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Cognitive Behavioral Therapy for Insomnia (CBT-I): A Primer

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Abstract

Cognitive Behavioral Therapy for Insomnia (CBT-I) is a multi-component treatment for insomnia that targets difficulties with initiating and/or maintaining sleep and is delivered over the course of six to eight sessions. The primary focus of CBT-I is to address the perpetuating factors (according to the three-factor model of insomnia) that contribute to the development of chronic insomnia. Chronic insomnia is the most prevalent sleep disorder, occurring in approximately 6–10% of the population, and is a risk factor for multiple medical and psychiatric disorders. Despite its prevalence and morbidity, the widespread dissemination of CBT-I is not commensurate with insomnia's overall public health impact. This is particularly surprising given its large evidence base and recent recommendation as the first line intervention for insomnia. The primary goal of this article is to provide a primer or brief introduction to CBT-I that is intended to be accessible to all clinicians and researchers, including non-sleep experts. Core components of CBT-I (i.e., Sleep Restriction Therapy, Stimulus Control Therapy, Sleep Hygiene, and Cognitive Therapy), relapse prevention strategies, multicultural considerations, adjuvants to traditional interventions, treatment adherence issues, efficacy, and further training options are described. A session-by-session outline is also provided.

Keywords

Cognitive Behavioral Therapy for Insomnia; insomnia; sleep restriction; cognitive therapy

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According to the three-factor (3P) model of insomnia, there are three primary factors that contribute to the development of chronic insomnia: (1) *predisposing* factors — traits or conditions (e.g., high emotional reactivity) that increase one's vulnerability to developing insomnia; (2) *precipitating* factors — situational conditions (e.g., stressful life events) that trigger the onset of insomnia; and (3) *perpetuating* factors — behaviors and cognitions that contribute to the transition from acute to chronic insomnia and maintain the disorder long term [36].

One noteworthy aspect of this model is that insomnia can be maintained long after the life stressor or precipitating event has resolved. This is thought to be the case because other factors serve to perpetuate insomnia over time (e.g., going to bed earlier to compensate for sleep loss, worrying about daytime functioning). In the context of Cognitive Behavioral Therapy for Insomnia (CBT-I), it is these perpetuating factors that are the primary focus of treatment [22; 24; 28]. Please note that while sleep problems and symptoms of insomnia are common in children and adolescents, the present paper focuses on the application of CBT-I in adult populations. For more information related to behavioral interventions for pediatric insomnia, please refer to a prior review and meta-analysis [18].

What is CBT-I?

CBT-I is a multi-component treatment for insomnia that targets difficulties with initiating and/or maintaining sleep. Standard treatment is delivered over the course of six to eight sessions (session length may vary between 30 and 90 minutes). Each session typically has a specific agenda (e.g., evaluation, rationale, delivery of individual interventions, adherence management, relapse prevention, etc.). Sessions most often occur in person or via telehealth on a weekly or bi-weekly schedule and can be delivered in either individual or group format. Please refer to the Appendix for a list of treatment manuals that are currently available.

This intervention is typically comprised of two core components: Sleep Restriction Therapy (SRT) and Stimulus Control Therapy (SCT); and two adjunctive components: Sleep Hygiene (SH) and Cognitive Therapy (CT). Most treatment protocols and published manuals [6; 17; 22; 31] deliver SRT and SCT as complementary therapies. SRT's primary indication is to increase homeostatic sleep drive (or the propensity to fall asleep) and to allow for consolidated sleep. SCT's primary indication is to manage nocturnal wakefulness via behavioral modification. Even in the absence of traditional cognitive therapy exercises (e.g., debunking dysfunctional beliefs and addressing catastrophization), SRT and SCT still include cognitive work via the therapist's explanations and efforts to garner adherence to the prescriptive aspects of therapy. The art of CBT-I pertains to how successful the therapist is at garnering patient "buy-in." This aspect of learning CBT-I is so central to the process that some treatment manuals provide therapist/patient example dialogues.

