International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	DIGITAL COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA (dCBT-I) AS A METHOD OF HYPNOTIC MEDICATION REDUCTION USE
DOI	https://doi.org/10.31435/ijitss.1(49).2026.5054
RECEIVED	26 November 2025
ACCEPTED	07 February 2026
PUBLISHED	18 February 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

DIGITAL COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA (dCBT-I) AS A METHOD OF HYPNOTIC MEDICATION REDUCTION USE

Zofia Hałabuda *(Corresponding Author, Email: zofia.halabuda@outlook.com)*
The Floriana Ceynowy Specialist Hospital in Wejherowo, Wejherowo, Poland
ORCID ID: 0009-0005-0976-5602

Kornelia Rynkiewicz
Medical University of Warsaw, Warsaw, Poland
ORCID ID: 0009-0006-0686-3618

ABSTRACT

Introduction & objective: Insomnia, being an established health problem, has led to the development of various ways of treatment. While Cognitive Behavioral Therapy is a gold standard of insomnia treatment, due to cost and accessibility limitations, pharmacological methods remain widely used. The most commonly used drugs are benzodiazepines and Z-drugs, which, due to their adverse effects and high dependency risk, impose various dangers. One of the "side effects" of insomnia treatment is the development of drug dependence. Well-established methods of combating these issues concern only benzodiazepines, Z-drug medication use reduction protocols are still unavailable. However, considering both these drugs, a slow dose reduction method is believed to be the most effective and safe. The newest research examines the use of digital CBT as a tool for reducing drug dependence. The results are promising, as combining slow dose reduction with digital CBT yields better outcomes than the previous approach. However, there is still limited data on the use of digital CBT in reducing reliance on pharmacological interventions in high-risk patient groups or among patients with high levels of dependency, the development of official protocols is needed. This literature review aims to assess progress in this field of medicine.
Review methods: This review is based on a non-systematic review of PubMed articles published between 2008 and 2026.
Brief description of state knowledge: In numerous studies, the efficacy of digital CBT is a safe and effective method of insomnia treatment. Concerning previous addiction reduction methods, the only established guidelines are those concerning benzodiazepine dependency, and they involve the method of slow dose reduction. Recent clinical trials suggest that combining digital CBT with dose reduction may be an alternative, demonstrating greater efficacy in treating pharmacological dependence.
Summary: Digital CBT-I is not only an alternative to traditional face-to-face CBT for the management of insomnia but may also represent a scalable and clinically relevant strategy for reducing benzodiazepine and Z-drug dependence. Emerging evidence suggests that combining gradual dose reduction with digital CBT-I may enhance deprescribing outcomes compared with tapering alone. However, limited real-world safety data highlight the need for further research to define better safety and protocols for dependency reduction in patients overusing benzodiazepines and Z-drugs using digital CBT.

KEYWORDS

Digital Cognitive-Behavioral Therapy, Insomnia, Safety, Benzodiazepine, Z-Drugs, Dependency

CITATION

Zofia Hałabuda, Kornelia Rynkiewicz. (2026) Digital Cognitive-Behavioral Therapy for Insomnia (dCBT-I) as a Method of Hypnotic Medication Reduction Use. *International Journal of Innovative Technologies in Social Science*. 1(49). doi: 10.31435/ijitss.1(49).2026.5054

Introduction

Insomnia is a common medical condition that affects not only sleep quality but also daytime functioning. Although the overall consensus in recommendations indicates cognitive behavioral therapy (CBT) as the gold standard, the pharmacological treatment of insomnia is widely common. The pharmacological methods in insomnia treatment propose a variety of medications, with benzodiazepine (BDZ) and z-drugs being the most widely prescribed (Wichniak et al., 2023). Pharmacological treatments are burdened by the many adverse effects and the risk of dependency. Although guidelines impose a limit of BDZ and Z-drugs treatment for 4 weeks (J. Y. Lee et al., 2018; Riemann et al., 2023), in reality, many patients take the medication longer, which increases the risk of dependency and the presence of adverse effects. Although initially thought to be less prone to abuse and dependence than BZDs, studies on Z-drugs have reported issues of tolerance and withdrawal effects, as well as being associated with falls, particularly in prolonged use (K. J. Lee et al., 2025). Moreover, in the case of the most prescribed drugs - Z-drugs, the process of tapering and quitting in totality may impose difficulties and last in some cases a substantial amount of time. Knowing that CBT has proven efficacy and safety in insomnia treatment compared to pharmacological methods, but due to its limits comprising a low number of therapists, high costs, and the problem of accessibility for patients in remote places, and as the misuse of medication such as benzodiazepines and Z-drugs has the scale of an epidemic, the development of digital CBT delivery may be groundbreaking. The variety of apps, from fully automated to digital therapy (Zofia Hałabuda & Kornelia Rynkiewicz, 2026), models provide a realistic alternative to the more traditional approach to CBT. The efficacy of digital CBT has been demonstrated across multiple studies. The question needs to be answered if it is not only a good method of insomnia therapy but also a viable method of fighting dependence on Z-drugs and BDZ in patients who have insomnia. Our review aims at analyzing the newest research on the use of digital Cognitive-Behavioral therapy in helping with addiction to sleep medication, as the pharmacological treatment of insomnia is still widely used.

