



## Perspective

# Perspectives on increasing the impact and reach of CBT-I

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### Abstract

Cognitive behavioral therapy for insomnia is now recognized as the front-line treatment for chronic insomnia, yet many challenges remain in improving its impact and reach. This manuscript describes our perspective on some of these challenges. Based on the literature that maladaptive cognitions predict low adherence and that high levels of cognitive-emotional hyperarousal may be associated with poor outcomes, we propose added focus on cognitive therapy strategies in CBT-I. Specifically, we propose broadening the range of traditional cognitive therapy strategies, utilizing acceptance-based strategies, and fuller integration of the broadened range of cognitive strategies into CBT-I throughout the course of treatment. We also highlight a few other promising emerging approaches to enhance the impact of CBT-I. These include involving partners to promote adherence with CBT-I treatment recommendations, using culturally relevant treatment adaptations to increase retention of patients in treatment, and using strategies for timely identification of barriers to engagement. We propose broadening the public health impact of CBT-I by integrating support for reduction in long-term use of hypnotic sleep medications, which is in line with current medical guidelines. We advocate for a case conceptualization-based approach for implementing CBT-I in a patient-centered manner, flexibly, yet with fidelity, to enhance its impact by addressing the factors above. For increasing the reach of CBT-I, we discuss the need to train more clinicians and ways to combine therapist and digital deliveries of CBT-I, highlighting stepped care strategies.

### Introduction

Empirical support for cognitive behavioral therapy for insomnia (CBT-I) as a multi-component non-pharmacologic treatment emerged in the 1990s [1, 2]. In the past decade, it has been identified as the front-line treatment for chronic insomnia disorder by multiple major medical and scientific organizations, including the American Academy of Sleep Medicine and the American College of Physicians, among others [3, 4]. CBT-I protocols have been tested and shown to be effective across a wide variety of medical and psychiatric comorbidities, different life circumstances (e.g. pregnancy and menopause), and when incorporating cultural factors [5–7]. Nonetheless, many challenges remain for improving the impact and reach of CBT-I. We discuss here our perspective on a few of these challenges to impact and reach and suggest strategies for addressing them.

### Strategies for Increasing the Impact of CBT-I

#### Improving adherence

There is evidence that the level of patient adherence to CBT-I recommendations is related to clinical outcomes. For example, in a study of 696 veterans receiving CBT-I, there was a large effect size for the association between adherence and outcome; specifically, veterans with the highest tercile for adherence compared to those with lowest tercile achieved, on average, 4.1 points greater reductions on the Insomnia Severity Index [8]. Furthermore, in a review of adherence to CBT-I treatment recommendations,

Mellor et al. reported that better overall adherence predicted greater reduction in insomnia severity [9]. Knowledge of predictors of adherence to the often counterintuitive behavioral and cognitive recommendations in CBT-I could, in turn, help identify intervention targets and strategies to promote adherence. Research on predictors of adherence is complex to interpret given large variability in the methods used to assess adherence [9, 10]. Nonetheless, greater dysfunctional beliefs about sleep have been identified as a predictor of lower self-rated and therapist-rated adherence [9]. Together, these findings suggest that improving adherence to CBT-I treatment recommendations has the potential to increase its clinical impact and that effective use of strategies to address sleep-related cognitions could be a promising approach to enhancing adherence.

Cognitive therapy is a psychotherapeutic approach that includes a rich array of strategies to address maladaptive cognitions. Perhaps unsurprisingly, cognitive therapy for insomnia is more effective at changing beliefs about sleep than the behavioral components of CBT-I [11]. However, in many CBT-I protocols, the cognitive component is limited in scope. Cognitive therapy strategies can be utilized to address dysfunctional beliefs about sleep and, relatedly, cognitions that interfere with adherence to the behavioral recommendations. Traditional cognitive therapy strategies that are included in most CBT-I protocols include examining the accuracy of thoughts and beliefs about sleep, with some protocols also using behavioral experiments, cost-benefit analysis, and other motivational enhancement strategies. Traditional cognitive therapy can also be supplemented

with more contemporary cognitive therapy techniques, such as meta-cognitive strategies [12]. These strategies are derived from acceptance-based cognitive therapies, including acceptance and commitment therapy [13] and mindfulness-based cognitive therapy [14]. Acceptance-based therapies use strategies to promote psychological flexibility that can help increase willingness to accept the time-limited discomfort that can occur when adhering to stimulus control and sleep restriction. Such strategies could increase adherence to these two core behavioral components of CBT-I. For a description of the application of these approaches to insomnia within CBT-I see Ong, 2016 [15].