Core Treatment Components

Sleep Restriction Therapy (SRT).

SRT is based on the notion that the most important perpetuating factor for chronic insomnia is sleep extension [37]. Sleep extension is the tendency for individuals to compensate for

“lost” sleep by increasing their time in bed (e.g., going to bed earlier, sleeping in later, or napping). A consequence of sleep extension, however, is the mismatch between sleep ability (i.e., how much time the person actually sleeps) and sleep opportunity (i.e., how much time the patient spends in bed). The primary goal of SRT is to address this mismatch by limiting sleep opportunity to the person’s average sleep ability. SRT is effective because it increases the homeostatic sleep drive and consequently reduces the time it takes to fall asleep or the amount of time spent awake at night. According to the original formulation, SRT can be completed using the following steps: (1) determine the patient’s baseline sleep ability in terms of average sleep duration (as assessed with daily sleep diaries gathered over a period of two weeks), (2) set the patient’s prescribed time in bed (PTIB, i.e., the patient’s “sleep window”) equal to their average sleep duration during the baseline period, (3) determine a morning rise time that the patient can closely adhere to on a daily basis, given their work schedule or other life style constraints, and (4) set the prescribed time to bed (PTTB) by subtracting PTIB from the desired wakeup time (e.g., if PTIB is 6 hours and rise time is set to 7:00 a.m., than PTTB equals 1:00 a.m.). This sleep schedule is maintained or altered based upon how consolidated the patient’s sleep is. For example, if the patient’s sleep efficiency (SE%; the percent of time in bed spent actually sleeping) is less than 85%, PTIB is reduced by 15 minutes. If SE% is between 85% and 90%, PTIB remains as prescribed. If SE% is greater than 90%, PTIB is increased by 15 minutes. Adjustments to the sleep schedule or PTTB are completed each week after reviewing the patient’s sleep diary from the previous week.

Stimulus Control Therapy (SCT).

SCT is based on behavioral principles and the idea that one stimulus may lead to a variety of responses, depending on the conditioning history [2]. In good sleepers, the stimuli typically associated with sleep (e.g., bed, bedroom, etc.) are paired with and subsequently elicit the response of sleep. In patients with insomnia, these same sleep-related stimuli become paired with other activities, such as reading, watching television, and lying awake in bed while *trying* to sleep (also known as sleep “effort”). Engaging in these other behaviors while in bed contributes to a maladaptive conditioning pattern (or stimulus dyscontrol) and, therefore, reduces the probability that sleep will occur when and where the patient wants. Most importantly, these other behaviors strengthen the association between one’s bed and wakefulness (i.e., the bed and the bedroom become cues for wakefulness). Stimulus control recommendations are as follows: (a) lie down to sleep only when sleepy, (b) avoid using the bed for activities other than sleep or sex, (c) get out of bed if unable to sleep within 15–20 min and return to bed only when sleepy, (d) repeat this pattern throughout the night as necessary, (e) get up at the same time every day, and (f) avoid napping throughout the day [30]. These recommendations form the basis for the development of good sleeping habits and are to be observed even after remission is achieved.

Sleep Hygiene (SH).

Educating patients about SH promotes better sleep practices by providing information about behaviors that influence sleep [24]. Although it shows only minimal treatment effects when used as a stand-alone intervention [7; 11], SH is considered a necessary part of CBT-I [23]. SH usually includes a one-page handout that outlines various lifestyle and environmental

factors that can be modified to decrease the risk of experiencing a sleepless night (e.g., limiting caffeine and alcohol use before bedtime, napping, creating a comfortable sleeping environment, and exercising regularly). SH is thought to be most helpful when tailored to the patient's own sleep/wake behaviors.

Cognitive Therapy (CT).

