

Psychological and Behavioral Treatments for Insomnia

Abstract: Insomnia, a costly public health problem, can be precipitated by multiple forms of stress. Sleep difficulties have many sources, some based in medical or mental health disorders and some based in other sleep disorders or in substance abuse. Primary insomnia, not accounted for by other health or sleep disorders, has been addressed by psychological and behavioral treatments, which offer remedies for the perpetuating factors that extend insomnia into chronic forms. Many people prefer not to rely on hypnotic medications as a permanent solution to insomnia. A report by the American Academy of Sleep Medicine (AASM) has identified several nonmedication-based interventions judged to be effective and recommended in the treatment of chronic primary insomnia. These include stimulus control, sleep restriction, relaxation training, cognitive behavior therapy, paradoxical intention, and biofeedback. Models of physiological, behavioral, cognitive, and metacognitive factors support these treatments and account for their effects.

PSYCHOLOGICAL AND BEHAVIORAL TREATMENT FOR INSOMNIA

CLINICAL CONTEXT

Insomnia, or difficulty initiating or maintaining sleep associated with daytime functional impairment, is a significant public health problem. The estimated prevalence of insomnia is 30% for people with at least one insomnia complaint and 5%–10% for people with specific insomnia disorders (1). It is defined broadly in the ICD-10 as nonorganic insomnia, but more specifically in ICSD-2 (2) and DSM-5. Those with primary insomnia report, variously, difficulty falling asleep, awakenings, which are sometimes prolonged during the sleep period, or early morning awakenings. Insomniacs report daytime impairments of functioning and preoccupation with sleep difficulties, often leading to self-defeating efforts to get more or better sleep. Impairments of function may be expressed in lapses of memory and attention, fatigue and irritability, accidents, increased alcohol consumption, absenteeism, and lowered mood and motivation.

Many roads lead to insomnia, and some roads lead on from it. Insomnia can be comorbid with medical or psychological pathologies, drug or other substance use/abuse, acute or chronic life stressors, poor sleep/wake

habits, circadian rhythm disturbances, or unknown factors. Some people report lifelong sleep difficulties; others can identify precipitating events from which sleep has never recovered. Insomnia may be both a feature of concurrent depression and a predictor of future depression as well as of future anxiety, substance use or dependence, and suicide (3). As many as 40% of insomnia sufferers may have comorbid psychiatric disorders (1).

TREATMENT STRATEGIES AND EVIDENCE

Psychological and behavioral treatments of insomnia, especially cognitive-behavioral treatment (CBT-I), have been effective for both primary insomnia and insomnia which is comorbid with other conditions (4). Although hypnotic medications are generally effective at inducing sleep and can reassure patients that sleep is achievable, many people are uneasy about relying on pills for sleep, being aware of the risks of tolerance, dependence and addiction.

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Dr. Byrne reports no competing interests.

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Table 1. Suggested Assessment Tools for Insomnia

Detailed information:

Insomnia Severity Index: a seven-item assessment of the patient's sleep difficulties on a Likert-type 5-point scale from 0 (no difficulty) to 4 (very severe difficulty) (14).

Pittsburgh Sleep Quality Index: a 24-item assessment requesting a description of the patient's usual sleep habits during the previous month. Most items request a response in terms of frequency, from "not during the past month" to "three or more times a week" (15).

Fatigue Severity Scale: a 9-item Likert-type 7-point scale of fatigue symptoms experienced in the previous week. Each item is rated from 1 (disagree) to 7 (agree) (16).

Dysfunctional Beliefs and Attitudes about Sleep (DBAS): 30- and 16-item versions are available (18, 19).

Beck Depression Inventory-II (BDI-II): a 21-item questionnaire regarding symptoms suggestive of depression experienced in the previous 2 weeks. Responses range from 0 to 3 (19).

Beck Anxiety Inventory (BAI): a 21-item questionnaire regarding symptoms suggestive of anxiety experienced in the previous 1 week. Items are rated "not at all," "mildly," "moderately," or "severely" true (20).

