

# BMJ Open Sleep hygiene strategies for individuals with chronic pain: a scoping review

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## ABSTRACT

**Objectives** Up to a quarter of the world's population experience chronic pain, which, in addition to interfering with daily activities and waking function, is often associated with poor sleep. Individuals experiencing poor sleep are often encouraged to implement sleep hygiene strategies. However, current sleep hygiene strategies have not been developed considering the unique challenges faced by individuals with chronic pain and therefore they might not be as effective in this population. The aim of this scoping review is to map the state of the existing literature examining sleep hygiene strategies in individuals with chronic pain.

**Design** This scoping review included a search of four online databases (Medline, Embase, PsycINFO and CINAHL) to identify articles examining the use of sleep hygiene strategies in populations with chronic pain.

**Results** Thirty articles investigated at least one sleep hygiene strategy in individuals with chronic pain, with improvements to sleep reported for six sleep hygiene strategies (education, exercise, limiting alcohol use, limiting tobacco use, prebed state and sleep environment). However, the timing of these strategies was often not reported which limits the degree to which these strategies can be generalised for use as a presleep strategy.

**Conclusion** This scoping review examined the existing literature focusing on sleep hygiene strategies for people with chronic pain. There are limitations to the methodology of the existing literature and gaps in our understanding of sleep hygiene strategies in some chronic pain conditions that must be addressed in future research before the effectiveness of these strategies can be understood.

## INTRODUCTION

Chronic pain is pain existing or reoccurring for longer than 3 months and is multifactorial, having social, biological and psychological attributes.<sup>1 2</sup> Globally, chronic pain is the leading cause of disability and disease burden,<sup>3</sup> affecting between one-third and one-half of the population in the UK, the USA and Australia.<sup>4</sup> In addition to the economic burden of chronic pain, there can be a significant personal cost. Difficulty in mobilisation, an increased likelihood of depression, a reduction in quality of life and an increased need for healthcare are all common experiences for individuals experiencing chronic pain.<sup>5</sup> Another common issue for those

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This is the first scoping review to explore sleep hygiene strategies in chronic pain populations
- ⇒ A strength of this scoping review was the comprehensive search strategy and broad inclusion criteria that allowed for an understanding of the current literature.
- ⇒ As this was a scoping review, to assess the effectiveness of sleep hygiene in chronic pain populations and the quality of the current literature, systematic reviews and meta-analyses are needed as a next step. The terminology used to discuss sleep hygiene varied greatly among the included studies which may have resulted in studies missed.

experiencing chronic pain is poor sleep, that is, disturbed sleep quality and quantity.<sup>5</sup>

The relationship between poor sleep and chronic pain is well documented<sup>5–7</sup> and bidirectional.<sup>8 9</sup> Individuals with chronic pain generally report poorer sleep quality<sup>10 11</sup> and quantity<sup>10–12</sup> compared with those without chronic pain. This is problematic, as sleep is a biological need, with 7–9 hours of sleep per night recommended for adults for optimal health and well-being.<sup>13 14</sup> Poor sleep is associated with poorer physical and psychological health outcomes,<sup>15 16</sup> in addition to impaired cognition, memory, attention and alertness.<sup>5 17 18</sup> Conversely, adequate nighttime sleep appears to be predictive of less pain and may assist individuals to cope with chronic pain.<sup>5 7</sup> Thus, there are likely to be far-reaching benefits of improving sleep in individuals experiencing chronic pain.

There is a need for strategies to improve sleep to be incorporated into current treatment and management approaches for chronic pain. While there are various strategies to manage chronic pain,<sup>19</sup> historically, medication is the most common treatment for pain symptoms.<sup>20–22</sup> However, some pain medications can impact sleep<sup>23–25</sup> and people with chronic pain have a higher risk of substance abuse.<sup>26</sup> Evidence is growing to support a multidisciplinary approach to pain