The primary goal of CT is to help patients develop realistic sleep expectations by (1) identifying dysfunctional thoughts about sleep that perpetuate insomnia or contribute to pre-sleep arousal, (2) examining these thoughts for accuracy, and, if necessary, (3) modifying them to be more rational and/or realistic [24]. Research on the influence of dysfunctional beliefs about sleep, attentional biases, and pre-sleep cognitions highlights cognitive restructuring as an increasingly important component of CBT-I [8]. CBT-I follows the traditional cognitive therapy approach by identifying maladaptive sleep-related cognitions and the resulting emotional reactions using thought records. The patient is then instructed to describe the situation that produced the thought, the content of the thought, the emotional reaction, and its intensity in detail. These beliefs are evaluated with cognitive restructuring techniques including, but not limited to, disputation of dysfunctional beliefs and decatastrophization, and replacing them with more adaptive sleep-promoting thoughts [22]. The patient is instructed to apply their revised thought to the situation and notes the change in emotion. These cognitive therapy techniques allow the patient to go through a process of guided discovery to realize that their beliefs may not be accurate or helpful, which in turn helps them to better manage their problematic sleep beliefs and cognitive responses.

Session-by-Session Outline

CBT-I typically begins with a 60–90-minute pre-treatment session, during which the therapist collects clinical information from the patient regarding the presenting sleep concerns, relevant sleep, and psychiatric history, relevant social and medical history, baseline symptom measurement (via self-report measures such as the Insomnia Severity Index (ISI) and a retrospective sleep diary). The primary goal of this initial session is for the therapist to develop diagnostic impressions and determine whether CBT-I is appropriate. If the therapist determines that CBT-I is warranted, an overview of insomnia, CBT-I, the format of treatment sessions, and orientation to the daily sleep diary is also provided during this initial session. Following Session 1, baseline sleep data is collected for 1–2 weeks using a daily sleep diary (while various versions exist, a consensus sleep diary was published in 2012 [3]). The remaining CBT-I sessions are typically 30–60 minutes and follow the structure outlined in Table 1.

Relapse Prevention

Prior to treatment termination, relapse prevention strategies are discussed. The patient is instructed on strategies to maintain healthy sleep patterns and how to self-administer treatment should they experience future sleep continuity problems. During this final session, the therapist discusses how to maintain the gains the patient has made in treatment and help them to identify the key strategies to manage their insomnia on their own. This typically

includes a review of the strategies that were discussed during SRT and SCT, such as the 3P Model of Insomnia, the importance of maintaining a consistent sleep schedule, and what to do when you experience a bout of acute insomnia (and how to stay mindful of factors or events that may potentially trigger these future episodes of insomnia).

Multicultural Considerations

While the effects of insomnia can be significant for all, some research suggests that insomnia disproportionately affects those who are already socially and/or economically disadvantaged, including racial/ethnic minorities [4; 5; 9; 10; 32]. That is, cultural/racial factors may influence the likelihood that someone will (1) develop insomnia, (2) identify sleeplessness as a problem, and (3) seek out or utilize medical or psychological interventions for sleep-related concerns. For example, racial minorities are disproportionately represented in lower income populations [33]. Socioeconomically disadvantaged individuals are therefore more likely to engage in behaviors that precipitate or perpetuate sleep continuity disturbance, such as having less consistent work/life schedules (e.g., greater proportion of people working rotating or night shifts), limited access to regular or comfortable sleeping conditions, or increased stress [1]. Moreover, some research supports that racial and ethnic minorities are less likely to seek treatment for their sleep difficulties. Studies have found cultural differences in what is considered a sleep “problem” [4; 16]. Therefore, it may be the case that individuals from certain cultural groups are more likely to minimize the presence of insomnia symptoms [14] or use cognitive appraisal strategies that minimize the functional impact of sleep/insomnia on their life [13].

These are important multicultural considerations that may limit the acceptability of interventions such as CBT-I and thus should be the focus of future research efforts (e.g., how to adapt behavioral interventions to different racial/ethnic groups).