Sleep Diary or Log. Many forms can be found or adapted, based on the information desired. One form of the basic sleep log contains 14 rows of 24 boxes, each allowing for symbols indicating time in bed, rising time, and estimated time asleep for each of 14 days. Indications of medications taken or other information can be added. See also, The Consensus Sleep Diary (21), based on collaboration among experts who developed two versions of sleep diaries, each asking 8–10 questions about the previous night's sleep.

In studies of medication versus CBT-I for insomnia, CBT-I produced benefits comparable to medications during active treatment and more enduring benefits in follow-up months and even years (up to 2 years) later (5). Improvements in sleep through CBT-I also seem to have benefits for comorbid depression (6).

The Academy of Sleep Medicine Report of 2006 (4), which is based on peer-reviewed articles dating back to 1999, judged psychological and behavioral interventions to be "effective and recommended" in the treatment of chronic primary insomnia as well as of secondary (comorbid) insomnia. Specific therapies judged as effective and recommended included stimulus control therapy, sleep restriction, relaxation training, cognitive behavior therapy, and multicomponent therapy (without cognitive therapy), paradoxical intention, and biofeedback. The report also recommended that psychological and behavioral interventions be implemented for older adults and for chronic hypnotic users.

Models of Insomnia Supporting CBT-I.

Spielman and associates (7) proposed a behavioral model of insomnia based on notions of predisposing, precipitating, and perpetuating factors. Chronic insomnia may be the result of predisposing factors based in physiology and personality. Precipitating factors such as health, work, or family stressors interact with predisposing factors and result in sleep onset or maintenance problems. Ideally, the resolution of precipitating factors allows sleep to recover, but insomnia becomes chronic as a result of perpetuating factors, which can persist long after precipitating factors have resolved. Spielman et al. identified such perpetuating factors as irregular bedtimes and rising times, longer periods spent in bed,

worry about sleep and daytime deficits, conditioning that bonds being in bed with being wakeful, and ingestion of caffeine, alcohol, or hypnotics. These identified factors often represent attempted solutions to the problem of disturbed sleep, but since they worsen the problem they become the targets of cognitive and behavioral treatment strategies.

Harvey proposed a cognitive model of insomnia (8) emphasizing the insomnia sufferer's worry about poor sleep and its aftermaths. Focus on sleep as uncertain results in autonomic arousal and emotional distress. Attention is paid selectively to sleep threats, and "safety behaviors" express efforts to protect sleep from disturbing thoughts, feelings, or actions. These expressions of anxiety and misguided behaviors interfere both with sleep and daytime functioning. Harvey suggests that treatment for insomnia should aim to correct the patient's mistaken assumptions about sleep, to reduce their focus on threats to sleep and eliminate self-defeating safety behaviors. Thus, both daytime and nighttime factors need to be the targets of treatment.

Borbely's model of sleep paired daytime and nighttime factors in a two process model of sleep regulation (9). A homeostatic process increases sleep tendency as a function of hours spent awake, and it is offset by an arousal system which provokes alertness when the organism senses some risk. A circadian process originates in the superchiasmatic nucleus (SCN) of the hypothalamus, generating cycles of sleep and wake tendencies. The human sleep-wake cycle is slightly longer than 24-hour clock time, but it is repeatedly reset by regularities of light and darkness and by imposed schedules of daily activity. Mental and physical responses of the

Table 2. Getting a Better Night's Sleep

Tend to the sleep environment:

Make the bedroom as dark, comfortably cool, and quiet as possible. Eye shades can be helpful. Consider using a white noise device or some other background sound to help mask disturbing noises (external or internal).

Separate the sleeping environment from work, study, or worry activities. Hold disagreements and difficult conversations elsewhere.

If pain is a problem, consider using pillows, wedges, or a softer or harder mattress to support better sleeping posture and decrease pressure on sensitive body areas.