Methods

This narrative review is based on a non-systematic search of PubMed articles published between 2008 and 2026. The search strategy utilized the keywords: “dCBT-I,” “insomnia,” “dependence,” “benzodiazepine,” and “Z-drugs.” Given the narrative nature of this review, no formal inclusion or exclusion criteria were predefined. Emphasis was placed on randomized controlled trials, meta-analyses, recent clinical guidelines, and real-world implementation studies published in English between 2008 and 2026. Relevance and methodological quality were assessed at the title, abstract, and full-text levels.

The principles of digital Cognitive-Behavioral Therapy (dCBT)

Digital Cognitive Therapy for Insomnia (dCBT-I) is a form of psychotherapy delivered via web-based programs, mobile applications, and chatbots (Lu et al., 2023). The methodology of dCBT-I typically involves translating the five core pillars of traditional treatment into structured digital modules. The five core pillars of CBT are sleep restriction therapy (SRT), stimulus control therapy (SCT), sleep hygiene (SH), cognitive therapy (CT), and relaxation (Walker et al., 2022). The primary behavioral component is Sleep Restriction Therapy (SRT), which aims to temporarily reduce time spent in bed to increase sleep pressure, reduce time awake in bed, and overcome conditioned associations between the bedroom and alertness (Sweetman et al., 2023). Another core pillar is Stimulus Control Therapy (SCT), which re-establishes the association between the bed and sleep. Cognitive restructuring techniques are used to identify and challenge dysfunctional beliefs and sleep-related worries that are causing hyperarousal (Prather et al., 2025). Digital CBT-I further incorporates relaxation training and sleep hygiene education to reduce somatic tension and address environmental factors that affect sleep quality (Riemann et al., 2023). Treatment protocols may vary across specific programs, but typically full intervention is delivered over 4 to 9 weeks (Espie et al., 2019; Olsen et al., 2025). Technically, dCBT-I operates by collecting daily sleep-wake data, commonly referred to as sleep diaries. Intelligent algorithms analyse that data and provide tailored feedback and weekly “sleep prescriptions” suggesting bedtime and wake time to increase sleep efficiency (Maurer et al., 2025; Philip et al., 2022). Digital CBT-I varies in the level of human involvement; it can be fully automated, therapist-guided, or used only as a supportive tool while a professional conducts CBT-I (Cheng et al., 2019; Winter et al., 2025). Numerous programs are available, but only some have undergone Randomized Controlled Trials (RCTs) to assess efficacy. Those with outstanding results are now recognized as prescribed digital therapeutics and have been approved by regulatory authorities, such as the FDA.

Digital CBT-I’s advantages over the traditional form lie in its accessibility and cost. As it is available online or as an app, it provides quick and flexible access to therapy. It is also cost-effective due to lower labor costs and the absence of travel expenses. Moreover, due to its automated features, it does not require constant human support, thereby helping to overcome the shortage of professional therapists. On the other hand, the lack of human oversight

in some forms of dCBT-I may reduce adherence. It may not be appropriate for patients with specific comorbidities, such as schizophrenia, bipolar disorder, obstructive sleep apnea, epilepsy, patients with an increased risk of falls, or those in occupations where alertness and caution are crucial (Zofia Hałabuda & Kornelia Rynkiewicz, 2026). Regarding efficacy, some authors suggest that it is as effective as traditional face-to-face therapy, whereas others report only moderate effects (Benz et al., 2024; Li et al., 2025; Soh et al., 2020).

Pharmacological methods for the treatment of insomnia

The latest recommendations for insomnia treatment emphasize the need for non-pharmacological interventions, such as cognitive behavioral therapy (Riemann et al., 2023). However, due to systematic limitations and, in some cases, nonadherence to CBT, pharmacological treatment may be necessary. The range of possible medications is wide (**Table 1**). However, the main group of drugs used for the treatment of insomnia is nonbenzodiazepine sedative hypnotics referred to in practice as Z-drugs (zolpidem, zopiclone, eszopiclone, zaleplon) (Wichniak et al., 2023). Their predecessors were benzodiazepines (BZDs), such as clonazepam, diazepam, and alprazolam. Z-drugs were developed in the late 1980s in order to propose a safer method of therapy, as the prevalence of BDZ side effects was a point of concern even then (Curado et al., 2022). Both medications are recommended for short-term therapy (maximum duration of 4 weeks) (J. Y. Lee et al., 2018; Riemann et al., 2023) as long-term use of BZD and Z-drugs can cause cognitive and psychomotor deficits that increase the risk of falls, fractures, trafficaccidents, mortality, abuse, and dependence– among users of both high and therapeutic doses (Brandt & Leong, 2017; Lader, 2011)