**Box 1 Sleep hygiene strategies (adapted from Mastin *et al* [30])**

- ⇒ Avoid daytime naps lasting two or more hours.
- ⇒ Go to bed at the same time each day.
- ⇒ Get out of bed at the same time each day.
- ⇒ Avoid exercising to the point of sweating within 1 hour of going to bed.
- ⇒ Avoid staying in bed longer than you should two or three times a week.
- ⇒ Avoid anything that may alert you before bedtime.
- ⇒ Avoid going to bed feeling stressed, angry, upset or nervous.
- ⇒ Avoid using your bed for things other than sleeping or sex.
- ⇒ A comfortable bed.
- ⇒ A comfortable bedroom (temperature, light, noise).
- ⇒ Avoid important work before bedtime.
- ⇒ Avoid thinking, planning or worrying when in bed.

management using a biopsychosocial framework.<sup>26</sup> Consequently, other strategies are being used to manage sleep and pain, including behavioural, non-pharmacological strategies.<sup>7 26</sup> One such behavioural strategy is sleep hygiene.

Sleep hygiene can be described as healthy sleep practices, including lifestyle, environmental and behavioural strategies.<sup>27–29</sup> A set of sleep hygiene guidelines was proposed by Mastin *et al*<sup>30</sup> and promoted by the Australasian Sleep Association and the Sleep Health Foundation.<sup>31 32</sup> An overview of sleep hygiene strategies is presented in **box 1**. Improving sleep hygiene has been shown to improve sleep in a range of populations including students,<sup>33 34</sup> older adults,<sup>35–37</sup> athletes<sup>38 39</sup> and individuals with sleep disorders such as insomnia.<sup>40</sup> However, there are limitations to our current understanding of the effectiveness of sleep hygiene strategies. In particular, there are no current evidence-based guidelines on the use of sleep hygiene strategies in individuals living with chronic pain.

Given the association between chronic pain and poor sleep, and the trend towards behavioural strategies being recommended for sleep improvement, it is critical to understand the effectiveness of sleep hygiene strategies in this population. While guidance on the use of sleep hygiene strategies is readily available for people living with chronic pain as part of free online resources for chronic pain management,<sup>41–43</sup> to date, no study has investigated whether the sleep hygiene guidelines are useful for improving sleep in this population.

This scoping review aims to map the state of the existing literature examining sleep hygiene strategies in individuals with chronic pain. Scoping reviews are considered an ideal tool to determine the scope of a body of literature.<sup>44</sup> Thus, a scoping review was chosen to allow the research team to explore the literature that currently exists in the area of sleep hygiene strategy use in individuals experiencing chronic pain and identify specific gaps in the literature. This scoping review is the first step in understanding whether sleep hygiene strategies are effective in a chronic pain population.

**METHODS****Patient and public involvement**

The design of this research was without patient or public involvement, and the conduct of this research was carried out without the involvement of patients (participants).

**Search strategy**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews guidelines were followed for this review.<sup>45</sup> A search was performed using the databases Medline, Embase, PsycINFO and Cumulative Index to Nursing and Allied Health Literature (CINAHL). The search was conducted on 22 April 2021 by author MS. Searches were performed on peer-reviewed abstracts within all databases. Search terms included ‘sleep’ and ‘chronic pain’ and a series of terms covering components of sleep hygiene. Search terms used (with slight differences based on database requirements) were:

Sleep AND ‘chronic pain’ AND (‘sleep hygiene’ OR napping OR bed time OR wake time OR exercise OR alcohol OR tobacco OR smoking OR caffeine OR alert\* OR activity OR emotion\* OR mood OR sex OR bed OR bedding OR light OR heat OR cold OR temperature OR noise OR sound OR work OR worry OR rumination OR stress OR routine)

Search terms were chosen to align with established sleep hygiene strategies. See **table 1** for an overview of strategies and aligned search terms.

**Eligibility criteria**

The Population-Intervention-Comparison-Outcome (PICO) structure was used to develop the key inclusion criteria for this review (Higgins *et al*, 2021).<sup>46</sup> See **table 2** for the PICO strategy.

