-light/night-mode of devices.</li> </ul>
4	<ul style="list-style-type: none"> <li>(a) Review of sleep diaries and WOOP technique</li> <li>(b) Understanding sleep hygiene</li> <li>(c) Using your 5 senses to improve sleep</li> <li>(d) Action plan for coping with stress</li> <li>(e) Session evaluation</li> </ul>	<ul style="list-style-type: none"> <li>(a) Insights from sleep diaries used to refine WOOP worksheets</li> <li>(b) Walking debate.</li> <li>(c) Worksheets provided to young people to help develop sleep hygiene tips</li> <li>(d) Young people supported to complete FEAR plan worksheets</li> </ul>
5	Follow up session to review how the young people were managing. They decided to share their expertise with others.	Microsoft Sway presentation created with young people's best tips for overcoming sleep problems. Arrangements made to provide a workshop to other year 11 students.

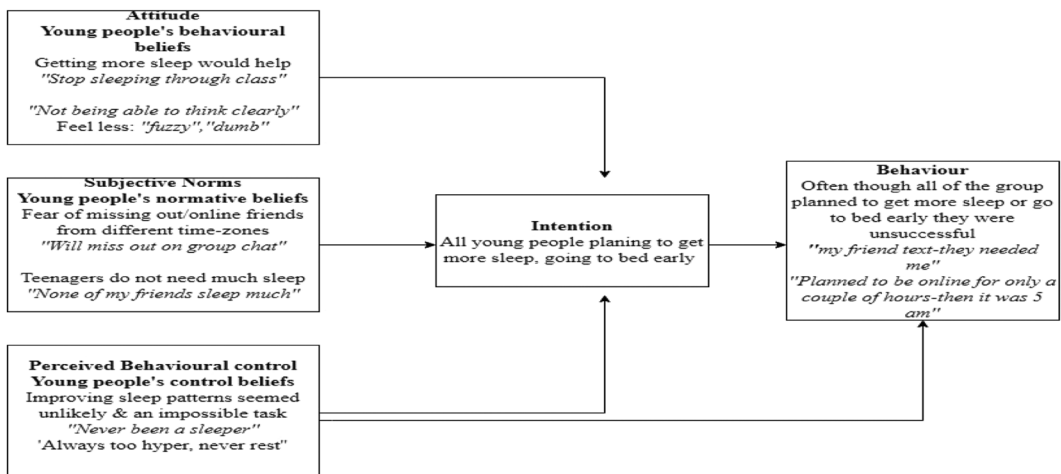
influences. Therefore, the AC promoted social cohesion (labelling similar experiences, reinforcing and modelling social support). Various modes of work were utilised: presentation, group brainstorming, worksheets, skill-based activities, visual prompts, and video support; to ensure that the intervention was accessible to all the group, who had different learning needs and preferences.

### 2.5.1 | Session one

The first session started with a group brainstorming activity to uncover their thoughts about why sleep was necessary. The young people found this difficult to answer. So instead, their beliefs and attitudes to sleep and how not sleeping well impacted them was discussed. They identified the detrimental effect lack of sleep had on their mood, educational attainment, cognitions, and relationships (peer, family and teacher). The Theory of Planned Behaviour (Ajzen, 1991) was utilised to formulate this information. The first author explained to the young people that sometimes we use theories to understand why people can find some actions easier or more difficult to change than others. Theories help us get a big picture of what is happening and plan how to support people to make changes.

To help the young people understand how to apply this theory, smoking cessation was used as a simple example first. Young people were asked if they knew anyone who tried to quit smoking successfully. One young person spoke about their mother trying to give up smoking. Their example was used to explain how the Theory of Planned Behaviour can work concerning smoking cessation. This was accomplished by using a large poster page displaying a diagram of the theory where information could be filled in under several headings: attitudes; what others think about this (this phrase was utilised instead of subjective norms for ease of understanding); ideas about my ability to do this (this phrase was used instead of perceived behavioural control for ease of understanding); intentions; and behaviour.