Tend to sleep-wake rhythms:

Make the hour or so before bedtime as calm and relaxing as possible. Settle down with a regular pre-bedtime routine. As much as possible, stay in dim light during this time.

Take a hot bath for 30 minutes within 2 hours of bedtime.

Do not go to bed either very hungry or very full. A carbohydrate snack or glass of milk at bedtime may help.

Work toward a regular bedtime, but do not go to bed until sleepy.

Get up at the same time every day, even if sleep was poor.

Move into bright light soon after arising.

If naps are taken, do so only during the middle of waking hours, not within 4 or 5 hours of rising or retiring.

Tend to health:

Avoid caffeine in the afternoon or evening. Better yet, avoid it altogether for 2 weeks and see if it makes a difference.

Exercise regularly, but avoid aerobic exercise close to bedtime.

Do not use alcohol as a sleep aid; after it clears the system, the second half of the night is likely to be restless.

Discuss sleep problems with physician, who can investigate possible causes such as pain, sleep apnea, leg movements, or the effects of medications.

Counteract Tension and Arousal:

Learn an approach to physical and mental relaxation that works for you. Practice it during the day, not just at bedtime.

Make lists of worries and things to do and leave them outside of the bedroom.

When settling down for the night, make a mental list of 20 things to be thankful for; start with "What's not wrong?"

If you cannot fall asleep within about 15 minutes, get out of bed and do some quiet activity in a dimly lit room until you feel sleepy again. Repeat as often as necessary. (The worst strategy is to keep trying harder to fall asleep.)

insomnia sufferer can interfere with both homeostatic and circadian processes. Excessive self-monitoring of sleep tendencies can trigger alertness via the arousal system, increasing sleep delay through anxiety leading to further alertness. Even normal sleepers sometimes report that they sleep restlessly when foreseeing the need for an earlier than usual rising time and worrying about oversleeping or losing sleep. Circadian regularity can be resistant to scheduling efforts, as in innate delayed sleep phase (night owl) or advanced sleep phase (morning lark) tendencies. It is also affected by such factors as weekday/weekend schedule changes, vacation schedules, and travel across multiple time zones.

Hyperarousal may characterize many insomnia sufferers not only as a result of struggles to sleep but also as a predisposing factor. A hyperarousal model of insomnia has been proposed, based on studies of multiple levels of physiological functioning operating in insomniacs during both daytime and nighttime (10).

A metacognitive model of insomnia has been proposed by Ong and colleagues (11), based on the ability of an individual to be aware of mental and

physical states associated with insomnia and then to learn to shift mental stances in the direction of balance and flexibility. The focus of treatment based on this model has elements in common with "third wave" approaches to behavior therapy (12) found in mindfulness-based cognitive therapy and dialectical behavior therapy. A metacognitive approach to insomnia treatment encourages the patient to consider alternative assumptions about sleep and to develop mindfulness and acceptance skills in the service of lessened arousal and increased balance. These approaches have not been strongly tested. If effective, they would help the patient allow sleepiness to develop naturally, neither seeking nor resisting sleep, and practice a calmer and more patient anticipation of sleep. Practices such as paradoxical intention (see below) might serve these aims.

Interventions. The first intervention in treatment of insomnia is an adequate initial assessment. Assessment should cover details of the patient's chief complaint and of current sleep/wake patterns, sleep history, medical history including previous treatments for sleep, self-help strategies already attempted, daily

Table 3. Examples of Various Beliefs about Sleep

Dysfunctional beliefs:

I will have a bad day tomorrow if I do not get a full night's sleep tonight.

If anything during the day upsets me, I'll never get to sleep that night.

I need to have unbroken nights of sleep to feel refreshed.

I should go to bed earlier so I can get more sleep.

I should sleep later whenever I can so I get caught up on sleep.

I never get the 8 hours of sleep I need.

Insomnia is ruining my health.

Positive cognitions:

I am learning what to do and not do to be a better sleeper.