Over the years, it was believed that Z-drugs present a safer alternative. Yet, more studies show that the prevalence of dependence in both groups is equally high, with BDZ presenting an increased risk of psychosocial dependence, anxiety, and depression (Curado et al., 2022). Both medications induce sleep by modulating GABA signaling in the brain (Wichniak et al., 2023), thereby producing a hypnotic and sedative effect. They bind with subtype A of g-aminobutyric acid receptors (Koniuszewski et al., 2023), with Z-drugs showing high selectivity for the α1 subunit (Curado et al., 2022). This selectivity was the basis of the belief that Z-drugs would be a safer alternative to benzodiazepines. However, through rapidly enhancing GABA neurotransmitters, calming the central nervous system while creating feelings of euphoria, Z-drugs and benzodiazepines present addictive qualities. Withdrawal symptoms of the cessation of BDZ and Z-drugs use include insomnia, anxiety, euphoria, irritability, tremor, inner restlessness, speech difficulties, abdominal pain, hypertension, tonic-clonic seizures, and confusion/disorientation/delirium (Riemann et al., 2023)

Table 1. Pharmacological treatment of insomnia based on *the European Insomnia Guideline 2023* (Riemann et al., 2023)

Group	**Medications**
Benzodiazepines	Diazepam, flunitrazepam, flurazepam, lormetazepam, nitrazepam, oxazepam, temazepam, triazolam
Benzodiazepine receptor agonists	Zaleplone, zolpidem, zopiclone, eszopiclone
Sedating antidepressants	Agomelatine, amitriptyline, doxepin, mianserin, mirtazapine, trazodone, trimipramine
Antipsychotics	Chlorprothixene, levomepromazine, melperone, olanzapine, pipamperone, prothipendyl, quetiapine
Antihistamines	Diphenhydramine, doxylamine, hydroxyzine, promethazine
Phytotherapeutics	Hops, kava-kava, melissa, passiflora, valerian, lavender
Melatonin receptor agonists	Fast-release melatonin, ramelteon, prolonged-release melatonin
Orexin receptor antagonist	Daridorexant

Methods of addiction therapy concerning medication used in insomnia treatment

Methods for overcoming dependence on hypnotic medications (clinically referred to as deprescribing or hypnotic reduction) primarily involve integration of Cognitive Behavioural Therapy for Insomnia (CBT-I) with structured Gradual Dose Reduction (GDR) protocols (Gutierrez et al., 2026; Simpson & Manber, 2022). CBT-I is internationally recognized as the first-line treatment for chronic insomnia and is uniquely effective at reducing or eliminating long-term use of sedative-hypnotics, such as benzodiazepines and "Z-drugs", which are associated with risk of cognitive decline, falls, and dependence (Gutierrez et al., 2026; Moon et al., 2025).

The most common clinical method for medication withdrawal is the supervised clinical method, Gradual Dose Reduction (GDR), which minimizes the risk of rebound insomnia and severe withdrawal symptoms (Rosenberg et al., 2021). Standard clinical protocols typically recommend a dose reduction of approximately 25% every one to two weeks, intending to achieve a 50% reduction by week four and complete discontinuation within 8 weeks (**Figure 1**) (Simpson & Manber, 2022). For medications that carry a higher risk of withdrawal symptoms, such as benzodiazepines, or for patients who have been using them for a long time, it may be necessary to adopt more conservative tapering schedules. This typically involves reducing the dose by 5%-10% per week to maintain the patient's tolerance (Gutierrez et al., 2026). Successful GDR requires active collaboration between therapists, who manage the patient's psychological dependence and behavior changes, and the prescribing physician, who oversees pharmacological safety and medical comorbidities (Simpson & Manber, 2022).