We then thought about how this theory could be applied to their own attitudes and beliefs towards sleeping. The young people's thoughts, attitudes, and beliefs about sleep were elicited through several open-ended questions: (1) How would my life be different if I slept more? (2) How does not sleeping well affect me? (3) On a day you plan to go to bed early, what can get in the way? and (4) What are the barriers for you or other young people getting a good night's sleep? From responses to question four, it was clear that the participants all believed that they would experience difficulties changing their sleep behaviour (low perceived behavioural control). They also



**FIGURE 1** Data from group brain storming activity formulated utilising the theory of planned behaviour (Ajzen, 1991)

thought that other adolescents did not sleep much either (perceived social norm) (see Figure 1). Their answers to all the questions were written on the whiteboard. Then another large poster page, with a diagram of the theory, was used to populate information from the whiteboard under the headings: attitudes; what others think about this; ideas about my ability to do this; intentions; and behaviour. The young people found this theory accessible and could understand the factors it purports impact intention to engage in behaviours (see Figure 1). They understood that if they could change their belief about the control they had over their sleep (i.e., increasing their perceived behavioural control), this could help them change their behaviour (see Figure 1). One young person likened this to changing your mindset before changing yourself. AC explained she would help them develop the skills to make it easier for them to change their sleep behaviours.

Next, psychoeducation was provided to raise their understanding of why young people naturally fall asleep and wake up later. Teenagers' ability to withstand the pressure to sleep due to changes to the sleep/wake homeostatic process whilst still requiring approximately nine hours of sleep were discussed. Changes to the circadian rhythm system were also briefly discussed, specifically how young people are more susceptible to light and how this can affect their sleep. Young people were invited to write on the whiteboard about different detrimental effects that happened to them after a bad night's sleep to help raise awareness about the consequences of not sleeping. AC then labelled each of these as affecting their thinking, behaviour, emotions, bodies, relationships, and ability to achieve in school. This was a helpful way of showing the young people how thoughts, feelings, bodily reactions, and behaviours can interlink using their own words and experiences. Then the benefits of sleep were taught to the young people (e.g., it helps filter emotions, consolidates memory and learning, increases energy levels, repairs muscle and tissue damage) (Ophoff et al., 2018). Finally, to end the first session, the young people were asked questions such as: (1) What do you think will change because of this intervention? (Prompted for physical, emotional, cognitive, and social changes) and (2) How would your life be different if you sleep better? The answers defined the young people's outcomes and generated a rich, in-depth, practical description of what they could experience without disordered sleep problems (O'Connell et al., 2012). The young people and the first author identified the behavioural objective 'to reduce technology usage' (e.g., television, phone, tablet, and laptop). The young people also felt stress was a key factor in their sleep disturbances. Each young person was then helped tailor their individual goals to ensure they were SMART (specific, measurable, achievable, relevant and time-bound). The behavioural goals picked by the young people were in line with data obtained from the preintervention psychometric tests. After the session, AC designed small laminated posters of each young person's SMART goals to act as visual reminder cues. She provided them to each young person, and it was suggested they could be placed in their bedrooms.

Brief one-to-one sessions were held to discuss the style of the supplementary videos and to check the young people's ability to assess them. The young people were presented with two video options, each approximately 10 min long. Option one provided an overview of what we had covered in the session and utilised a mixture of PowerPoint slides and verbal presentations. Option two was the preferred choice of all the young people. AC verbally reviewed what had been covered in session one. The participants' names were used throughout this video to pinpoint times in the session when the group had shared good ideas, been helpful to each other, or worked well together. The young people found this style more accessible and appeared eager to watch videos to the end to see when they might be mentioned. The individual behaviour goals were also discussed, reinforcing why the young people had chosen them (i.e., their personal utility and value).

The content of the subsequent three sessions was designed, focusing on stress management, cognitions, technology usage, habit formation, and circadian rhythms. IM is an iterative process (Lloyd et al., 2011); the intervention was redesigned and refined as new data were obtained in sessions and from continual feedback of the participants.