To be included in this literature review, articles were required to be published in a peer-reviewed journal (ie, no industry reports or grey literature were included). No limits on the year of publication were included. Case studies and reviews were excluded, as were studies that were not written in English. Articles were required to include at least one sleep hygiene strategy, with a population experiencing chronic pain of any kind, and a minimum of one subjective or objective measure of sleep was required. (For the purposes of this review, any sleep hygiene strategy used in an included study is termed a sleep hygiene intervention.)

**Data charting**

Data extracted from the included articles included year of publication, authorship team, location, study design, population and study setting. Additionally, the aspect(s) of sleep hygiene that each article addressed was identified (eg, caffeine use, prebed routines). Results were then synthesised by sleep hygiene strategy. Data charting was conducted by author MS.

**Table 1** Sleep hygiene strategies and aligned search terms

Sleep hygiene strategy	Keyword/term	Search terms
Avoid daytime naps lasting two or more hours.	Napping	Napping
Go to bed at the same time each day, get out of bed at the same time each day.	Consistent bed and wake time	Bed time OR wake time
Avoid exercising to the point of sweating within 1 hour of going to bed.	Prebed exercise	Exercise
Avoid alcohol, tobacco and caffeine within 4 hours of going to bed or after going to bed.	Alcohol; tobacco; caffeine	Alcohol; Tobacco OR smoking; Caffeine
Avoid anything that may alert you before bedtime.	Prebed alerting activities (eg, video games, internet)	Sleep hygiene OR alert* OR activity
Avoid going to bed feeling stressed, angry, upset or nervous.	Prebed state (eg, stress, anger, worry, rumination)	Emotion* OR mood OR worry OR rumination OR stress
Avoid using your bed for things other than sleeping or sex.	Use of bed for activities other than sleep or sex	Activity OR sex
A comfortable bed.	Uncomfortable bed/bedding	Bed OR bedding
A comfortable bedroom (temperature, light, noise).	Sleep environment (eg, light, heat)	Light OR heat OR cold OR temperature OR noise OR sound
Avoid important work before bedtime.	Prebed work	Work
Avoid thinking, planning or worrying when in bed.	Prebed routine	Routine

Reference lists were also hand searched to identify any additional articles that were not included in the initial search.

## RESULTS

### Selection of sources of evidence

Searches identified a total of 946 peer-reviewed journal articles (after duplicate removal) that were screened based on title and abstract. Full text review was performed on 88 journal articles, of which 30 met the criteria for inclusion. See [figure 1](#) for an overview of screening procedures (PRISMA flow chart). Full text screening was performed by authors MS and SAF. Any discrepancies were resolved by consulting with a third author (CCG).

### Characteristics of sources of evidence

Study design, location, year of publication, population, study setting and outcomes are presented in online supplemental file 2. The following strategies had associated articles: alcohol use (n=2), exercise (n=10), light (n=1), prebed state (n=11), tobacco use (n=3) and sleep hygiene education (n=1). An additional two papers included both measures of sleep hygiene and sleep in a chronic pain population. No studies were found addressing any other sleep hygiene strategies in a chronic pain population.

Chronic pain populations included individuals with fibromyalgia (n=3), non-specified chronic pain (n=6), non-cancer-related chronic pain of any kind (n=4), chronic spinal pain (n=1), chronic benign neck, low back

and/or generalised pain (n=2), chronic low back pain (n=2), musculoskeletal chronic pain (n=3), back pain, osteoarthritis and/or rheumatoid arthritis (n=1), failed back surgery syndrome (n=1), chronic knee pain (n=1), sickle cell disease (n=1), orofacial pain (n=1), chronic rheumatic conditions (n=2), cancer (n=1) and Parkinson's disease (n=1). Participants in the included studies included adults (n=29) with one study including child participants (n=1).