Using cognitive and meta-cognitive therapy strategies in the service of promoting adherence requires that adherence-interfering cognitions are addressed as they arise. This is a different approach than the way cognitive therapy is utilized in many session-by-session protocols of CBT-I, where cognitive therapy is introduced as a separate component later in treatment, rather than integrated throughout. Introducing cognitive components only after the behavioral components misses the opportunity to leverage cognitive approaches to enhance adherence. There is evidence that CBT-I protocols that use this integrated approach can be implemented effectively. For example, the nationwide dissemination of CBT-I to mental health providers in the Veteran Administration Health Care Systems (VHA) demonstrated that a flexible CBT-I protocol that promotes integration of cognitive strategies is effective [8]. This flexible approach utilizes a case conceptualization framework, which guides the timing and relative emphasis of the components of CBT-I [16]. Program evaluation of the VHA CBT-I rollout also found that therapist-rated patient adherence to CBT-I was significantly associated with reductions in insomnia severity [8].

A greater emphasis on cognitive therapy and additionally using meta-cognitive strategies could also help improve outcomes by reducing pre-sleep hyperarousal. This assertion is based on the fact that pre-sleep hyperarousal is a predictor of CBT-I outcome [17] and on Espie's model of insomnia, which posits that cognitive processes, such as repeated effort to sleep, can increase cognitive arousal over time [18]. Thus, the data suggest that, for individuals with insomnia with high pre-sleep arousal, the standard CBT-I arousal-reduction strategies, such as relaxation and implementing an unwinding period before going to sleep, may not suffice. Espie's theoretical model suggests that greater emphasis on strategies that target sleep effort, a cognitive process, may help reduce pre-sleep hyperarousal and hence improve outcomes. Initial data suggest that broadening the range of cognitive and meta-cognitive strategies has the potential to improve outcomes [19–22]. However, this idea needs to be tested in large trials, ideally in a design that allows testing mechanisms. Applying a network intervention analysis [23] could help elucidate the relative contribution of the cognitive and behavioral components to outcome.

In addition to sleep-interfering cognitions, Mellor and colleagues identified greater psychosocial support as a predictor of better adherence to CBT-I. Social support can come in multiple forms, including from partners/bed-partners. In a review of interpersonal factors in insomnia, Rogojanski et al. laid out a comprehensive approach for integrating bed partners into all components of CBT-I [24]. The resulting partner-assisted CBT-I protocol has the potential to enhance adherence and outcomes and is an innovative approach that is now being tested in a clinical trial [25]. This ongoing study compares traditional CBT-I and partner-assisted CBT-I to a control intervention that does not include sleep restriction therapy or stimulus control but does include partner support. The partner-assisted CBT-I protocol actively engages

the partner in all aspects of treatment through exposure to the educational materials, involvement in problem-solving around challenges to adherence, and actively assisting with the implementation of treatment recommendations at home. This novel approach to CBT-I highlights the potential to capitalize on factors known to predict better adherence to enrich or expand traditional CBT-I.

## Retaining patients in treatment

Another promising approach to increasing the impact of CBT-I is to apply effective strategies to help keep patients in treatment so that they can be exposed to the full range of treatment components. Early identification of those at risk for premature discontinuation creates an opportunity for intervention to address barriers to completion of the full course of treatment. The Intent to Attend measure was developed in order to address the challenge of nonrandom dropout in clinical trials [26]. Its use has been extended to reducing attrition from treatment. Specifically, the patient's intent to attend the next session is measured at each session so that the clinician can identify a patient who may be at risk for prematurely discontinuing treatment and then work with the patient to identify and address barriers to successful completion of treatment, as they emerge. The intent to attend measure adds little impact, as it has only three items. Initial evidence from a study of therapist-delivered psychotherapy for PTSD suggests that this strategy could indeed reduce attrition [27]. Although it has face validity, the efficacy of this and other strategies to identify those at risk of discontinuing CBT-I and subsequently address barriers to their continued engagement has yet to be empirically tested.

