

## Personality and Social Psychology

# A self-help book is better than sleep hygiene advice for insomnia: A randomized controlled comparative study

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The objective was to compare the effects of two types of written material for insomnia in a randomized trial with follow-up after three months. Insomniacs were recruited through newspaper advertisements to a web-based survey with validated questionnaires about sleep, anxiety, depression, and use of sleep medications. A self-help book focusing on cognitive behavioral therapy for insomnia was compared to standard sleep hygiene advice; 77 and 78 participants were randomized to self-help book or sleep hygiene advice, respectively. The response rate was 81.9%. The self-help book gave significantly better scores on the sleep questionnaires compared to sleep hygiene advice. The proportion using sleep medications was reduced in the self-help book group, whereas it was increased in the sleep hygiene group. Compared to pre-treatment, the self-help book improved scores on the sleep (effect sizes 0.61–0.62) and depression (effect size 0.18) scales, whereas the sleep hygiene advice improved scores on some sleep scales (effect sizes 0.24–0.28), but worsened another (effect size –0.36). In addition, sleep hygiene advice increased the number of days per week where they took sleep medications (effect size –0.50). To conclude, in this randomized controlled trial, the self-help book improved sleep and reduced the proportion using sleep medications compared to sleep hygiene advice. The self-help book is an efficient low-threshold intervention, which is cheap and easily available for patients suffering from insomnia. Sleep hygiene advice also improved sleep at follow-up, but increased sleep medication use. Thus, caution is warranted when sleep hygiene advice are given as a single treatment.

**Key words:** Sleep, insomnia, cognitive behavioral therapy, sleep hygiene, self-help book.

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### INTRODUCTION

Sleep problems are common in the general population. About one-third of adults complain of insomnia symptoms, and chronic problems with daytime consequences are reported in about 10% (Morin, Bootzin, Buysse, Edinger, Espie & Lichstein, 2006; Pallesen, Nordhus, Nielsen *et al.*, 2001). Despite high prevalence, studies show that few insomniacs are diagnosed and treated (Ancoli-Israel & Roth, 1999; van Straten & Cuijpers, 2009).

Sleep problems are usually treated by drugs. Most clinicians agree that acute insomnia may be treated with hypnotics in a safe and effective way (Buscemi, Vandermeer, Friesen *et al.*, 2007), but chronic drug use (beyond one month) is discouraged. There are several reasons for this, including risk of tolerance, addiction and abuse (Kripke, 2000). Cognitive behavioral therapy is recommended as the treatment of choice for chronic insomnia, and provides greater and more prolonged effect compared with sleep medications (Morin *et al.*, 2006; Sivertsen, Omvik, Pallesen *et al.*, 2006). A recent study shows that among patients who have used sleep medications, 80% of them prefer non-pharmacological treatment over hypnotics (Omvik, Pallesen, Bjorvatn, Sivertsen, Havik & Nordhus, 2010). Cognitive behavioral therapy for insomnia (CBTi) consists of different treatment components. Stimulus control and sleep restriction have the best documented effect (Morin, Culbert & Schwartz, 1994). Sleep hygiene, cognitive techniques and relaxation are usually included in such multicomponent therapy (Morin *et al.*, 2006; Sivertsen *et al.*, 2006).

Sleep hygiene covers basic advice on how the patient should behave in order to sleep well (such as reducing caffeine use before bedtime, keeping the bedroom dark and quiet, avoiding alcohol as a sleep aid, advice concerning food intake before bedtime, etc.; Stepanski & Wyatt, 2003). Stimulus control aims at breaking associations between the sleep environment and wakefulness, and to teach the patient to associate the bed and bedroom with sleep and relaxation. To achieve this, the patient follows specific advice: (1) Go to bed only when you intend to sleep and only when you are sleepy; (2) Do not use your bed for activities other than sleep, that is do not read, watch TV, eat or worry in bed – sexual activity is the only exception to the rule; (3) If you cannot sleep within approximately 15–20 minutes, get up and go into another room; do not return to the bedroom until you are sleepy again; (4) If you still cannot sleep, repeat rule 3; do this as many times as needed throughout the night; (5) Get up at the same time every morning, regardless of how much sleep you got during the night; (6) Do not sleep or nap during the day (Bootzin, 1972). Sleep restriction is a rule-based method that is intended to enhance the homeostatic sleep pressure. Many patients with poor sleep compensate by spending more time in bed, hoping to get some sleep. It is not uncommon for patients with about 5 hours of sleep to spend 9–10 hours in bed. This can maintain the sleep difficulties. In sleep restriction therapy it is recommended that the patient reduces the time in bed to the time the patient is actually sleeping (but not to less than 5 hours). Sleep diaries are used to calculate the sleep duration. For each week of treatment the sleep efficiency