## 2.5.2 | Session two

Session two commenced with a review of each of the behavioural goals. Achievements were celebrated, and judgements of those that did not complete them were avoided. However, the first author ensured discrepancies

between current behaviour and identified goals were explored. In this feedback process, AC acted as the young people's accountability partner, ensuring that non-adherence to goals was reframed into learning opportunities and ways to elicit group support. Barriers to completing these goals were assessed. Real barriers were accepted, and the goals were refined. Excuses and ways to overcome them with strong motivators or other strategies were discussed. By troubleshooting challenges in this way, group support was elicited which reinforced group social influences, and helped facilitate learning and modelling from each other (Abraham & Michie, 2008). Sleep diaries were introduced and practised. The value of getting an overview of sleep patterns to develop their knowledge, skills and self-regulatory behaviour was highlighted. By learning to monitor their sleep diaries, the young people were able to establish a link between their sleep duration, how they physically and emotionally felt, and how active they were. It was explained to them that our thoughts, feelings, actions and behaviours are connected, and if they were able to change a part of this, it could change other aspects. One participant realised she often had fights with her sister over which TV show to watch. As a result, she went to bed upset, impacting her sleep. Her sleep improved by communicating differently with her sister and not engaging in an argument before bedtime. Another young man with a diagnosis of Autism highlighted he woke up seven to eight times a night. He feared becoming dehydrated and was drinking large amounts of water before bedtime. By learning to regulate his water intake, his ability to sleep through the night improved.

Most of this session was spent looking at the impact of stress. The effects of stress on the body were delivered using a body mapping exercise. One student lay on a large piece of paper, and their shape was outlined. The group then drew or wrote on this body map indicating what happens to the body when feeling stressed. Worksheets were then provided to identify maladaptive thought processes that occur whilst stressed (e.g., blowing things up, negative sunglasses, fortune-telling, mind reading and ignoring positives). Cognitive restructuring techniques were taught to help combat these types of thinking, facilitate their ability to complete their goals, and reduce stress or worry before bedtime. By the end of the second session, the young people began to embrace the collaborative nature of the process. One young person offered to share grounding techniques they found helpful in the next session. Young people received the second video the following Monday morning.

### 2.5.3 | Session three

Session three commenced with teaching the young people to use their sleep diaries to "data mine." Insights were gained as to what may have impacted the young people's sleep on certain nights. Psychoeducation regarding habit formation was taught using metaphors ("when walking through a wood the path gets easier to use when you do the walk many times") and the neuroscience of synapse formation. Using different ways to explain habit formation was utilised to account for the range of learning needs in the group. The WOOP technique (Oettingen, 2014) was then introduced to the group to help them obtain their personal identified goals. WOOP (Wish, Outcome, Obstacle(s), Plan) uses mental contrasting and implementation intention strategies. Research indicates that goal commitment is enhanced by mental contrasting, a strategy involving describing the desired outcome in detail, in conjunction with anticipated obstacles to achieving this goal (Oettingen, 2014). Implementation intentions outline the actions an individual will take when the opportunity to achieve a goal presents itself and are an effective way of changing health behaviours (Gollwitzer, 1999; Mairs & Mullan, 2015). The young people were asked to write their SMART goal and then imagine how fulfilling this wish would make them feel: physically and emotionally. This was added to the outcome section of their worksheet. Then they considered all the obstacles they had encountered so far and listed them. Finally, they utilised the format "if \_\_\_ (obstacle) then I will \_\_\_\_" to plan actions of how they would overcome these obstacles.

Mindful breathing techniques were taught, and the Mindful Gnats App was recommended to practice these techniques. Mindfulness reduces anxiety, increases focus and helps improve sleep (Gong et al., 2016; Heeren & Philippot, 2011; Murphy et al., 2012). One of the young people led an activity, teaching grounding techniques (e.g.,

focusing on each of your senses). The final section of the session focused on circadian rhythms, sleep, and how technology can affect this. Circadian rhythms are the natural processes that regulate human bodies in relationship to the cycle of the 24-h day. Circadian rhythms influence many of the body's systems and functions including the sleep-wake cycle. A participant showed other group members how to use the dim-light/night-mode function on their devices to help decrease blue light, which can affect sleep (Espie, 2010).