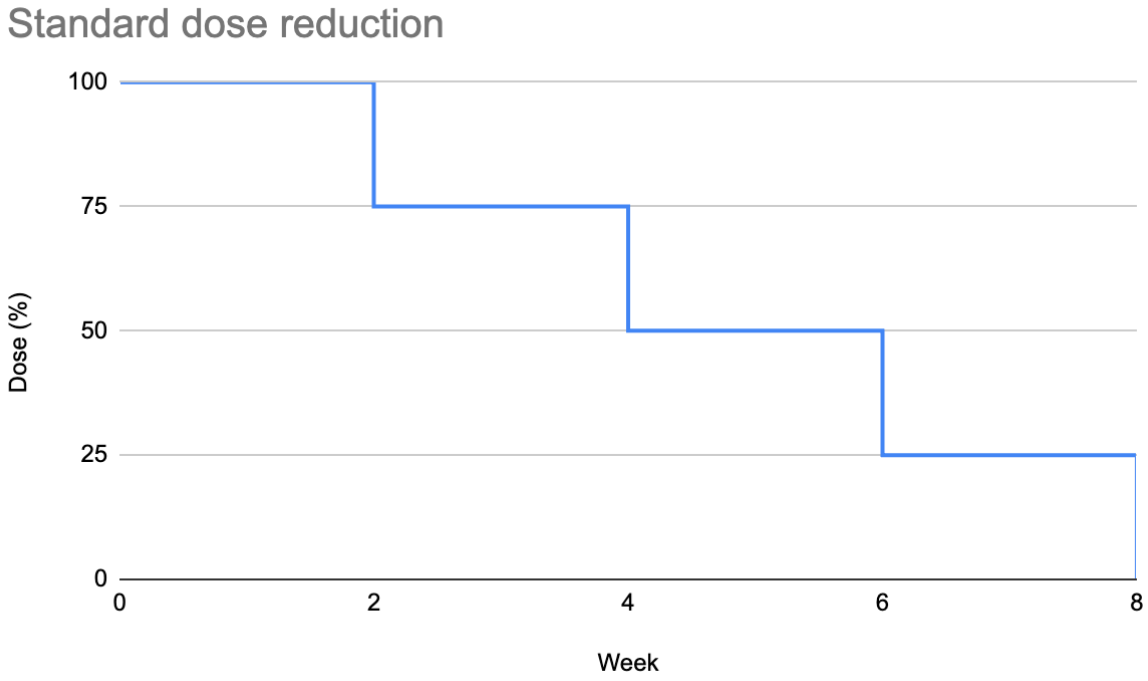

Fig. 1. *Standard clinical protocols of dose reduction in case of benzodiazepine and Z-drugs usage (Simpson & Manber, 2022)*

Hypnotic benzodiazepines and Z-drugs

The European Insomnia Guidelines recommend this class of medication for the short-term management of insomnia, particularly for periods of up to four weeks (Riemann et al., 2023). After this time, it is crucial to discontinue their use to avoid the risks associated with long-term treatment. Sudden cessation of hypnotic benzodiazepines and Z-drugs can result in rebound insomnia and withdrawal symptoms; therefore, it is crucial to implement a safe discontinuation strategy.

In cases of existing dependencies, discontinuation should be gradual and tailored to the patient's personal needs. In 2025, the American Society of Addiction Medicine (ASAM) published guidelines on benzodiazepine tapering (Brunner et al., 2025). The main takeaways (**Table 2**) are the importance of individualizing therapy and continuous risk-benefit assessment of BDZ use/tapering.

Table 2. The main rules of Benzodiazepine discontinuation based on the 2025 Guidelines of the American Society of Addiction Medicine (ASAM) (Brunner et al., 2025)

Key takeaways of Benzodiazepine (BDZ) discontinuation according to ASAM
● Ongoing risk–benefit assessment of BZD use/tapering ● Clinicians should utilize shared decision-making strategies in collaboration with patients ● Clinicians should not discontinue BZDs abruptly in patients who are likely to be physically dependent and at risk of withdrawal ● Clinicians should tailor tapering strategies to each patient and adjust tapering based on patient response ● Clinicians should offer patients adjunctive psychosocial interventions to support successful tapering

The general rule for BDZ discontinuation is a slow reduction in the medication dose over time, with 5-10% dose reduction every 2-4 weeks as the overall approach. Experts note that the dose reduction may not exceed 25% of the baseline dose at each 2-week interval (Brunner et al., 2025). Sadly, the process of BDZ tapering is long and often difficult for both patients and clinicians. In patients with a relatively short history of medication use (e.g., < 3 months), tapering may be rapid. In contrast, in patients with a longer history of medication use, tapering may last more than 1 year. Here, an individualized approach to dependency treatment is essential, as many patients may require longer adjustment periods with the new lower dose; the standard 2- to 4-week period may be too short. Moreover, patients may present different tapering acceptance at different stages of the treatment, with a change of tolerance of the pace of the taper during the process (e.g., with minimal symptoms at the beginning of the taper (i.e., at a higher dose), and substantial challenges at the end of the process, at the "tail-end" of tapering) (Zgierska et al., 2025).

Worth noting are the limitations of the newly published guidelines, which do not address sedative-hypnotic medications such as barbiturates and Z-drugs (i.e., eszopiclone, zaleplon, and zolpidem). Although this group of medications presents a similar mechanism of action to BZDs and may pose similar risks, there are no clear guidelines concerning the treatment of their dependency. While the tactics of Z-drugs discontinuation are scattered across the literature, the overall consensus is that tapering is necessary in patients who were administering excessively high doses, due to the risk of serious adverse effects like seizures (Watson et al., 2023). Interestingly, most randomized controlled trials examining the acute sleep and daytime effects of stopping Z-drugs have not tapered the Z-drug and instead have used abrupt placebo substitution (Watson et al., 2023). However, a tapering schedule for hypnotics of a 25% reduction in the dose per week has been described (Pollmann et al., 2015). Interestingly, in the case of zolpidem and, to a lesser extent, eszopiclone, a rebound insomnia of at least one night is observed; hence, tapering these medications might be expected to improve tolerance to switching agents (Watson et al., 2023).

It is worth mentioning that the key to successful dependency treatment is properly informing the patient of the available alternatives in managing their insomnia (Kuntz et al., 2019) and properly educating them about the treatment processes with a clear description of the possible withdrawal symptoms (Belleville & Morin, 2008; Kuntz et al., 2019). For other insomnia drugs, such as DORAs, doxepin, and ramelteon, tapering is not required (Watson et al., 2023). Lastly, off-label antidepressants and antipsychotics used to treat insomnia should be gradually reduced when discontinuing.

As the prevalence of the use of BDZ and Z-drugs is still high, in recent years, a slightly decreasing trend for most hypnotic and anxiolytic drugs, except for clonazepam and zolpidem, has been observed (Kurko et al., 2018). Reliable, non-pharmacological therapy methods are needed. The introduction of CBT-I may also help transition people off of hypnotic medication (Park et al., 2018).