(sleep duration / time in bed \* 100%) is calculated. When sleep efficiency is higher than 80–85%, the patient is instructed to go to bed 15 minutes earlier. If sleep efficiency is lower than 80%, time in bed is kept unchanged (Bjorvatn, Sivertsen, Øyane, Nordhus & Pallesen, 2009). Cognitive techniques are about identifying dysfunctional beliefs and cognitions that may contribute to maintaining the sleep difficulties. Dysfunctional beliefs and cognitions may include unrealistic beliefs about sleep (e.g. that everyone needs 8 hours of sleep to be refreshed), incorrect beliefs about the causal relationship between sleep and impaired daytime functioning (e.g. that poor daytime functioning always is due to poor sleep), and misconceptions related to assumptions about the causes of insomnia (e.g. that insomnia is solely due to a biological or biochemical defect). The therapy aims to challenge these beliefs and cognitions, and replace them with more realistic and appropriate assumptions (Morin, Hauri, Espie, Spielman, Buysse & Bootzin, 1999).

Objections to CBTi are that such treatment is complicated, time consuming and not easily available (Morin, Beaulieu-Bonneau, LeBlanc & Savard, 2005). Few therapists offer CBTi. Several studies have examined how the therapy can be made easier and more available. CBTi may be provided by specially trained nurses (Espie, MacMahon, Kelly *et al.*, 2007). Positive results using telephone consultations (Bastien, Morin, Ouellet, Blais & Bouchard, 2004) and treatment via the internet have also been documented (Ritterband, Thorndike, Goner-Frederick *et al.*, 2009; Strom, Pettersson & Andersson, 2004). Distribution of six weekly self-help booklets gave moderate improvements in insomniacs (Morin *et al.*, 2005). In one meta-analysis of ten randomized controlled studies of self-help therapies for insomnia, it was concluded that such interventions provide small to moderate effects (van Straten & Cuijpers, 2009). The majority of the studies compared self-help therapy with waiting list controls (van Straten & Cuijpers, 2009). More studies on easily available treatment alternatives are needed (Espie, 2009; Ritterband *et al.*, 2009).

The objective of this study was to compare the effect of standard sleep hygiene advice and a self-help book focusing on all aspects of CBTi in a randomized controlled trial (RCT) of patients suffering from insomnia.

## METHOD

Patients were recruited through newspaper advertisements, where they were referred to a website for more information. The website informed that the survey investigated the effects of two types of written material for insomnia. Patients who consented were asked to answer questionnaires on the website, and to provide their addresses so we could send out the written material and contact them for follow-up. After three months, the participants were asked to answer the same questionnaires. The survey was administered by SurveyXact. The survey was approved by the Regional Committee for Medical Research Ethics, Western Norway.

The study was a randomized controlled study comparing two active treatments: (1) the self-help book "Bedre søvn. En håndbok for deg som sover dårlig" ("Better sleep. A handbook for you who sleep poorly") and (2) sleep hygiene advice. The sleep hygiene advice was given on a sheet of paper, and included advice about caffeine, nicotine, food intake, exercise etc. (Table 1). The self-help book (153 pages) was published in 2007 (Bjorvatn, 2007). It covers normal sleep and sleep regulation, how sleep problems are assessed, and describes different causes of poor sleep. The main focus of the book is CBT for chronic insomnia. This kind of

Table 1. Sleep hygiene advice

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- Avoid caffeinated drinks during the last hours before bedtime (coffee, tea, cola)
  - Avoid smoking/nicotine during the last hours before bedtime
  - Avoid alcohol as a sleep aid
  - Avoid going to bed hungry, but do not consume a heavy meal before bed
  - Keep the bedroom dark, quiet and with moderate temperature. If necessary, use mask and earplugs
  - Regular exercise is good, but do not exercise during the last hours before bedtime
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therapy is reviewed in detail in the book. To demonstrate the methods in the most tangible and recognizable manner a typical patient is followed through assessment, diagnosis and treatment of the sleep problems. One aim of the book is that patients with insomnia will be able to carry out the treatment program on their own.