#### 2.5.4 | Session four

Sleep diaries were reviewed, and any insights gained were utilised to refine individual WOOP worksheets. This session aimed to improve the participants' sleep hygiene: habits and practices that are conducive to promoting better sleep. Their knowledge was tested using a walking debate methodology: an interactive way of ensuring that any gaps in their knowledge were discovered and then focused on during the psychoeducation section of the session. Posters with "True", "False," and "Unsure" were stationed around the room. Statements regarding sleep hygiene practices were read out, and young people chose which answer to walk towards. The next activity involved the young people working in pairs to complete a "five senses" worksheet. This worksheet was used to delineate the best sleep hygiene practices (e.g., for "sight" young people identified sleeping in a dark room or using light therapy alarm clocks for awakening; for "touch" room temperatures conducive to sleep were discussed, the use of weighted blankets, or bedlinen choices which help with sensory needs). Finally, to end the programme, the first author supported each young person to complete an individual "FEAR" plan to help them cope with stress or rumination affecting their sleep. A "FEAR" plan involves completing a worksheet under four headings: (1) Feeling: identifying how they were feeling in their body; (2) Expectations: negative thoughts or beliefs they might be experiencing; (3) Attitudes and Actions: listing any strategies they had found helpful throughout the programme; and finally (4) Reflect and Refine: a reminder that this plan could be amended and refined as their sleep habits and behaviours changed.

#### 2.5.5 | Follow-up session

A follow-up session was conducted 7 weeks later to review the young people's thoughts on their "FEAR" plans. All the young people felt they had attained many valuable skills throughout the programme and two of them decided it would be of value to share their learning with others. The session then focused on designing an interactive workshop for their Personal Development class, where they would share their knowledge and skills with other students.

### 3 | OUTCOMES

Data were collected using the ASWS and the ASHS 1 week before the intervention started, 1 week after session four, and then 13 weeks later. It took the young people approximately 45 min to complete the scales at each point. Change scores were calculated for each participant to inform personalised feedback (see Table 5) and the group.

Two Wilcoxon Signed Rank analyses were undertaken to compare ASWS results pre- and postintervention ( $Z = 2.032, p < .042$ ) and ASHS results pre- and postintervention ( $Z = 1.753, p < .080$ ). Figure Two shows a significant increase in scores for the ASWS, which are indicative of improvements in sleep behaviour. Figure Two shows a decrease in ASHS scores (nearly reaching significance), which indicates decreases in negative sleep hygiene practices. These results were communicated to key stakeholders (senior leadership team, young people, and parents) via reports (Figure 2).

TABLE 5 Questionnaire individual score comparison

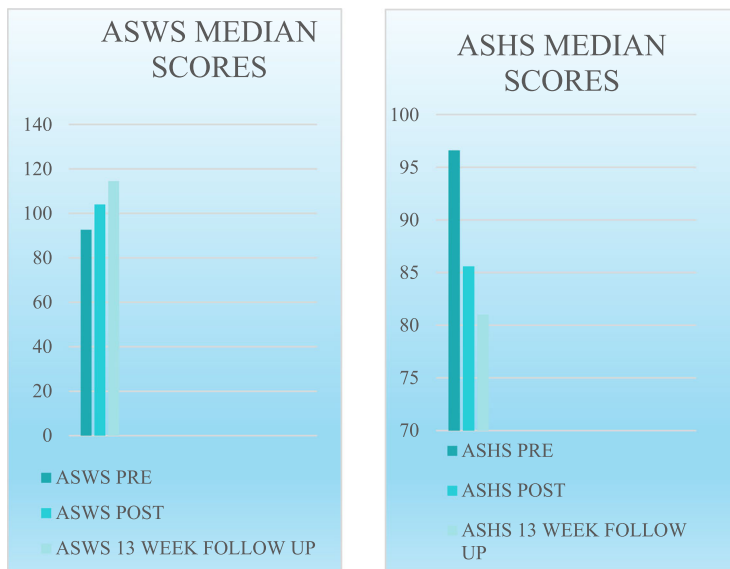
Young person	Preintervention ASWS Increase in score shows improvements	Postintervention ASWS Increase in score shows improvements	Follow-up session ASWS Increase in score shows improvements	Preintervention ASHS Decrease in score shows improvements	Postintervention ASHS Decrease in score shows improvements	Follow-up Session ASHS Decrease in score shows improvements
P1	93	109 <sup>a</sup>	110 <sup>a</sup>	68	58 <sup>a</sup>	81
P2	92	105 <sup>a</sup>	119 <sup>a</sup>	114	87 <sup>a</sup>	69 <sup>a</sup>
P3	112	115 <sup>a</sup>	120 <sup>a</sup>	85	68 <sup>a</sup>	81
P4	91	104 <sup>a</sup>	89	111	112	114
P5	75	73	XX	105	103 <sup>a</sup>	XX