Adjuvants to Traditional Interventions

In addition to the key components of CBT-I, additional interventions, such as nighttime grounding/relaxation, deep breathing, progressive muscle relaxation, or mindfulness meditation, may be beneficial components as well. For example, one of the most influential changes to CBT-I was the adoption of mindfulness training. Mindfulness was first introduced in the context of insomnia to address sleep-related cognitive arousal [26]. The approach differs from traditional cognitive therapy in that it is not focused on disputing, derailing, or disengaging worry or intrusive negative thoughts. Instead, mindfulness is focused on the non-judgmental observation of one’s cognitions, with the desired goal of changing one’s relationship with their thoughts as opposed to fighting with them. In this way, the process encourages more acceptance.

Treatment Adherence Issues

Lack of treatment response can often be explained by participant non-adherence. Even if adherence does not appear to be an issue when referencing the sleep diary, the clinician should question each aspect of the regimen. If an aspect of non-adherence is identified, the

clinician may ask questions to determine reasons for non-adherence, review the basis for the behavioral prescription, and generate solutions with the participant to promote better adherence. The most common adherence problems include: not completing sleep diaries, not adhering to the prescribed bedtime and wake time, not getting out of bed during the night when unable to sleep, not staying out of bed long enough during the night for sufficient sleepiness to build, and napping. During this assessment, the clinician should avoid patronizing or scolding the participant for non-adherence, as this may worsen the problem. The participant should feel like a collaborator in this process. General approaches to the most common issues with adherence are outlined in Table 2.

Efficacy of CBT-I

While a complete review of CBT-I's overall efficacy is beyond the scope of the present paper, the evidence is clear: CBT-I works. According to meta-analytic estimates, the average treatment effect sizes range from 1.0–1.2, which corresponds to approximately a 50% post-treatment reduction in individual insomnia symptoms [21; 35; 38]. These treatment effect sizes are even greater when overall insomnia severity (e.g., as assessed by the ISI) is assessed [38]. Just as importantly, the effects of CBT-I are stable over time (i.e., clinical gains can be maintained for up to 24 months post-treatment [23; 25]). Finally, one study showed that CBT-I could even be effective in treating insomnia among “real world” patients (i.e., those with comorbid medical and behavioral disorders) [27]. Please also refer to the Appendix for a more complete list of recommended readings related to the evidence for and efficacy of CBT-I.

Conclusion and Further Training

There is an overwhelming preponderance of evidence that CBT-I is an efficacious treatment for chronic insomnia [15; 38]. Specifically, the literature supports that it is as effective in treating insomnia symptoms as sedative-hypnotics during acute treatment (4–8 weeks [12; 15; 29]) and is more effective than sedative-hypnotics in the long term (e.g., 3+ months following treatment) [19; 20]. For these and other reasons, the American College of Physicians has recently recommended that CBT-I be considered the first line treatment for chronic insomnia [34]. The issue that emerges from this is how to make CBT-I available. Some recommendations include: (1) having clinicians assess for insomnia; (2) educating clinicians that the first-line therapy for chronic insomnia is CBT-I; (3) routinely referring patients to insomnia treatment and allowing clinicians to decide whether to make CBT-I available in their practice or to refer patients to an outside CBT-I provider. In the case of the former, one could either hire a CBT-I specialist or learn to deliver CBT-I within their own practice. One way to accomplish this would be to buy a treatment manual and read it. While that's an excellent place to begin (and it will make the clinician a more informed consumer of CBT-I), practicing or using this intervention in one's practice will be more successful if clinicians engage in a more rigorous training regimen; one that includes CE courses, observation, and supervision/peer consultation. Resources for such educational activities can be found via any of the major CBT-I training programs (i.e., University of Pennsylvania [Perlis/Posner], Oxford University [Espie/Simon], Ryerson University [Carney], University of Arizona [Grandner/Taylor], or the VA [Manber]).

Such educational opportunities may help enrich even the most experienced clinician's foundational knowledge of the principles and practice of CBT-I. At the end of the day, the prescriptive components of CBT-I are straightforward, but garnering patient adherence is a high art form. If the clinician elects to refer for CBT-I, this can be done in at least one of three ways: (1) prescribe CBT-I as a digital therapeutic (e.g., Somryst, Pear therapeutics); (2) recommend the patient use an online (unattended) internet-based CBT-I (e.g., Sleepio; SHUTi); and (3) refer to behavioral sleep medicine specialists via the use of provider directories (<https://www.behavioralsleep.org/index.php/united-states-sbsm-members> or https://www.med.upenn.edu/cbti/provder_directory.html).