Participants who completed the follow-up questionnaire were offered the written material that the other group had received as a reward for participation. They were given no other compensation. Participants were consecutively randomized to either self-help book or sleep hygiene advice.

Validated sleep questionnaires were used as outcome measures; Bergen Insomnia Scale (BIS) (Pallesen, Bjorvatn, Nordhus, Sivertsen, Hjørnevik & Morin, 2008) and Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman & Kupfer, 1989). BIS consists of six items, and is designed based on the diagnostic criteria for insomnia (Pallesen *et al.*, 2008). The scale is used as a continuous scale (values 0–42), where higher values indicate a greater degree of insomnia, or for diagnosing insomnia. PSQI consists of 19 questions, covering different aspects of sleep and daytime function. A total score is calculated (range 0–21), where a value >5 indicates a sleep disturbance. Furthermore, participants completed the Dysfunctional Beliefs and Attitudes about Sleep-16 (DBAS-16). DBAS-16 comprises 16 questions (response alternatives from 0 = strongly disagree to 10 = strongly agree), where an average value of all the questions is calculated (Carney, Edinger, Morin *et al.*, 2010). In addition, anxiety and depression were assessed by the Hospital Anxiety and Depression Scale (HADS). HADS consists of 14 questions, seven concerning depression symptoms, and seven concerning anxiety symptoms (Zigmond & Snaith, 1983). Each question is scored on a four-point scale (0–3), and separate total scores for anxiety and depression are calculated.

Participants were asked if they were using medications (yes/no) or non-pharmacological therapy (yes/no) for sleep problems or psychological disorders. Use of all types of sleep medications (nonbenzodiazepines, benzodiazepines, sedating antihistamines, sedating antidepressants, sedating antipsychotics, melatonin, valerian) was recorded as the number of days taken per week. Participants were asked about symptoms of other sleep disorders (loud snoring, sleep apnea, restless legs, periodic limb movements during sleep) based on the Global Sleep Assessment Questionnaire (Roth, Zammit, Kushida *et al.*, 2002). Response alternatives are "never," "sometimes," "usually" and "always". In the follow-up survey after three months, participants were asked to indicate whether they had read the written material ("strongly disagree," "disagree," "neither disagree nor agree" "agree," "strongly agree").

## Inclusion/exclusion criteria

Participants had to be at least 18 years old, and meet the criteria for an insomnia diagnosis based on the BIS (Pallesen *et al.*, 2008). To be included, the sleep problems must have lasted for >6 months. Patients who already received non-pharmacological treatment for sleep disorders were excluded. In addition, patients who answered "always" on the questions about sleep apnea, restless legs or periodic limb movements during sleep were excluded, because this suggests that other sleep disorders may explain the insomnia symptoms.

### Statistics

Power calculations were done with the G \* Power software version 3.0.3 (Faul, Erdfelder, Lang & Buchner, 2007). It was assumed a moderate effect size ( $d = 0.5$ ). Alpha was set to 0.05 (two-tailed) and statistical power ( $1 - \beta$ ) was set to 0.80. The allocation ratio with respect to the allocation of participants of the two conditions was set to 1. On the basis of these parameters, it was estimated that each group needed at least 64 participants. A  $2 \times 2$  ANOVA with one between group factor (self-help book vs. sleep hygiene advice) and with one within subjects/repeated measures factor (pre-treatment vs. follow-up) was used to compare the effect of the self-help book and the sleep hygiene advice. The interaction effects are reported, and when significant, such interaction effects indicate different time courses for the two interventions. Paired  $t$ -tests, effect sizes (Cohen's  $d$  for paired values), and Pearson chi-square tests were used to compare values before and after the intervention within each condition. Scores on the questionnaires in the two conditions at pre-treatment were compared with unpaired  $t$ -tests (for ratio and interval scales), Pearson chi-square tests (for nominal variables), and Mann-Whitney U tests (for ordinal variables). Intention-to-treat analyses were used, that is, scores from pre-treatment were carried forward to the 3-month follow-up, if follow-up data were missing. Significance level was set at 0.05.