Note: XX did not complete follow-up questionnaire.

Abbreviation: ASWS, Adolescent Sleep Wake Scale.

<sup>a</sup>Indicates improvement.

### Adolescent Sleep Wake Scale (ASWS) and Adolescent Sleep Hygiene Scale (ASHS) Results



**FIGURE 2** Adolescent Sleep Wake Scale (ASWS) and Adolescent Sleep Hygiene Scale (ASHS) Results. ASWS PRE: Adolescent Sleep Wake Scale Administered before the intervention. ASWS POST: Adolescent Sleep Wake Scale Administered after the intervention was completed. ASWS 13 WEEK FOLLOW-UP: Adolescent Sleep Wake Scale Administered 13 weeks after the intervention was completed. ASHS PRE: Adolescent Sleep Hygiene Scale Administered before the intervention. ASHS POST: Adolescent Sleep Hygiene Scale Administered after the intervention was completed. ASHS 13 WEEK FOLLOW UP: Adolescent Sleep Hygiene Scale Administered 13 weeks after the intervention was completed

### 3.1 | Reflection

We designed this novel sleep intervention using IM as a framework, to see whether an intervention using CBT and Mindfulness, together with the Theory of Planned Behaviour, and youth participation methodologies would improve sleep hygiene and sleep behaviours. The inclusion of the Theory of Planned Behaviour (Ajzen, 1991) and participative practices was due to scoping the literature on adolescent CBT and Mindfulness sleep interventions and identifying areas for optimisation (see Blake et al., 2019). Incorporating a youth participation methodology (Lundy, 2007) was a strength of this intervention and ensured that the young people had a safe space to voice their thoughts and that their views would be heard and have an influence on the development, delivery, and evaluation of this group adolescent sleep intervention. The co-formulation and cooperative design of the sessions worked well as it was novel to the young people. They struggled at times at the start to meaningfully participate, as it required a power shift (O’Cathain et al., 2019) not commonly found in schools.

Power differences are apparent in all types of research but more pronounced between child-adult research processes due to age differences, social differences, and the duty of care adults have to ensure young people are safe and protected (Horgan, 2017). To reduce power differentials between the participants and the first author the stance advocated by Mayall (2000) was utilised; that the power difference between researcher and young people should be acknowledged. AC labelled this dynamic at the start of the intervention, explaining as an adult she lacked the knowledge about their lived experiences, and she wanted to learn from their expertise to design together an intervention that would meet their identified behavioural objectives. They would be collaborators in this process and learn from each other. She would use her power as an adult to try ensuring that their views about the intervention had influence. In addition, this initial reluctance to engage in group discussion during Session One

could also potentially be due to adolescents' struggles with social interactions because of concerns that behaviours or attitudes different to the "group norm" could lead to stigma or a perceived undesirable attribute in the eyes of the others in the group (Saporito et al., 2011). However, through encouragement, providing praise for positive attitudes and showing social support to others in the group both in sessions and in the videos, rapport building, inclusive communication processes, and ensuring their feedback had influence (e.g., they were unhappy with the room utilised: "felt like detention," so it was changed for further sessions), the young people became more open to sharing their opinions and evaluations, and it appeared their perceived sense of competence improved.