APPENDIX

List of CBT-I treatment manuals and other recommended articles that review the theory and evidence for CBT-I

Manuals and Guides

Edinger, J.D., & Carney, C.E. (2014). *Overcoming insomnia: A cognitive-behavioral therapy approach, therapist guide*. Oxford University Press

Manber, R., & Carney, C.E. (2015). *Treatment plans and interventions for insomnia: A case formulation approach*. Guilford Publications

Morin, C.M., & Espie, C.A. (2007). *Insomnia: A clinical guide to assessment and treatment*. Springer Science & Business Media

Perlis, M.L., Aloia, M., & Kuhn, B.R. (2010). *Behavioral treatments for sleep disorders: A comprehensive primer of behavioral sleep medicine interventions*. Elsevier Science

Perlis, M.L., Jungquist, C., Smith, M.T., & Posner, D. (2006). *Cognitive behavioral treatment of insomnia: A session-by-session guide*. Springer Science & Business Media

Theory and Evidence

Irwin, M.R., Cole, J.C., & Nicassio, P.M. (2006). Comparative meta-analysis of behavioral interventions for insomnia and their efficacy in middle-aged adults and in older adults 55+ years of age. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, vol. 25(1), pp. 3–14. DOI: [10.1037/0278-6133.25.1.3](https://doi.org/10.1037/0278-6133.25.1.3)

Morin, C.M., & Benca, R. (2012). Chronic insomnia. *Lancet (London, England)*, 379(9821), pp. 1129–1141. DOI: [10.1016/S0140-6736\(11\)60750-2](https://doi.org/10.1016/S0140-6736(11)60750-2)

Smith, M.T., Perlis, M.L., Park, A., Smith, M.S., Pennington, J., Giles, D.E., & Buysse, D.J. (2002). Comparative meta-analysis of pharmacotherapy and behavior therapy for persistent insomnia. *The American Journal of Psychiatry*, vol. 159(1), pp. 5–11. DOI: [10.1176/appi.ajp.159.1.5](https://doi.org/10.1176/appi.ajp.159.1.5)

Spielman, A.J., Saskin, P., & Thorpy, M.J. (1987). Treatment of chronic insomnia by restriction of time in bed. *Sleep*, vol. 10(1), pp. 45–56. URL: <https://pubmed.ncbi.nlm.nih.gov/3563247/>

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van Straten, A., van der Zweerde, T., Kleiboer, A., Cuijpers, P., Morin, C.M., & Lancee, J. (2018). Cognitive and behavioral therapies in the treatment of insomnia: A meta-analysis. *Sleep Medicine Reviews*, vol. 38, pp. 3–16. DOI: [10.1016/j.smr.2017.02.001](https://doi.org/10.1016/j.smr.2017.02.001)

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Table 1

Session-by-session outline

Session #	Session focus	Session tasks
1	Assessment and introduction to CBT-I	<ul style="list-style-type: none"> • Determine patient's presenting complaint(s) and comorbid conditions • Administer assessment battery • Administer instructions on how to complete the sleep diary
2	Introduce SRT and SCT	<ul style="list-style-type: none"> • Review sleep diary • Introduce 3P Model of Insomnia (mismatch between sleep ability and opportunity) • Introduce sleep restriction and stimulus control • Set sleep prescription (PTIB)
3	Sleep hygiene	<ul style="list-style-type: none"> • Review sleep diary • Identify problems and devise strategies to enhance adherence to new sleep schedule • Introduce sleep hygiene
4	Cognitive therapy	<ul style="list-style-type: none"> • Review sleep diary • Identify problems and devise strategies to enhance adherence • Introduce cognitive therapy rationale
5-7	Continue cognitive therapy and adherence management	<ul style="list-style-type: none"> • Review sleep diary and make appropriate adjustment to PTIB (if treatment gains have been met (SE>90% and sleep duration is adequate, proceed to Session 8) • Identify problems and devise strategies to enhance adherence • Review status of sleep hygiene changes • Continue cognitive therapy as needed
8	Relapse prevention	<ul style="list-style-type: none"> • Review sleep diary and treatment progress • Discuss relapse prevention • Summarize final recommendations and confirm 3-month follow-up