### RESULTS

Figure 1 shows a flow chart of the study. A total of 155 participants were randomized to either self-help book ( $n = 77$ ) or sleep hygiene ( $n = 78$ ); 127 participants answered questions at follow-up, giving a response rate of 81.9%. There were no significant differences between the groups at pre-treatment (Table 2). Four participants in the book group and one participant in the sleep hygiene group answered "disagree" or "strongly disagree" on the question about whether they had read the written material.

The self-help book gave significantly larger improvement on all sleep instruments (BIS, PSQI and DBAS-16) compared to sleep hygiene advice at follow-up (Table 3). There were no significant differences between the two groups at follow-up on anxiety, depression, or the number of sleep medications taken per week among drug users (Table 3). Compared to pre-treatment, the self-help book gave significant improvements on the scores of BIS, PSQI and depression, whereas sleep hygiene advice gave improvements on BIS and PSQI but worsening on DBAS-16 and number of drugs taken per week among drug users (Table 3). The proportion who used sleep medications was reduced from 36.4% to 31.2% in the self-help book group ( $\chi^2 = 13.8$ ,  $df = 1$ ,  $p < 0.0005$ ), while in the sleep hygiene group, the proportion of drug users increased from 26.9% to 39.7% ( $\chi^2 = 30.9$ ,  $df = 1$ ,  $p < 0.0005$ ). In the group that received the book, there were 14 participants out of 77 surveyed that no longer had insomnia at follow-up, while the corresponding figure for the sleep hygiene group was 8 out of 78 participants ( $\chi^2 = 2.0$ ,  $df = 1$ ,  $p = 0.16$ ).

### DISCUSSION

The self-help book was more effective than the sleep hygiene advice to improve sleep, while there were no significant differences between the conditions on the anxiety and depression scores. The proportion using sleep medications was significantly reduced in the self-help book group compared to pre-treatment, while the number of tablets consumed per week among the drug users was unchanged. Furthermore, depression scores were significantly reduced in the self-help book group at follow-up. In the group receiving sleep hygiene advice the scores on some of the

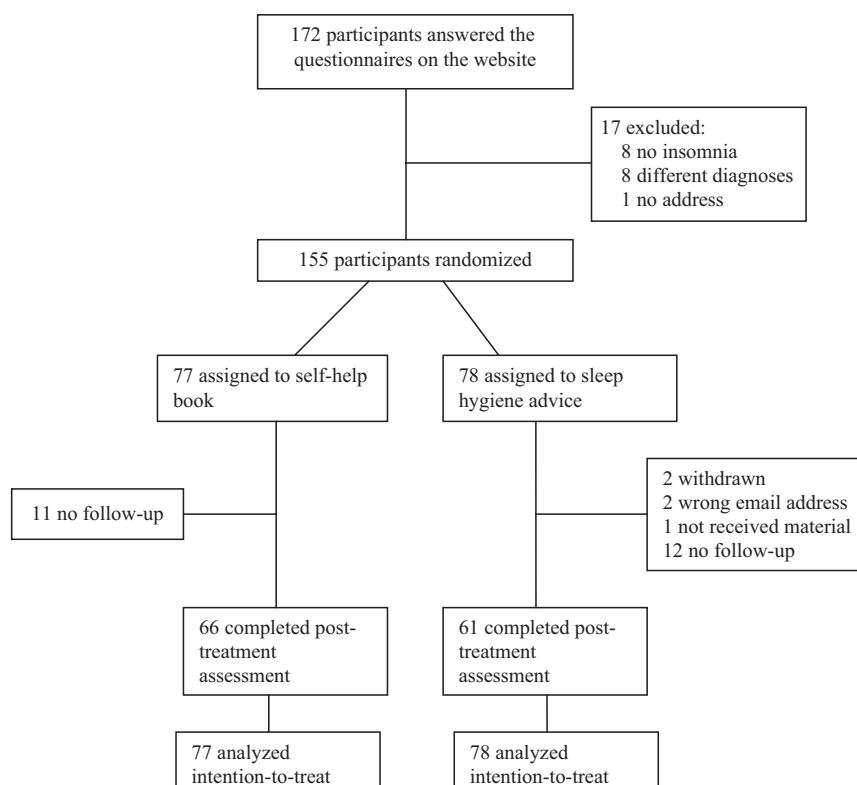


Fig. 1. Overview of the participants in the survey.