Even good sleepers often wake up during the night.

Even with sleep difficulty, I usually function well the next day.

I am probably underestimating the amount of sleep I am getting.

I am probably overestimating the amount of sleep I need.

It is better to go relax in the living room until I am sleepy than toss and turn in bed.

Learning to relax during the day can help me relax better at night.

health habits, personal, family, and social history, desired goals of treatment, mental status observations and diagnostic impressions. In many cases, bed partners can also be usefully included in assessment and treatment (13). The clinician's interest in the details of the patient's sleep story and the implied message that help will be provided are subtle but important benefits of this first intervention. Patients' completions of questionnaires are helpful both for initial assessment and in prepost assessments (see Table 1). This article assumes that a medical screening for sleep-related respiratory irregularities, periodic leg movements, seizures, and electroencephalogram (EEG) anomalies has been carried out, supported by nocturnal polysomnography when indicated. Clinicians who are the first to assess an insomnia patient's complaints should be attentive to signs that a more specialized medical assessment may be called for.

Cognitive Strategies of CBT-I. Hauri and Linde (22) have recommended that the insomnia sufferers be engaged in becoming their own sleep therapists. This implies that patients be encouraged to recognize and describe their own sleep story and learn sleep facts and myths. Useful topics include the stages of sleep, circadian rhythms, sleep requirements and differences among individuals, impacts

of daytime life on sleep, and the possible effects of poor sleep on health. A review of sleep hygiene can be a useful vehicle for this education, especially if rationales for sleep hygiene directives are discussed (see Table 2). Dysfunctional beliefs about sleep should be identified and corrected. Dysfunctional Beliefs and Attitudes about Sleep forms, consisting of 30- and 16-items, have been developed (17, 18) to help both patient and therapist identify catastrophizing self-talk or mistaken viewpoints, which lead to self-defeating actions. For instance, those convinced that getting enough sleep on a daily basis is the most important value may disrupt their sleep-wake rhythms by spending hours of extra time in bed. Jacobs (23) recommends the acknowledgment and practice of positive sleep thoughts. These can be formulated and reinforced depending on a patient's individual difficulties and perspectives (see Table 3). Books written by sleep experts for the lay reader can help patients diagnose their own sleep problems and develop better sleep/wake habits (22, 23).

PARADOXICAL INTENTION

The cognitive strategy of paradoxical intention is a strategy considered effective and is recommended by the Academy of Sleep Medicine (4) for chronic difficulty initiating sleep. Its aim is to reduce performance anxiety and allow sleep to come involuntarily, as it must. The directions for applying a paradoxical intention guide the patient to view as absurd catastrophizing images of the results of sleep loss and to accept and welcome wakefulness at night, using nonsleep times for useful or enjoyable activities, or, alternatively, to lie in bed in darkness, keeping the eyes open and intending to stay awake until sleep comes naturally (5). The method of paradoxical intention is related to the metacognitive model of acceptance and mindfulness (11). A patient complaining of insomnia following retirement was frustrated that a sleep expert could not offer a quick sure cure but hinted to him that he was too focused on sleep difficulties. He discovered that he began to sleep well after formulating his own paradoxical intention: "To hell with whether I go to sleep or not."

BEHAVIORAL STRATEGIES OF CBT-I

Stimulus Control Treatment. The most thoroughly studied behavioral strategy of CBT-I is Bootzin's Stimulus Control Treatment (SCT) (24). This strategy aims to overcome the conditioned arousal, which besets many insomniacs upon retiring to bed, i.e., "I'm tired, I'm sleepy, I can't wait to get in bed, and then I get into bed and it's show time!" SCT helps the patient re-establish an automatic

Table 4. Stimulus Control Strategy: Directions For Patients

Application: Difficulty initiating sleep, especially when this is presumed to arise from a conditioned response of increased alertness upon retiring to bed.