Note. Adopted from Perlis et al. [28] — Cognitive behavioral treatment of insomnia: A session-by-session guide.

Table 2

Strategies for managing adherence issues

Adherence Issue	General Strategy
Concerns about restricting sleep schedule	Patients often express dissatisfaction with their usual amount of sleep and are therefore inclined to spend extra time in bed to get any more sleep or at least to rest. Help them see that this strategy hasn't been working for them and that it is only likely exacerbating the problem. Explain to them that by learning that they can sleep solidly, their anxieties about sleep will reduce, and their schedule will begin to repair itself. Also, remind them that as they begin to sleep solidly, they will be able to gradually increase their time in bed and maintain efficiency, so this restriction is short-term and not a lifetime sentence.
Difficulty getting out of bed at the prescribed rise time	It is important to encourage patients to set an alarm even if they normally do not. They should also inform their bed partner of their required wake time and solicit their assistance in helping them to get out of bed. Other useful strategies include having participants place the alarm clock at a distance from them, so they are forced to get out of bed to turn it off and scheduling morning activities with other people. It is also important to reiterate the rationale for consistent wake times to regulate the circadian clock.
Falling asleep before their prescribed bedtime	Often the prescribed bedtime is later than the patient's habitual bedtime, and they may spend the last few hours before bed alone and engaged in a quiet activity, making them vulnerable to falling asleep. The patient should be encouraged to schedule social activities, both inside and outside the house, and to spend later evening hours doing something active rather than passive. You can reassure the patient that getting too "wound up" is less problematic than falling asleep before their prescribed bedtime.
Failure to observe the 15–20 minute "rule"	Patients often instinctively want to remain in bed to stay under the warmth of their covers, to avoid "waking themselves up," or at least "to rest." Getting up may also represent failure or cause worry that it could disturb others. Encourage them to expect to be up and so to make a specific plan about what they will do (e.g., leave the heat and light on in the living room, set out a book). The more specific the plan, the greater the likelihood the patient will follow through during the night.
Napping during the daytime	Patients may nap during the daytime or after work to deal with the daytime sleepiness associated with restricting their sleep. It is important to reiterate the rationale for avoiding daytime napping by framing it in terms of building the drive for sleep and not spending or depleting that drive at any time other than at night when they want to sleep. It is also helpful to schedule alternative activities during that time to avoid the urge to nap. They should also view daytime sleepiness as an indication that the behavioral strategies are successfully increasing their sleep drive.
Lapsing from the assigned schedule, especially on weekends	Patients should be encouraged to avoid exceptions to their sleep schedule during treatment. Reiterate the rationale for regularity and consistency and emphasize that it will shorten their treatment if they are consistent. Help them to generate morning activities to get them out of bed at the appropriate time. It can be emphasized that to fall asleep earlier, or sleep in later, will spend down sleep drive thus, making the next several nights more prone to problems.
Desire to make rapid adjustments to the restricted sleep schedule	Patients will often ask to make significant increases to TIB early in the therapy, especially if they notice increases in their SE early on. Empathize with this desire but emphasize that it takes time to restore the biological clock to a consistent rhythm. It can also be useful to draw a distinction between how long they have had insomnia and how quickly they have made positive changes to highlight that this is a longstanding issue that requires changing, which is likely to take some time. Note that adjustments are permissible when the patient meets the SE 85% criterion.

Note. Adopted from Perlis et al. [28] – Cognitive behavioral treatment of insomnia: A session-by-session guide.