Table 2. Demographics and scores on the instruments before sending the written material

	Self-help book (n = 77)	Sleep hygiene advice (n = 78)	p-value
Age, mean (SD)	49.6 (14.5)	50.3 (13.2)	0.77 <sup>a</sup>
Proportion female	59.7%	56.4%	0.67 <sup>b</sup>
Marital status (% married/cohabiting, single/divorced/separated/widow/widower)	72.7, 27.3	65.4, 34.6	0.32 <sup>b</sup>
Education (% primary school, secondary school, vocational/technical school, university/college)	13.0, 5.2, 23.4, 58.4	6.4, 14.1, 25.6, 53.8	0.70 <sup>c</sup>
Median number of years with sleep problems	6.5	8	0.62 <sup>c</sup>
Pharmacological treatment for sleep problems	36.4%	26.9%	0.21 <sup>b</sup>
Pharmacological treatment for mental disorders	5.2%	5.1%	0.99 <sup>b</sup>
Psychotherapy for mental disorders	6.5%	2.6%	0.24 <sup>b</sup>
Loud snoring (% never, sometimes, usually, always)	36.4, 46.8, 15.6, 1.3	33.3, 47.4, 15.4, 3.8	0.61 <sup>c</sup>
Breathing pauses in sleep (% never, sometimes, usually)	76.6, 16.9, 6.5	82.1, 14.1, 3.8	0.39 <sup>c</sup>
Restless legs (% never, sometimes, usually)	51.9, 35.1, 13.0	55.1, 33.3, 11.5	0.68 <sup>c</sup>
Repeated rhythmic leg jerks or leg twitches during sleep (% never, sometimes, usually)	67.5, 29.9, 2.6	59.0, 35.9, 5.1	0.24 <sup>c</sup>
BIS total score (SD)	28.1 (8.7)	27.2 (8.1)	0.49 <sup>a</sup>
PSQI total score (SD)	12.9 (3.0)	12.8 (2.8)	0.89 <sup>a</sup>
DBAS-16 average score (SD)	4.8 (1.5)	4.8 (1.5)	0.96 <sup>a</sup>
HAD-anxiety total score (SD)	7.6 (3.8)	8.1 (3.9)	0.41 <sup>a</sup>
HAD-depression total score (SD)	5.4 (3.5)	5.4 (3.5)	0.99 <sup>a</sup>

Note: BIS, Bergen Insomnia Scale; PSQI, Pittsburgh Sleep Quality Index; DBAS, Dysfunctional Beliefs and Attitudes about Sleep; HAD, Hospital Anxiety and Depression Scale.

<sup>a</sup> p-values are based on unpaired *t*-tests.

<sup>b</sup> p-values are based on Pearson chi-square tests.

<sup>c</sup> p-values are based on Mann-Whitney U tests.

Table 3. Effects of the self-help book and the sleep hygiene advice on different questionnaires

	Self-help book (n = 77)			Sleep hygiene advice (n = 78)			Interaction effect <sup>c</sup>	
	Mean (SD) Pre – Post	p-value <sup>a</sup>	Effect size <sup>b</sup>	Mean (SD) Pre – Post	p-value <sup>a</sup>	Effect size <sup>b</sup>	F-value	p-value
BIS	28.1 (8.2) – 22.4 (10.0)	<0.0005	0.62	27.2 (8.1) – 25.0 (10.2)	0.004	0.24	8.43	0.004
PSQI	12.9 (3.0) – 10.8 (3.8)	<0.0005	0.61	12.8 (2.8) – 11.9 (3.5)	0.001	0.28	6.50	0.012
DBAS-16	4.8 (1.5) – 4.8 (1.9)	0.885	0.00	4.8 (1.5) – 5.4 (1.8)	<0.0005	-0.36	6.68	0.011
HAD-A	7.6 (3.8) – 7.4 (3.6)	0.528	0.05	8.1 (3.9) – 7.9 (4.2)	0.411	0.05	0.03	0.860
HAD-D	5.4 (3.5) – 4.8 (3.3)	0.023	0.18	5.4 (3.5) – 5.4 (3.8)	0.930	0.00	2.44	0.120
Drug use <sup>d</sup>	4.1 (4.4) – 4.1 (4.5)	1.000	0.00	3.3 (3.9) – 5.3 (4.0)	0.008	-0.50	3.54	0.064

Notes: BIS, Bergen Insomnia Scale; PSQI, Pittsburgh Sleep Quality Index; DBAS, Dysfunctional Beliefs and Attitudes about Sleep; HAD-A, Hospital Anxiety Scale; HAD-D, Hospital Depression Scale.