1. Establish a rising time, set an alarm, and be prepared to get up promptly, regardless of the amount or quality of sleep you have gotten.
2. Go to bed at night only when sleepy.
3. If you are still awake after 15 minutes, get out of bed. Do something quiet without the aid of computer, phone, or other electronics. You might read, draw, play solitaire (not on computer), listen to music, meditate, or do something else minimally stimulating. Stay in dim rather than bright light.
4. Go back to bed only when you are sleepy again. If still awake in 15 minutes, repeat Step 3. Do so as often as necessary. Do not sleep past your planned rising time.
5. Persist in this practice in subsequent nights, and do not take daytime naps. Use the bed only for sleep or sex.

This is a well-researched strategy designed to help your mind/body relearn how to fall asleep quickly once you are in bed. Initially, difficult nights will lead to daytime fatigue and sleepiness, but this will help you fall sleep more quickly the next night.

connection between the bed/bedroom/bedtime and falling asleep. As with many strategies of behavior change, it can be a challenging commitment. Bedroom activities other than sleep are avoided: no more television, computer work or play, phone calls, eating, or schedule planning; sexual activity is the only exception. If the patient is not asleep within 10 minutes of bedtime and lights out, he/shen leaves the bedroom. Some recent versions of these instructions recommend a 15 or 20-minute wait before getting up (see Table 4 for instructions to the patient). The reward for those who persist in SCT is gradually shorter sleep latency and increased confidence about falling asleep easily and automatically.

Sleep Restriction Treatment. For patients whose sleep is broken by awakenings, Spielman and colleagues proposed a restriction of time in bed (25). This

approach has become standard for sleep maintenance difficulties. Sleep restrictions work by initially reducing sleep time thereby increasing sleep drive. The regular timing of sleep reinforces a more consistent sleep-wake cycle. Psychologically, efforts to get to sleep or stay asleep are replaced by efforts to stay awake until the prescribed bedtime. Patients who have been wakeful in bed until 2:00 or 3:00 a.m. begin to struggle to stay up until 12:00 or 1:00 a.m. As in other behavioral treatments, a plausible theory or analogy for sleep restriction will support the patient's adherence to the sleep schedule. For instance, the patient imagines that sleep is like a river. Bedtime can be seen as similar to one bank of a river and rising time is the opposite bank. Banks that are far apart result in shallows and sand bars of wakefulness; drawing banks closer together

Table 5. Sleep Restriction Strategy: Directions for Sleep Specialist

Application: Difficulty maintaining sound sleep; multiple awakenings, some of which may be prolonged. Wakefulness upon getting into bed or before rising time also may be part of the pattern.

1. Based on patient's sleep logs, calculate average nightly total sleep time for past 2 weeks. This average dictates the number of hours that your patient will spend in bed each night. Do not restrict time in bed to less than 5 1/2 hours, however, and be even less restrictive if safety is a concern.
2. Plan with your patient the rising time to be followed. Counting back from that, derive the prescribed bedtime. Daytime naps are not permitted. This schedule should be followed 7 days a week.
3. Let your patient know that daytime fatigue and sleepiness will be normal and, combined with limited hours in bed, will increase the likelihood of sleep being more sound. Advise caution about driving or other risky activities during this period of sleep restriction.
4. Recommend that your patient phone in each day the previous night's hours spent in bed and total hours of sleep. Calculate the nightly "sleep efficiency score," or the percentage of time in bed when he/she was asleep. (Hours of sleep divided by hours in bed \times 100. For example, 5 hours sleep/8 hours in bed \times 100 = 62.5% sleep efficiency.) Some patients are likely to be willing and motivated to do this calculation and report it to you on a weekly basis.
5. On a weekly basis, calculate average sleep efficiencies for the previous week. When average sleep efficiency is $>90\%$, more sleep is allowed by setting bedtime 15 minutes earlier. When this average is $<85\%$, bedtime is set 15 minutes later. Total time in bed should not be reduced below 5 hours.
6. Aim at consistent weekly sleep efficiencies at 85% or above, with good daytime alertness. Advise the patient to maintain the sleep schedule, avoiding extended times in bed, and call you about difficulties with these instructions.