Cognitive-Behavioral Therapy for hypnotic reduction

Cognitive Behavioral Therapy for Insomnia (CBT-I) is the internationally recommended first-line treatment for chronic insomnia. It is highly effective at helping patients reduce or eliminate their use of hypnotic medications. While hypnotic medications often provide short-term relief without addressing the underlying causes of sleep issues, CBT-I targets the psychological and behavioral patterns that maintain insomnia, providing a durable path toward drug-free sleep (Simpson & Manber, 2022; Sweetman et al., 2023).

CBT-I is significantly more effective at facilitating medication discontinuation than attempting a drug tapering alone (Simpson & Manber, 2022; Takaesu et al., 2019). In studies focusing on older adults, combining CBT-I with a structured taper achieved an 85% cessation rate for benzodiazepines, compared to just 48% for

those who used only gradual discontinuation. Furthermore, spontaneous reduction of hypnotics was also observed in studies where medication reduction wasn't the main goal. Individuals receiving CBT-I reduced doses of drugs as their sleep improved during the treatment (Simpson & Manber, 2022). The outcomes of therapy are also long-lasting, as some studies suggest that only 27% of participants who received CBT-I were still using sleep medications, compared to 47% in a control group.

Several key therapeutic mechanisms support medication reduction during Cognitive Behavioral Therapy for Insomnia (CBT-I). In the initial phase of therapy, patients are educated about tolerance, psychological dependence, and the possibility of experiencing temporarily worsened sleep during the process of dose reduction.

Firstly, therapy helps patients regain confidence in their natural ability to sleep, thereby reducing their psychological dependence on medication (Simpson & Manber, 2022) and enhancing their sleep self-efficacy. Therapists need to be observant of behaviors that patients may choose, which could reinforce the belief that good sleep depends on hypnotic medication. These behaviors are often referred to as "safety behaviors," with a common example being the use of "rescue medication," taken only when patients feel they cannot fall asleep (Simpson & Manber, 2022).

Clinicians often use a dialogue technique called "Socratic Questioning." This approach involves asking guided, open-ended questions to help patients identify, challenge, and modify their dysfunctional beliefs about sleep. The primary goal is to encourage patients to use behavioral tools rather than rely on higher medication doses (Simpson & Manber, 2022).

It's also important to address the transient sleep fragmentation and anticipatory anxiety that can arise from lowering medication doses. These issues are often interconnected: fear of not being able to sleep leads to increased arousal, which then causes temporary disruptions in sleep continuity (Simpson & Manber, 2022). Thereby, clinicians typically begin a taper during the sleep restriction phase of Cognitive Behavioral Therapy for Insomnia (CBT-I). Reducing time spent in bed helps to increase homeostatic sleep pressure, acting as a "behavioral cushion."

The most effective approach is to combine Gradual Dose Reduction (GDR) with CBT-I, which is considered the gold standard for deprescribing because CBT-I addresses the psychological and behavioral patterns that pharmacological agents often mask (Gutierrez et al., 2026; Koffel et al., 2021; Simpson & Manber, 2022). While research protocols (as noted previously) often employ fixed schedules, clinical practice prioritizes flexibility and patient tolerance.

Digital Cognitive-Behavioral Therapy in deprescribing “sleep pills.”

dCBT-I is an effective tool for reducing and discontinuing sleep medications (Lu et al., 2023; Vedaa et al., 2020). In a recent clinical trial (Liu et al., 2026), patients receiving dCBT-I showed a significantly greater reduction in hypnotic doses than those receiving digital sleep hygiene alone. Reductions were evident by week 4 and sustained through the 12-week follow-up period. In a U.S. clinical setting, patients using digital interventions were 53% less likely to fill prescriptions for insomnia medications than during their pretreatment period. In contrast, matched control groups showed no significant reductions (Miller et al., 2025).

Furthermore, dCBT-I has demonstrated superiority over medication monotherapy at 6-month follow-up in terms of subjective sleep quality, sleep efficiency, and alleviation of daytime dysfunction (Lu et al., 2023). Notably, although participants reported subjective improvements in sleep and reduced hypnotic use, objective polysomnographic (PSG) parameters did not demonstrate significant changes in total sleep time or sleep efficiency (Liu et al., 2026). This discrepancy highlights the potential role of dCBT-I in modifying sleep perception and maladaptive cognitive processes rather than altering macro-architectural sleep parameters.

Evidence from routine clinical practice further supports the potential for deprescribing with digital interventions. Real-world data from U.S. clinical settings indicate that individuals engaging in digital CBT-I were 53% less likely to fill prescriptions for insomnia medications than during the pretreatment period, whereas matched controls showed no significant change (Miller et al., 2025). Moreover, dCBT-I has demonstrated superiority over medication monotherapy at six-month follow-up in improving subjective sleep quality, sleep efficiency, and daytime functioning (Lu et al., 2023). The effectiveness of dCBT-I in reducing hypnotic use is maximized when combined with structured Gradual Dose Reduction (GDR) protocols. Standard tapering schedules typically involve approximately 25% dose reductions every one to two weeks, although more conservative reductions of 5–10% may be employed for high-risk patients to improve tolerability.