### Synthesis of results

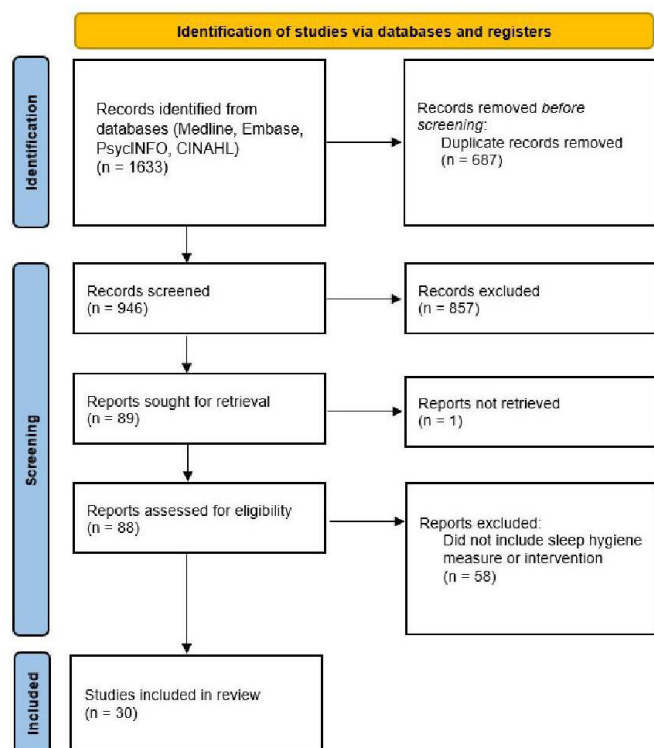
Each sleep hygiene strategy for which studies were identified is discussed. The strategies are listed based on those most commonly reported in the literature to least commonly reported.

#### Prebed state: avoid anything that may alert you before bedtime

Eleven studies examined prebed state and sleep outcomes in patients with chronic pain.<sup>47-57</sup> There was methodological heterogeneity among these 11 studies. Of the studies that used a cross-sectional design, two investigated the impact of presleep arousal on scores on the Insomnia Severity Index in participants with chronic pain.<sup>49 51</sup> Both studies demonstrated that heightened prebed state, measured by greater presleep arousal, was associated

**Table 2** Cochrane PICO strategy

Population	Intervention	Comparison	Outcome
Chronic pain population of any kind and age.	Sleep hygiene intervention (refer to <a href="#">box 1</a> ).	No comparison required. Typically, a control group where no intervention is used.	A minimum of one sleep outcome (subjective and/or objective measures).



**Figure 1** Screening process.

with higher scores on the Insomnia Severity Index, indicating impaired sleep. The study by Zaidel *et al*<sup>67</sup> used a cross-sectional design in older adults (>65 years old) diagnosed with chronic pain and reported that prebed state, measured as higher daily stress, was associated with poor sleep quality and quantity. Daily stress was also associated with poor sleep quality in a sample of children diagnosed with sickle cell disease.<sup>56</sup>

Mindfulness and meditation were also common among the studies that addressed prebed state and sleep.<sup>47 52 53 55</sup> Mindfulness programmes were assessed in populations of patients with chronic non-cancer pain,<sup>47</sup> failed back surgery syndrome,<sup>52</sup> chronic knee pain<sup>53</sup> and chronic low back pain.<sup>55</sup> There were mixed findings, with some studies identifying less sleep disturbance after mindfulness intervention,<sup>47 55</sup> and the remaining two studies showing no benefit of mindfulness on sleep compared with a control condition<sup>52</sup> or listening to music.<sup>53</sup>

Relaxation was also investigated as a prebed state strategy.<sup>48 50 54</sup> Findings were again mixed with improvements in subjective sleep quality seen after using progressive relaxation in a sample of 19 participants with chronic pain<sup>50</sup> and in a sample of 36 participants with chronic back or joint pain.<sup>54</sup> Conversely, no improvement in sleep quality was seen in a sample of 12 participants with musculoskeletal pain who completed a prebed relaxation intervention.<sup>48</sup>

**Exercise: avoid exercising to the point of sweating within 1 hour of going to bed**

Ten studies assessed exercise as a sleep hygiene strategy, with mixed findings. Decreases in insomnia

severity,<sup>58 59</sup> decreases in sleep problems<sup>60</sup> and increases in sleep quality<sup>61 62</sup> were found after some exercise interventions to increase activity during the day in participants living with chronic pain. Other studies, however, found that higher daytime activity was associated with either no change in insomnia symptoms,<sup>63</sup> poorer sleep quantity and quality in individuals with chronic pain.<sup>64–66</sup>