Emerging research suggests that cultural adaptations of CBT-I could also help keep more patients in treatment. Cultural adaptations of CBT-I incorporate sociocultural values, as well as culturally relevant concepts and metaphors. A recent study compared culturally adapted versus standard versions of digital CBT-I in a sample of black women, where the adaptations were based on input from black patients and healthcare professionals [28]. It found that both treatments were effective; however, fewer patients dropped out of the culturally adapted protocol. Another group is currently evaluating a deep-level adaptation of digital CBT-I for Latinx adults (R01HS024274). These studies highlight the value of culturally responsive insomnia care and the potential positive impact on reducing barriers to completion of treatment and, in so doing, increasing the impact of CBT-I among patients from traditionally underserved backgrounds.

The issue of retaining patients in treatment is particularly relevant when CBT-I is delivered via digital technology (also known as dCBT-I). Multiple studies and meta-analyses have demonstrated that dCBT-I is effective, including when insomnia is comorbid with other conditions [29]. However, data also suggest that in real-world settings only 5% completed all six treatment modules [29]. Methods to reduce premature treatment discontinuation from digital interventions for both adolescents and adults include adding features throughout to make the content more engaging and to motivate the user to interact with the program. Examples of these features include: presenting material in multiple formats (e.g. text, videos, and animations), utilizing games and case vignettes that describe someone of a similar background, testing knowledge and understanding using quizzes, presenting graphs of treatment progress, and sending automated reminders to prompt continued engagement in treatment [30–32]. To the best of our knowledge, although these features have face validity and were

developed with users' input, there are no head-to-head comparisons of digital CBT-I with and without these features.

There is also some evidence that human or automated support provided alongside a digital CBT-I program may reduce premature treatment discontinuation and improve outcomes [32–34]. Attributes of support that have been used in past research varied in type (e.g. email, texting, and phone calls), frequency, (e.g. weekly, daily, and as needed), and the level of training received by the support provider (e.g. trained coaches, research assistants, and licensed clinician). However, implementing human support requires additional resources, which may constrain its reach. Many important questions still need to be answered regarding supported CBT-I, including what type of support is needed, how much is needed, who can provide the support, how to train the supporting personnel, and what is the cost-effectiveness of supported digital CBT-I. Ongoing research is testing some of these questions by comparing three levels of written support for digital CBT-I, provided by trained paraprofessionals (e-coaches); specifically, the study will compare the impact of receiving messages from e-coaches after each session, on-demand, or not at all [35].

### Leveraging CBT-I to explicitly promote reduction in use of sleep medications

It is common for patients with chronic insomnia to be prescribed hypnotic medication for treatment. For example, among patients receiving CBT-I in a sleep clinic, more than half were taking medication for sleep [36]. Moreover, many hypnotic users are long-term users. In one large longitudinal survey of benzodiazepine and non-benzodiazepine hypnotic use, about half of users between 1999 and 2014 reported long-term (greater than 24 months) use; in addition, for most data collection years, only one-fifth of users reported using hypnotic medications for less than 6 months [37]. There is a trend for deprescribing hypnotic medications in favor of utilizing CBT-I to treat chronic insomnia. This trend is, at least in part, a response to clinical practice guidelines put forth by the American College of Physicians to raise awareness that many medications used regularly for insomnia have an FDA indication only for time-limited use [38] and the Beers Criteria which also identifies hypnotic medications on its list of potentially inappropriate medications for older adults [39].

Even when CBT-I does not specifically target hypnotic use, it can lead to significant reduction in hypnotic use. For example, in a recent real-world study using data from over 7000 adults who purchased access to a digital CBT-I program, the percentage of nights on which a sleep medication was used (including both prescription and over-the-counter sleep aids) decreased from 42.4% of nights after completing the first two cores (session equivalent) to 30.2% after completion of the last two cores [29]. It appears that adding a parallel gradual taper plan is superior to CBT-I alone. For example, Morin et al. tested the added value of including a medication taper intervention along with therapist-delivered CBT-I compared with CBT-I alone and with medication taper alone. The study was conducted among individuals with insomnia disorder who were chronic users of hypnotic medications [40]. It found that the combined interventions yielded a greater proportion of patients who discontinued hypnotic use (85%) than CBT-I alone (54%) or the medication taper alone (48%) at the end of treatment. Medication reduction gains were well-maintained at a 12-month follow-up, although the differences between groups were no longer statistically significant at that time point [41]. In this study, the two interventions were provided in parallel, and the CBT-I did not explicitly discuss issues pertaining to the medication taper.

It is possible that incorporating CBT-I strategies to explicitly support hypnotic taper would improve long-term outcomes, including longer hypnotic-free periods.