Beyond medication reduction, dCBT-I provides substantial secondary benefits such as a significant reduction in insomnia severity, anxiety, and depressive symptoms. Also, improvements in immediate and delayed memory have been observed (Liu et al., 2026). These gains may reflect reduced benzodiazepine exposure, as long-term use is associated with cognitive impairment.

The integration of digital CBT-I into deprescribing protocols may offer a scalable solution to the global overuse of hypnotic medications, particularly in primary care settings where access to trained CBT-I therapists remains limited. For primary care physicians, dCBT-I may serve as a first-line non-pharmacological intervention prior to initiating long-term hypnotic therapy. In patients already receiving benzodiazepines or Z-drugs, digital CBT-I may be introduced concurrently with gradual dose reduction to enhance treatment adherence and reduce psychological dependence. However, digital-only interventions may not be appropriate for individuals with severe psychiatric comorbidity, high-dose dependence, or complex withdrawal risk, who may require supervised clinician-led tapering strategies.

Implementation of dCBT-I in routine care is increasingly facilitated through triaged stepped-care models that match the level of care to the patient's clinical presentation. A standardized Triage Checklist is used to identify patients unlikely to respond to digital-only formats, such as those with high-frequency hypnotic use (>= 4 times per week), extreme short sleep duration, or severe psychopathology (Manber et al., 2025). It assigns them to clinician-led care for closer monitoring.

While findings are promising, several limitations should be noted. Some results are based on relatively homogeneous samples (e.g., predominantly middle-aged, Han Chinese individuals with at least nine years of education), limiting generalizability to older adults and more diverse populations (Liu et al., 2026). Additionally, the long-term sustainability of medication reductions beyond 12 weeks remains unclear and warrants further investigation.

Conclusions

Cognitive behavioral therapy is the gold standard in insomnia treatment, although due to its limitations, pharmacological methods are still widely used. Because of that, the overuse of sleeping medication like benzodiazepines and Z-drugs among patients combating insomnia is a well-established problem. In recent years, digital CBT has advanced and become a valid alternative to the more traditional Cognitive Behavioral Therapy, which typically uses a one-on-one in-person therapy style. Recent studies have shown that dCBT may also be a method of dependency reduction in the use of benzodiazepines and Z-drugs, which are the most commonly used medications in insomnia treatment. As the risk of dependency in case of both these medications is high, it is often necessary to reduce the use of these medications. The basic method involves a slow time-dose reduction, with approximately 25% per week. It was shown that protocols combining digital CBT with a reduction method were more effective than dose reduction alone, demonstrating greater efficacy and longer-lasting effects. Although current findings are promising, high-quality randomized trials focusing on high-dependency populations, older adults, and long-term real-world outcomes are needed to establish standardized deprescribing protocols and clarify safety considerations.

REFERENCES

1. Belleville, G., & Morin, C. M. (2008). Hypnotic discontinuation in chronic insomnia: Impact of psychological distress, readiness to change, and self-efficacy. *Health Psychology*, *27*(2), 239–248. https://doi.org/10.1037/0278-6133.27.2.239
2. Benz, F., Grolig, L., Hannibal, S., et al. (2024). Investigating non-inferiority of internet-delivered versus face-to-face cognitive behavioural therapy for insomnia (CBT-I): A randomised controlled trial (iSleep well). *Trials*, *25*(1), 371. https://doi.org/10.1186/s13063-024-08214-6
3. Brandt, J., & Leong, C. (2017). Benzodiazepines and Z-Drugs: An Updated Review of Major Adverse Outcomes Reported on in Epidemiologic Research. *Drugs in R&D*, *17*(4), 493–507. https://doi.org/10.1007/s40268-017-0207-7
4. Brunner, E., Chen, C.-Y. A., Klein, et al. (2025). Joint Clinical Practice Guideline on Benzodiazepine Tapering: Considerations When Risks Outweigh Benefits. *Journal of General Internal Medicine*, *40*(12), 2814–2859. https://doi.org/10.1007/s11606-025-09499-2
5. Cheng, P., Luik, A. I., Fellman-Couture, C., et al. (2019). Efficacy of digital CBT for insomnia to reduce depression across demographic groups: A randomized trial. *Psychological Medicine*, *49*(3), 491–500. https://doi.org/10.1017/S0033291718001113