Table 6. Resources for Better Sleep

Books:

Hauri and Linde (22). Also issued in a workbook format.

Jacobs (23)

Espie (27)

Benson (26)

Bharati (28). This is a form of yoga that involves no physical movement, only awareness of parts of the body. Many people find it very relaxing. Other versions in book and CD forms are available by different authors.

Websites:

Naparstek (29)

This website has many other audio resources for mental and physical health, meditation, stress management, and sleep for children and adults.

Ortiz (30)

CDs:

www.headspace.com (31) teaches a mindfulness approach to meditation gradually, beginning with 10 free 10-minute meditations guided by Andy Puddicombe. For modest fees, interested persons can sign on for more extended guided meditations.

(i.e., shorter times in bed) results in a deeper flow of sleep (see Table 5 for instructions to the sleep specialist).

Relaxation Training. When asked how they relax, many insomnia patients will list sedentary or active pastimes. Relaxation in the sense used by Benson (26) as “a physiologic state of quietude,” may not be experienced in these activities. Based on his study of practices of transcendental meditation (TM), Benson recommends for multiple health benefits the practice of four basic elements: a quiet environment, a comfortable (usually sitting) position, an object or word to dwell on, and a passive attitude. Practice periods of at least 20 minutes are ideal, and the practitioner’s patient acceptance of distractions is essential.

Given the anxiety that insomnia sufferers usually bring to bed, relaxation is best practiced earlier in the day or evening. Because time spent in the relaxation response can feel like doing nothing or wasting time, insomnia sufferers often need support to try out (including in the provider’s office) strategies of quieting and relaxation. A self-imposed “clearing” of the mind is usually unachievable and frustrating to strive for, but having nothing much on the mind can be an irresistible invitation for drowsiness.

Resources for relaxation training abound in print and in digital formats (see Table 6 for a sampling).

Biofeedback. Biofeedback training, an operant conditioning strategy, could be seen as bridging

cognitive and behavioral approaches to insomnia treatment. Given information from instruments monitoring physiological processes that are usually out of awareness, motivated patients learn by trial and error to exercise some control in these areas. The aims of biofeedback commonly have been to reduce stress and induce relaxation, a benefit among insomniacs who are tense at bedtime. Biofeedback instruments can singly or in combination monitor muscle activity, finger temperature, skin conductance, and heart rate. Neurofeedback, which is a more recent development, monitors cortical arousal measured by electroencephalography (EEG). People with insomnia have shown higher cortical arousal during waking and sleeping times, and neurofeedback has shown promise for affecting waking as well as sleeping EEG (32).

RECENT DEVELOPMENTS

Computerized CBT-I. Despite its effectiveness, trained providers of CBT-I for insomnia sufferers appear to be limited and the geographical distribution of sleep experts is uneven. Cheng and Dizon (33) reported a review and meta-analysis of randomized control trials (RCTs) of computerized CBT-I treatment (CCBT-I), which took place in several countries. They report on six studies that met selection criteria; three studies were from the United States and one each from Canada, Sweden, and Japan. The studies involved 433 participants, and overall adherence rate was 78%. It was concluded that CCBT-I is a mildly/moderately effective self-help treatment for persistent insomnia.

The American RCT tested a fully automated CCBT-I, Sleep Healthy Using the Internet program (SHUTi), which incorporates behavioral, educational, and cognitive techniques (34). Twenty-two Internet participants were compared on outcomes to 22 control subjects. Sleep diary data showed significant improvement among the Internet group in sleep efficiency, wake after sleep onset, and number of nighttime awakenings. The study’s authors acknowledged some limitations of the study, such as their sample being small and without comorbidities and all data being based on self-report, but they concluded that an Internet-based program can provide effective delivery of CBT for insomnia.

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- ## NOTES

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