Another strength of this intervention was focusing on improving the participants' belief in their ability to change or maintain a new health behaviour through utilising the Theory of Planned Behaviour (Ajzen, 1991) as a framework and focusing on psychoeducation and behaviour change techniques (e.g., SMART goals and the WOOP technique). This, in addition to the participative collaborative practices, helped with the young people's self-efficacy and engagement. They took ownership of the programme and identified themselves as "sleep experts" on completion. They were empowered to share their learning with peers and presented it to the Year 11 Personal Development class. The young people presented topics and skills that had resonated with them and were vital to their behavioural changes. For example, one participant found goal setting regarding technology reduction crucial. She reaped the benefits of sleeping more at the start of the programme. She became confident in her ability to make changes, which helped motivate her to maintain her new behaviours. Goal setting and the benefits of improved sleep were the areas she shared her learning in. Sharing expertise in this way is empowering, reduces stigma, and may prolong the impact of interventions (Martin et al., 2015).

The use of Supporting Information Videos also was a strength. The informal style in the videos was preferred by young people when piloted. They wanted to watch the 8–12-min videos until the end to see if their names were mentioned. It helped to motivate them, reinforced learning and was an attempt to engage the parents in the intervention. Taking the requirements and interests of participants into consideration so that technology is accessible, enjoyable, and needs-led ensures the intervention is service user friendly (O'Cathain et al., 2019). Due to the time-consuming nature of video development, creating a bank of prerecorded generic clips on various topics covered during sleep interventions and then editing in parts that refer to tailored sessions would reduce the time burden. Thus, tailored videos' friendly style and motivational aspects are still maintained, and the workload is kept at a minimum.

Homework adherence was excellent for some and not so good for others. For example, sleep diaries were not completed by all weekly. As diaries are helpful to delineate changes, identify triggers or maladaptive behaviours (Harvey, 2016), it was beneficial to focus on celebrating the learning achieved by those that had completed them and asking those who had not completed them to reflect on their previous night's sleep. Highlighting discrepancies between current behaviours and identified goals once rapport and trust had been established between the first author and young people was crucial, as young people were held accountable in this feedback process. Nonadherence is best reframed into learning opportunities and ways to elicit group support, ensuring a collaborative approach and processes.

Reports of objective intervention outcomes were provided to the participants, their parents, and the school's board of management. Social validity, acceptance and satisfaction with intervention procedures and results were assessed by soliciting opinions from the young people in the follow-up session. All the young people found the outcomes from the interventions had utility and were salient to their lives: improved relationships with peers and family members were discussed. They believed their moods were more positive due to longer sleep durations, there was less stress in the morning as there was more time to get ready, and some noted improvements with how they engaged with teachers in school and their academic performance. Following on from the "Sleep Experts" sharing their learning with their peers, there was significant buy-in from other students, who began to self-refer to the Sleep Clinic waiting list. School staff also noted they observed changes in the young people involved in the intervention: greater attention levels in class and less daytime sleepiness. Given the programme's success from both students' and staff's perspectives, it was agreed that a targeted sleep intervention would be delivered in each of the



PRUs between September and December annually. In addition, standalone whole-class workshops would be offered monthly between January and June annually to help young people develop skills to improve their sleep before annual exams in June.

Study limitations and future research are considered in parallel. As this was a pilot intervention developed within practice, a limitation was the small sample size and not having a control group (nonintervention) to compare it with. In addition, only subjective measures were utilised to measure sleep behaviours. It would have been optimal to incorporate actigraphy equipment to complement the self-report sleep duration and sleep behaviour data. In future sleep interventions, it would be interesting to explore which personal determinants: knowledge/skills, self-regularity ability, perceived behavioural control, or subjective norms, were active in this process. Doing this would facilitate future intervention optimisation, as only effective components could be retained (O'Cathain et al., 2019). Also, administering a scale to parents would be helpful to gauge if they perceived any changes in their child's sleep behaviour pre- and postintervention. This would encourage parents to become more engaged, as their positive influence could have been reinforcing (Stokols, 1996).