**Tobacco: avoid alcohol, tobacco and caffeine within 4 hours of going to bed or after going to bed**

Three studies investigated tobacco use and sleep outcomes in patients with chronic pain.<sup>67–69</sup> Cross-sectional study designs were used in all three studies, with both Burris *et al*<sup>68</sup> and Khan *et al*<sup>67</sup> doing retrospective reviews of clinical care data from patients experiencing chronic pain. In both studies sleep disturbance was significantly worse in participants who smoked compared with those who did not, as measured by the Pittsburgh Sleep Quality Index (PSQI)<sup>68</sup> and a sleep-related question from the Patient-Reported Outcomes Measurement Information System.<sup>67</sup> Similar results were seen in the study conducted by Stipelman *et al*,<sup>69</sup> with data from a National Health Interview Survey. Smokers were more likely to have short sleep duration (<6 hours) compared with non-smokers in a sample of 22 850 patients with chronic rheumatic conditions.

**Sleep hygiene**

Two studies measured the relationship between the use of ‘sleep hygiene practices’ as a whole and sleep outcomes in individuals with chronic pain.<sup>70 71</sup> Emery *et al*<sup>71</sup> conducted a study in which 60 participants completed a survey including the Sleep Hygiene Awareness and Practice Scale and the PSQI. They found that participants with musculoskeletal chronic pain reported better sleep hygiene than those with comorbid major depressive disorder and musculoskeletal pain. However, regardless of sleep hygiene use, all participants had poor sleep-onset latency and sleep quality. Likewise, in a study of adolescents with and without chronic pain,<sup>70</sup> those with chronic pain had poorer sleep quality despite a similar use of sleep hygiene among participants.

**Alcohol: avoid alcohol, tobacco and caffeine within 4 hours of going to bed or after going to bed**

Alcohol use and sleep was investigated in samples of patients with chronic pain in two studies.<sup>72 73</sup> Graham and Streitel<sup>72</sup> had 108 college students with any reported type of chronic pain complete a survey about alcohol use and sleep and found that increased alcohol use was associated with poorer sleep. Similarly, Miller *et al*<sup>73</sup> found that an increase in alcohol consumption resulted in increased sleep latency in a sample of 23 students with fibromyalgia who completed 14-day alcohol and sleep diaries.

**Education**

One study was identified that investigated the influence of education about healthy sleep as a sleep hygiene strategy.<sup>74</sup> Berry *et al*<sup>74</sup> conducted a randomised controlled trial with 85 participants with chronic non-cancer pain and

found that a 4-week sleep hygiene education programme improved sleep-onset latency in people living with chronic pain compared with a control group of people living with chronic pain who did not receive the same education programme.

#### Sleep environment: a comfortable bedroom (temperature, light, noise)

Only one study identified in this review investigated optimising the sleep environment.<sup>75</sup> Morning bright light was used in 37 participants with chronic back pain for 13 days. It was found that subjective sleep quality improved after bright light treatment compared with before treatment.

#### No evidence found

No studies included in this review presented information on napping, consistent bed and wake times, caffeine use, prebed activities (not mood related), bed and bedroom use, uncomfortable bed/bedding, prebed work or prebed routines.

## DISCUSSION

The aim of this scoping review was to map the state of the existing literature examining sleep hygiene strategies in individuals with chronic pain. While there was a range of literature supporting the use of sleep hygiene strategies in individuals with chronic pain, the heterogeneity of sleep hygiene strategies used and chronic pain samples studied limits the generalisability of current findings. This finding is important to consider given that sleep hygiene strategies are commonly recommended for those with chronic pain as part of behavioural treatments.<sup>76</sup>