<sup>a</sup> Paired *t*-test, comparing values before and after the intervention (separate tests for the self-help book and the sleep hygiene advice).

<sup>b</sup> Effect size (Cohen's *d*) for paired values.

<sup>c</sup> A mixed between-within subjects 2 × 2 ANOVA comparing the effect of the self-help book and the sleep hygiene advice.

<sup>d</sup> Drug use (all types) reported as the number of days taken per week. The figures are based on patients who use hypnotics (n = 33–36), and not the entire study population.

sleep instruments were better at follow-up than at pre-treatment, while scores on the Dysfunctional Beliefs and Attitudes about Sleep-scale worsened. Furthermore, the proportion using sleep medications and the number of tablets consumed per week increased in the sleep hygiene group from pre-treatment to follow-up. It is possible that increased drug use may explain the reported sleep improvements in this group.

The improvement in many of the participants was large, and in the self-help book group there were 14 patients who no longer met the criteria for insomnia at follow-up. As the proportion that used sleep medications also was reduced, we interpret this as clinically significant changes. Effect sizes on the BIS and the PSQI were above 0.6, which is clearly higher than the effect sizes of 0.2–0.3 that are reported with self-help brochures (Morin *et al.*,

2005). In the meta-analysis of randomized controlled studies of self-help therapies for insomnia the overall effect size was 0.36 (van Straten & Cuijpers, 2009), which is also clearly lower than what we found for the self-help book in the present study.

Previously the effect of the self-help book among those who actively purchase the book was studied (Bjorvatn & Pallesen, 2009). Effect sizes in that study were 0.76–0.96, but these results are based on a pre-posttest design without a control condition, that is, placebo effects cannot be excluded (Bjorvatn & Pallesen, 2009). It is also assumed that the effect is greater in patients who actively purchase a self-help book, because the motivation to follow the advice then is high.

Sleep hygiene advice is often given by doctors/therapists in the treatment of sleep problems, but the effect of such simple



advice is variable (Morgenthaler, Kramer, Alessi *et al.*, 2006; Stepanski & Wyatt, 2003). According to current guidelines, there is insufficient evidence for such advice as a single treatment of insomnia (Morgenthaler *et al.*, 2006). In our study we found positive effects of sleep hygiene advice on some sleep scales, but also negative changes. The proportion using sleep medications and the number of days per week where they took sleep medications increased, which we regard as unfortunate. We cannot explain this change in drug use, but it suggests that caution is warranted when sleep hygiene advice is given as a single treatment.

Insomnia affects many people. Consequently, there is a need for readily available treatment. Espie (2009) has called for a service-delivery model, based on stepped-care principles, in order to provide cost-effective treatment for insomnia. The lowest step is self-administered CBTi provided in, for example, books, brochures or the internet, while the upper step is individualized CBTi provided by certified sleep specialists. A self-help book will thus operate at the lowest step, as a low-threshold treatment option. Patients who do not improve should consult healthcare professionals, such as psychologists or GPs, for more individualized treatment. If this still does not lead to clinical improvement the patient should be referred to a sleep disorders specialist (Espie, 2009).

Our study has several strengths and limitations. One asset is that we employed a randomized controlled design comparing two active treatments. Other strengths are that the response rate was high and that the questionnaires are well validated. The use of intention-to-treat analyses improves the generalizability of the results. The generalizability is also strengthened by the fact that few participants were excluded based on inclusion and exclusion criteria. The choice of inclusion and exclusion criteria may, however, also be regarded as a limitation. We cannot rule out that patients with sleep problems that ideally require different kinds of treatment were included, such as patients with insomnia due to pain or other somatic complaints. Another limitation is the way patients were enrolled. It is likely that most patients were motivated to try non-pharmacological therapy, since the study sought participants for a study of written material. Patients who prefer sleep medications are therefore presumably less likely to participate. Another limitation is that we do not know for how long the treatment effects will persist.

## CONCLUSION

Sleep problems are common. Most patients who consult a doctor are offered drug therapy. There is a need for low-threshold treatment alternatives that are cheap and readily available. A self-help book satisfies such requirements. Our study showed that the self-help book improved sleep and reduced the number of drug users, and that the book was more effective than standard sleep hygiene advice.

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