## 3.2 | Application

Undertaking health behaviour change interventions within a school can be beneficial. Adolescents are less likely to ask for help in public mental health services than adults (Cheng, 2009), and attending small group teaching or joining in different projects within a school is common practice and, therefore, can be destigmatising. As mentioned above, after the "Sleep Experts" shared their learning with their peers, there was significant buy-in from other students, who began to self-refer to the Sleep Clinic waiting list. However, we also believe this intervention could be delivered in primary care or community settings. Asking young people to input on the design of advertisements for sleep interventions in these settings may be one way of making the intervention appear more attractive to adolescents and increase uptake. Zachariae and colleagues (2016) found online CBT sleep interventions to have a similar impact to face-to-face interventions. Delivering in this way can make interventions very accessible, increasing scalability so many adolescents could be reached and can be time and cost-effective. This intervention could easily be translated into a group online intervention with some modifications. For example, within an online session, including the use of Padlet to do group brainstorming activities; Mentimeter to capture young people's thoughts and beliefs about sleep; Mural to create a visual formulation; and posting or emailing individual worksheets in advance of the session.

Getting adolescents to follow treatment guidelines and remain engaged in a sleep intervention is also challenging (Blake et al., 2019). By listening to the voices of the young people about what would help them, we were able to design a sleep intervention with their needs, wants, and wishes at the forefront. The literature highlights the benefits of implementing needs-led interventions versus the inherent feasibility of doing so in reality due to the demands on time and staffing (O'Cathain et al., 2019). The young people's identified needs were not demanding when designing this intervention. They chose what style of video to use. They requested that the intervention include stress management techniques. Changing the physical space, as they felt the room was very sterile and "felt like detention" was not an unmanageable task. We encourage psychologists, therapists, sleep practitioners or any staff working with children and adolescents to develop their understanding of youth participation methodologies. The Planning Checklist, based on the Lundy Model of Youth Participation (2007) from the Irish National Framework for Children and Young People's Participation in Decision Making (Department of Children Equality Disability Integration and Youth, 2011), is a helpful guide to involving young people in the decision-making process and to using a human rights-based approach when working with young people. Service user involvement in the design of interventions is considered best practice and optimal (O'Cathain et al., 2019).

Although, as outlined above, the intervention was responsive to the needs of the young people regarding the approaches used, we argue that in the case of this intervention, there is a structured essential content

underneath this collaborative, empowering design. We suggest that this intervention can be reproduced in a mainstream education setting for young people who are most impacted by sleep disruption by following this outline but ensuring to be collaborative in your approach with the students. Looking at a stepped-health-care delivery model, whole class psychoeducation regarding sleep hygiene would be the first port of call. Providing training in sleep hygiene is accessible, low-cost, and could be delivered by a teacher or another non-clinician. Research suggests sleep education classes can help improve students' knowledge about sleep but are not effective in changing sleep behaviour (Blunden et al., 2012). We propose this intervention in its entirety as a "stepped up" mid-level intervention for those who did not benefit from an education programme alone or could be predicted to benefit more from a skills-based intervention. Individual sleep interventions would be the most intensive treatment in this model.

## 4 | CONCLUSION

In conclusion, adolescence is a period when healthy sleep practices can be encouraged, cultivated, and maintained. Benefits accrued from changes in sleep patterns improve young people's academic performance and physical, emotional, and mental health and reduce the likelihood of chronic sleep-related disease emerging in adulthood. We designed and delivered a novel intervention based on IM techniques to see whether using health psychology theory and youth participation, in addition to CBT and Mindfulness could improve sleep hygiene and sleep behaviours in adolescents. Utilising the Theory of Planned Behaviour (Ajzen, 1991) helped the young people believe in their ability to make and maintain changes to their sleep behaviour. Seeking the voice of the young people throughout the design, delivery, and evaluation process was also found to empower the young people and strengthen the design of this successful adolescent group sleep intervention.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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