6. Curado, D. F., De Barros, V. V., Noto, A. R., & Opaleye, E. S. (2022). Dependence on hypnotics: A comparative study between chronic users of benzodiazepines and Z-drugs. *Brazilian Journal of Psychiatry*, *44*(3), 248–256. https://doi.org/10.1590/1516-4446-2020-1651
7. Espie, C. A., Emsley, R., Kyle, S. D., Gordon, et al. (2019). Effect of Digital Cognitive Behavioral Therapy for Insomnia on Health, Psychological Well-being, and Sleep-Related Quality of Life: A Randomized Clinical Trial. *JAMA Psychiatry*, *76*(1), 21. https://doi.org/10.1001/jamapsychiatry.2018.2745
8. Gutierrez, G., Chowdhary, A., Hartogensis, W., et al. (2026). Outcomes from a combined cognitive behavioral therapy for insomnia (CBT-I) and sleep-related medication and substance use reduction treatment. *Sleep Medicine*, *138*, 108696. https://doi.org/10.1016/j.sleep.2025.108696
9. Koffel, E., Branson, M., Amundson, E., & Wisdom, J. P. (2021). "Sign Me Up, I'm Ready!": Helping Patients Prescribed Sleeping Medication Engage with Cognitive Behavioral Therapy for Insomnia (CBT-I). *Behavioral Sleep Medicine*, *19*(5), 629–639. https://doi.org/10.1080/15402002.2020.1828085
10. Koniuszewski, F., Vogel, F. D., Dajić, I., et al. (2023). Navigating the complex landscape of benzodiazepine- and Z-drug diversity: Insights from comprehensive FDA adverse event reporting system analysis and beyond. *Frontiers in Psychiatry*, *14*, 1188101. https://doi.org/10.3389/fpsyt.2023.1188101
11. Kuntz, J. L., Kouch, L., Christian, D., Hu, W., & Peterson, P. L. (2019). Patient Education and Pharmacist Consultation Influence on Nonbenzodiazepine Sedative Medication Deprescribing Success for Older Adults. *The Permanente Journal*, *23*(1), 18–161. https://doi.org/10.7812/TPP/18-161
12. Kurko, T., Saastamoinen, L. K., Tuulio-Henriksson, A., et al. (2018). Trends in the long-term use of benzodiazepine anxiolytics and hypnotics: A national register study for 2006 to 2014. *Pharmacoepidemiology and Drug Safety*, *27*(6), 674–682. https://doi.org/10.1002/pds.4551
13. Lader, M. (2011). Benzodiazepines revisited—Will we ever learn? *Addiction*, *106*(12), 2086-2109. https://doi.org/10.1111/j.1360-0443.2011.03563.x
14. Lee, J. Y., Farrell, B., & Holbrook, A. M. (2018). De-prescribing benzodiazepine receptor agonists taken for insomnia: A review and key messages from practice guidelines. *Polish Archives of Internal Medicine*. https://doi.org/10.20452/pamw.4391
15. Lee, K. J., Wei, Y., Leung, S.-M., et al. (2025). A decade of Benzodiazepine and Z-drug use in Hong Kong: A longitudinal study. *The Lancet Regional Health - Western Pacific*, *59*, 101591. https://doi.org/10.1016/j.lanwpc.2025.101591
16. Li, C., Luo, Q., & Wu, H. (2025). Digital therapeutics for insomnia: An umbrella review and meta-meta-analysis. *Npj Digital Medicine*, *8*(1), 554. https://doi.org/10.1038/s41746-025-01946-y
17. Liu, M., Yi, R., Han, Z., et al. (2026). Efficacy of digital cognitive behavioral therapy for insomnia in hypnotic reduction among patients with insomnia: A randomized controlled trial. *Sleep Medicine*, *139*, 108727. https://doi.org/10.1016/j.sleep.2025.108727
18. Lu, M., Zhang, Y., Zhang, J., et al. (2023). Comparative Effectiveness of Digital Cognitive Behavioral Therapy vs Medication Therapy Among Patients With Insomnia. *JAMA Network Open*, *6*(4), e237597. https://doi.org/10.1001/jamanetworkopen.2023.7597
19. Manber, R., Gumport, N. B., Tully, I. A., et al. (2025). Effects of a Triage Checklist to optimize insomnia treatment outcomes and reduce hypnotic use: The RCT of the effectiveness of stepped-care sleep therapy in general practice study. *SLEEP*, *48*(1), zsae182. https://doi.org/10.1093/sleep/zsae182
20. Maurer, L. F., Aust, F., & Lorenz, N. (2025). Real-world evidence for the use of digital cognitive behavioural therapy for insomnia within primary care: A systematic evaluation of user data. *Somnologie*. https://doi.org/10.1007/s11818-025-00502-w
21. Miller, C. B., Bradley, D., Wood, I., et al. (2025). Real-World Implementation and Impact of Digital CBT for Insomnia on Healthcare Utilization: A Propensity-Matched Controlled Study. *Implementation Research and Practice*, *6*, 26334895251386306. https://doi.org/10.1177/26334895251386306
22. Moon, D. U., Kim, J., Sun, J. H., & Lee, Y. (2025). Applying a mobile intervention for chronic insomnia in routine care: Study protocol for a multicenter randomized controlled trial. *Internet Interventions*, *41*, 100848. https://doi.org/10.1016/j.invent.2025.100848
23. Olsen, M. L. S., Thorlund, J. B., Zachariae, R., et al. (2025). Digitally delivered cognitive behavioral therapy for insomnia (CBT-I) for patients with chronic pain and insomnia (The Back2Sleep Trial): Study protocol for a randomized controlled trial. *Trials*, *26*(1), 292. https://doi.org/10.1186/s13063-025-09013-3
24. Park, K. M., Kim, T. H., Kim, W. J., An, S. K., Namkoong, K., & Lee, E. (2018). Cognitive Behavioral Therapy for Insomnia Reduces Hypnotic Prescriptions. *Psychiatry Investigation*, *15*(5), 499–504. https://doi.org/10.30773/pi.2017.11.20
25. Philip, P., Dupuy, L., Sagaspe, P., et al. (2022). Efficacy of a Smartphone-Based Virtual Companion to Treat Insomniac Complaints in the General Population: Sleep Diary Monitoring Versus an Internet Autonomous Intervention. *Journal of Clinical Medicine*, *11*(15), 4387. https://doi.org/10.3390/jcm11154387