Thirty studies were found that supported the use of six specific sleep hygiene strategies (education, exercise, limiting alcohol use, limiting tobacco use, prebed state and sleep environment), with the most commonly reported strategies being the management of prebed state and use of daytime exercise. Standard sleep hygiene advice relating to prebed state highlights the need to avoid thinking, planning and worrying before sleep.<sup>30</sup> The 11 identified studies that addressed prebed state suggest that using strategies such as relaxation,<sup>48 50</sup> mindfulness<sup>47 52</sup> and meditation and music<sup>53</sup> can improve sleep quality and decrease sleep disturbance in people with chronic pain. However, it must be noted that many of the included studies did not require these relaxation strategies to be performed immediately prior to bed (ie, these activities were performed at any time of day). It is possible that the impact of these activities on prebed state (and potentially on subsequent sleep) would be greater if performed within the context of a specific sleep hygiene intervention (ie, if relaxation or mindfulness activities were performed in the hour or two before bed). The studies for prebed state as a sleep hygiene strategy included participants from a wide range of age groups. This is an important consideration when interpreting the impact of this sleep hygiene strategy, as there are age-related changes in sleep

across the lifespan,<sup>77</sup> which may mean that the sleep of different age groups is differentially impacted by sleep hygiene strategies. Further, given that chronic pain is typically associated with high levels of stress and anxiety,<sup>78</sup> it is likely that interventions designed to improve prebed state may be of particular importance for improving sleep in this population.<sup>79</sup>

Conflicting results were found for exercise as a sleep hygiene strategy in people with chronic pain. Given that there was a high level of heterogeneity in the types and duration of exercise measured in each study, no one study can provide recommendations for the optimal type or duration of exercise for improving sleep in individuals with chronic pain. It is also likely that the effectiveness of exercise as a strategy for improving sleep differs based on the type of chronic pain experienced by the individual as well as the type of exercise (eg, high intensity vs low intensity). This corresponds to previous literature showing that overactivity can exacerbate symptoms of chronic pain.<sup>64</sup> Further, it is important to note that while the sleep hygiene guidelines by Mastin *et al*<sup>80</sup> recommend avoiding exercise within 1 hour of going to bed, a recent systematic review and meta-analysis of 23 articles found that overall, evening exercise did not influence sleep quality.<sup>80</sup> Given that the exact timing of exercise was not investigated in the studies identified in the present review, it is unknown if there is an optimal time of day to exercise for people living with chronic pain in relation to sleep outcomes. As such, there is a need for future research to address both the timing, type and duration of exercise used by individuals with different types of chronic pain when considering the impact on subsequent sleep. This research will inform targeted recommendations for exercise as a sleep hygiene strategy for individuals with chronic pain.

Alcohol and tobacco intake was also investigated in the reviewed studies, with sleep disturbances in individuals with chronic pain associated with increased tobacco use and alcohol use.<sup>67–69 72 73</sup> Of note, however, is that the sleep hygiene recommendation is to avoid these substances in the 4 hours prior to bed.<sup>30</sup> In the studies included in this review, however, overall daytime consumption of alcohol or tobacco was measured rather than specific timing of consumption (ie, whether alcohol/tobacco were consumed close to bedtime). Therefore, timing of alcohol and tobacco use, rather than restriction of alcohol use, is the critical question in the context of a sleep hygiene strategy and should be considered within future research. This research is particularly important given that alcohol may negatively interact with pain medications,<sup>72</sup> and tobacco can contribute to higher pain intensity.<sup>81</sup> Furthermore, alcohol has reportedly been used to self-medicate in some individuals with chronic pain,<sup>82</sup> and there may therefore be reluctance to decrease or stop use in the absence of a pain management alternative.

Despite identifying existing literature that supports the use of certain sleep hygiene strategies in individuals with chronic pain, caution must be taken when recommending these strategies due to the limited scope of the literature.