We have previously described strategies that can be incorporated into CBT-I to support hypnotic tapers [42]. Briefly, we suggest starting the taper after the patient has experienced some improvement in sleep and after time in bed restriction has commenced, as long as daytime sleepiness levels are within safe limits. At this point, the accumulated homeostatic sleep drive resulting from time in bed restriction can help counter anticipatory arousal that may interfere with sleep and the patient has gained some self-efficacy around sleep. We also suggest using cognitive therapy strategies to address anticipatory anxiety about reducing the dose, beliefs about the need for sleep medication, sleep-related self-efficacy, and, importantly, psychological dependence that might develop among those who have previously tried and failed to discontinue the sleep medication.

### Strategies for Extending the Reach of CBT-I

The traditional delivery of CBT-I is by mental health professionals with specialized training in behavioral sleep medicine. However, the low and uneven distribution of professionals trained to competency in delivering CBT-I creates a significant barrier to access [43]. CBT-I implemented via telemedicine and group deliveries of CBT-I are effective [44–46] and help increase access within this traditional model; group treatment allows more patients to be treated by a single provider and telemedicine allows patients who live in areas where there is no trained provider to receive treatment. A survey of 200 mental health providers in Canada and the United States found that 95% of those surveyed reported no clinical sleep training during graduate school, internship, or post-doctoral fellowship [47]. This and other surveys also document that post-licensure training is perceived as insufficient, consists mainly of workshops without an experiential, competency-based follow-up training, and that the vast majority of the therapists surveyed desire additional training [47–49]. Training therapists to be competency in delivering CBT-I is clearly an important direction to pursue in order to increase access. The nationwide efforts to train licensed mental health providers in the VHA to competency in delivering CBT-I, first in individual and later in group formats, has increased the number of providers [50, 51]. However, as documented in a recent retrospective analysis of VA electronic health records, although the percentage of patients receiving CBT-I has doubled between 2015 and 2019, in the last year of the review, the percentage of patients treated with sleep medications was still 30-fold higher than those treated with CBT-I [51]. Thus, although the VHA dissemination rollout has proven effective and can serve as a model for increasing the ranks of qualified CBT-I providers, access to CBT-I remains low, suggesting that other models of providing CBT-I are needed.

As discussed earlier, digital CBT-I has emerged as a viable alternative to therapist-led CBT-I. Like telemedicine and group CBT-I, dCBT-I helps mitigate barriers to seeing a therapist that stems from low and uneven distribution of trained professionals. Digital CBT-I has additional advantages of offering immediate and convenient access, allowing flexible pacing, and avoiding stigma that is sometimes associated with engaging in mental health treatments. Additionally, it can provide CBT-I at scale, relative to the volume of patients who can be seen by the currently limited number of trained therapists. However, a recent network meta-analysis documents lower effect sizes for dCBT-I compared to synchronously delivered CBT-I (i.e. individual onsite,

group-delivered, and telehealth) [45]; although the field has not yet reached a consensus on this. Considering the relative advantages of each of the two delivery options and the scarcity of trained providers, there is increased attention to stepped care models of delivery of CBT-I that utilize both.

Traditional stepped-care treatment models provide a lower-intensity intervention, such as dCBT-I, to all patients as a first step. More intensive treatment, such as therapist-led CBT-I, is then only provided to patients who do not adequately respond to the first step of treatment. Two studies (the AIR study and the GET study) are currently testing this traditional model [35, 52]. An alternative to the traditional stepped care model is the triaged stepped care model, where the goal is to preemptively and proactively match patients who are less likely to respond to the lower intensity treatment (for example, digital CBT-I) to a higher level of care (for example, therapist-led CBT-I) right from the start [53, 54]. In the triaged stepped care model, as in the standard model, patients who do not sufficiently benefit from the lower intensity intervention can still be stepped up to a higher level of care. A recent study tested a triaged stepped-care model of CBT-I among patients living with cancer and found that using the insomnia severity index to triage patients into digital or therapist-delivered CBT-I was not inferior to traditional therapist-delivered CBT-I [55]. Two other studies are now testing more complex triage algorithms that, although developed independently, are fairly similar [54, 56]. In addition to testing their triage checklists, these studies will provide health economic data regarding the cost-effectiveness of a triaged stepped care approach and help identify predictors of differential response that could guide further refinement of the triage criteria that can then be tested in future studies. Answering questions pertaining to how to best combine digital and therapist-led CBT-I to optimally leverage resources without compromising outcomes has the potential to increase the reach of CBT-I.