26. Pollmann, A. S., Murphy, A. L., Bergman, J. C., & Gardner, D. M. (2015). Deprescribing benzodiazepines and Z-drugs in community-dwelling adults: A scoping review. *BMC Pharmacology and Toxicology*, *16*(1), 19. https://doi.org/10.1186/s40360-015-0019-8
27. Prather, A. A., Krystal, A. D., Emsley, R., et al. (2025). The Effectiveness of Digital Cognitive Behavioral Therapy to Treat Insomnia Disorder in US Adults: Nationwide Decentralized Randomized Controlled Trial. *JMIR Mental Health*, *12*, e84323. https://doi.org/10.2196/84323
28. Riemann, D., Espie, C. A., Altena, E., et al. (2023). The European Insomnia Guideline: An update on the diagnosis and treatment of insomnia 2023. *Journal of Sleep Research*, *32*(6), e14035. https://doi.org/10.1111/jsr.14035
29. Rosenberg, R., Citrome, L., & Drake, C. L. (2021). Advances in the Treatment of Chronic Insomnia: A Narrative Review of New Nonpharmacologic and Pharmacologic Therapies. *Neuropsychiatric Disease and Treatment*, *Volume 17*, 2549–2566. https://doi.org/10.2147/NDT.S297504
30. Simpson, N., & Manber, R. (2022). CBT-I in patients who wish to reduce use of hypnotic medication. In *Adapting Cognitive Behavioral Therapy for Insomnia* (pp. 437–456). Elsevier. https://doi.org/10.1016/B978-0-12-822872-2.00014-1
31. Soh, H. L., Ho, R. C., Ho, C. S., & Tam, W. W. (2020). Efficacy of digital cognitive behavioural therapy for insomnia: A meta-analysis of randomised controlled trials. *Sleep Medicine*, *75*, 315–325. https://doi.org/10.1016/j.sleep.2020.08.020
32. Sweetman, A., Andronis, C., Hancock, K., et al. (2023). General practitioner assessment and management of insomnia in adults. *Australian Journal of General Practice*, *52*(10), 691–698. https://doi.org/10.31128/AJGP-01-23-6678
33. Takaesu, Y., Utsumi, T., Okajima, I., et al. (2019). Psychosocial intervention for discontinuing benzodiazepine hypnotics in patients with chronic insomnia: A systematic review and meta-analysis. *Sleep Medicine Reviews*, *48*, 101214. https://doi.org/10.1016/j.smrv.2019.101214
34. Vedaa, Ø., Kallestad, H., Scott, J., et al. (2020). Effects of digital cognitive behavioural therapy for insomnia on insomnia severity: A large-scale randomised controlled trial. *The Lancet Digital Health*, *2*(8), e397–e406. https://doi.org/10.1016/S2589-7500(20)30135-7
35. Watson, N. F., Benca, R. M., Krystal, A. D., McCall, W. V., & Neubauer, D. N. (2023). Alliance for Sleep Clinical Practice Guideline on Switching or Deprescribing Hypnotic Medications for Insomnia. *Journal of Clinical Medicine*, *12*(7), 2493. https://doi.org/10.3390/jcm12072493
36. Wichniak, A., Bieńkowski, P., Dąbrowski, R., Mastalerz-Migas, A., & Rymaszewska, J. (2023). Treatment of insomnia in older adults. Recommendations of the Polish Sleep Research Society, Polish Society of Family Medicine and the Polish Psychiatric Association. *Psychiatria Polska*, *57*(3), 495–516. https://doi.org/10.12740/PP/OnlineFirst/161597
37. Winter, S., Crocker, S., Rolls, T., Curtin, D., Haratsis, J., & Szollosi, I. (2025). Stepped care and digital intervention service model design in the multidisciplinary sleep service. *Internet Interventions*, *40*, 100830. https://doi.org/10.1016/j.invent.2025.100830
38. Zgierska, A. E., Boyle, M. P., & Conigliaro, J. (2025). Supporting Patients Through Benzodiazepine Tapering: A New Joint Clinical Practice Guideline. *Journal of General Internal Medicine*, *40*(12), 2811–2813. https://doi.org/10.1007/s11606-025-09634-z
39. Zofia Hałabuda & Kornelia Rynkiewicz. (2026). DIGITAL COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA: SAFETY, LIMITATIONS, AND PATIENT-SPECIFIC CONTRAINDICATIONS. *International Journal of Innovative Technologies in Social Science*, (1(49)). https://doi.org/10.31435/ijitss.1(49).2026.4925