First, there are diagnosis-specific characteristics found in different chronic pain conditions.<sup>83</sup> For example, people with nociplastic conditions such as fibromyalgia or complex regional pain syndrome are known to have higher sensory sensitivity, and suffer from fatigue and insomnia more than people with other pain conditions.<sup>26</sup> This is likely to influence the efficacy of sleep hygiene strategies for this specific chronic pain population. Further, it is likely that were these sleep hygiene strategies to be recommended, some modifications may be necessary to tailor the recommendations for individuals with chronic pain. For example, one sleep hygiene strategy involves avoiding alerting activities before bedtime, such as the use of a mobile phone, internet or video games. However, such tasks have been shown to be a distraction from pain symptoms.<sup>84 85</sup> Therefore, a suggestion to avoid these tasks before bed may increase awareness of pain symptoms before bed which would have a negative impact on sleep. A prebed activity that is distracting from pain but not alerting may be an appropriate alternative for individuals with chronic pain. Modifications such as this should be considered for all sleep hygiene strategies.

No studies investigated the use of the remaining eight sleep hygiene strategies (prebed work; prebed routine; use of bed for activities other than sleep or sex; uncomfortable bed or bedding; caffeine; prebed alerting activities; napping; and consistent bed/wake times). A priority for future research is to investigate the efficacy of these strategies for improving sleep in chronic pain populations. An important first step could be to investigate the caffeine-related strategy, as caffeine is known to play a role in pain management due to the adjuvant analgesic effects.<sup>86</sup> Much like alcohol and tobacco, caffeine is best avoided in the 4 hours prior to bed according to the general sleep hygiene guidelines.<sup>30</sup> However, no studies assessing this strategy in a chronic pain population were identified in this review. Further, several studies have highlighted that those with chronic pain consumed significantly more coffee than those without chronic pain.<sup>72 87 88</sup> This highlights the need for further investigation of the relationship between caffeine use, chronic pain and sleep, given the high amount of use of caffeine in a chronic pain population.

The limitations of this review must be acknowledged. This is a scoping review designed to overcome the evidence bias that may be present in a narrative review but with a broader search than a systematic review in order to understand a wider research area.<sup>44</sup> A limitation of the search strategy is that terminology used to discuss sleep hygiene throughout the literature was not consistent and many studies did not use the term sleep hygiene. While the search strategy was widened to include terms relating to specific strategies, it is possible that some articles were missed.

The review highlights that while sleep hygiene is promoted as a non-pharmacological strategy for improving the sleep of those with chronic pain, there is limited research on the efficacy of these strategies in

individuals with chronic pain. While creating, evaluating and promoting targeted sleep hygiene guidelines for people living with chronic pain is a goal, more research is needed. First, assessment of the efficacy of current sleep hygiene strategies in individuals with chronic pain is required. Specifically, certain activities (eg, exercise) would ideally be investigated in the context of the prebed period, taking account of timing. While research on some sleep hygiene strategies was identified, only tentative support could be provided due to the heterogeneity of type and duration of sleep hygiene strategies used. Therefore, studies should be designed to evaluate the efficacy of certain sleep hygiene strategies in individuals with chronic pain. The differences between chronic pain conditions must also be considered, in addition to individuals experiencing chronic pain as a symptom of a treatment (eg, chronic pain associated with chemotherapy<sup>72</sup>). Following additional studies, systematic reviews and meta-analyses should be prioritised to assess effectiveness of the sleep hygiene strategies investigated in the chronic pain populations represented by the literature. Finally, qualitative approaches will be critical in understanding the lived experience of chronic pain and the use of sleep hygiene strategies.

This scoping review mapped the current literature addressing sleep hygiene in individuals experiencing chronic pain. Limited literature was identified, and while some strategies show promise for improving sleep in people living with chronic pain, the timing of the strategy use/implementation was not examined. Given the relationship between sleep quality and pain, as well as the fact that sleep hygiene is commonly promoted to people with chronic pain, future research into the efficacy of sleep hygiene programmes is needed. This is necessary to ensure that advice given to people living with chronic pain is evidence based and will lead to improvements in sleep.

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**Contributors** CCG, MS and CJ-D were responsible for conceptualisation of the paper. Searches were conducted by MS and SAF, with assistance from CCG. Original manuscript preparation was completed by CCG, MS and CJ-D, and manuscript reviewing and editing was done by CCG, MS, CJ-D and SAF. CCG is the guarantor of this study.

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