## Summary and Discussion

Our perspective identified ideas for improving the impact and reach of CBT-I. Concerning the impact of CBT-I, we highlighted increased attention to, and fuller integration of cognitive therapy strategies as a means to help increase adherence to treatment recommendations and, additionally, to reduce hyperarousal in order to improve outcomes among patients with high levels of hyperarousal. We discussed promising emerging approaches that consider the patient's social context, including the involvement of partners in CBT-I to promote adherence to treatment recommendations and the use of culturally relevant treatment adaptations to increase retention of patients in treatment. We pointed to the importance of addressing barriers to engagement in a timely manner through assessment in each session of the patients' intent to attend the next session and addressing the barriers as they emerge. We also suggested to broaden outcomes of interest to include hypnotic medication use, thus supporting medical guidelines for deprescribing hypnotic medications in general and particularly among older adults, and discussed how CBT-I can be enriched to help patients reduce chronic hypnotic use.

We advocate for use of a case conceptualization approach to CBT-I, in which the components of CBT-I are flexibly applied to an individual patient's presentation [57, 58]. In this approach, the therapist (or digital CBT-I program) is guided by the core treatment principles, and introduces the components and strategies of CBT-I in an order and level of emphasis that are based on the individual case presentation. Such a flexible approach can be

implemented in a manner that preserves fidelity to CBT-I, for example, through a use case conceptualization form, as was done in the VA rollout of CBT-I [16, 58]. Treatment fidelity can be promoted and measured by the therapist's routine completion of a checklist, indicating the treatment elements that were and were not delivered at each session. This method is easy to use in both clinical settings and field research and has been determined to be valid, including when applied to sleep interventions [8, 59]. A case conceptualization approach also provides a framework for when to use empirically valid variants of standard components, such as counter control and sleep compression, and when to emphasize cognitive components. In these ways, a case conceptualization approach includes some of the already tested modest formal adaptations of CBT-I protocols for treating patients with comorbidities [60]. Examples include strategically timed naps to promote safety and prevent unintentional evening dozing among patients with comorbid sleep apnea [61], strategies to help overcome anhedonia-related obstacles to adherence with time in bed restriction among patients with comorbid major depression [62], and use of a variant of time in bed restriction that is introduced later in the course of treatment among patients with comorbid bipolar disorder [63]. We believe that this flexible case conceptualization approach makes CBT-I relevant to populations that have been historically difficult to engage and treat.

Concerning the goal of extending the reach of CBT-I, we discussed strategies to increase access to therapist-delivered CBT-I, including telemedicine, delivery in group modality, and training more clinicians to competency in delivering CBT-I. We focused on utilizing empirically supported digital CBT-I alone or in stepped care models, in a manner that capitalizes on digital CBT-I's scalability potential and addresses some of its weaknesses, such as low level of completion outside of research settings. We discussed providing human support as means for promoting retention in dCBT-I and highlighted the next set of questions that, we believe, will need to be answered about how to best combine digital and therapist resources to increase access to, retention in, adherence to, and outcomes of CBT-I. We identified both standard and triaged stepped-care approaches as promising cost-effective directions, when compared to receiving the treatment from a mental health provider [64, 65]. Knowledge about the relative cost-effectiveness of the two models could help improve insurance coverage for digital CBT-I, further increasing the reach of CBT-I. Also, important for extending the reach of CBT-I is promoting primary care physicians' awareness and knowledge about CBT-I and its efficacy, so that they can refer patients in a manner that promotes follow-through. Surveys and interviews with primary care physicians indicate that they are not satisfied with sleep hygiene and pharmacotherapy as treatment options [66], that they report insufficient knowledge about CBT-I [67], and that they view their workflow as not optimal for insomnia care [49]. We therefore believe that educational/training efforts targeting primary care physicians are also critically important for extending the reach of CBT-I.

In this manuscript, we identified several frontiers in CBT-I research. We recognize that there are other promising areas for future research to answer questions pertaining to increasing the impact and reach of CBT-I (see for example, Perlis and Posner [68]). We are also aware that there are other models for combining therapist and digital CBT-I, such as integrating dCBT-I within ongoing psychotherapy and using dCBT-I in full or in part to enable shorter and less frequent visits with a CBT-I therapist [69]. The richness of the field of behavioral sleep medicine is such that multiple ideas and approaches to improving CBT-I can be

considered and tested. The perspectives that we presented here are informed by the literature and influenced by our ongoing research and our clinical experience. We believe that the next few decades of clinical work and research will produce significant gains in the impact and scope of CBT-I, with more and better ideas yet to come.

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