



# Predictors of dropout from internet-based self-help cognitive behavioral therapy for insomnia



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## ABSTRACT

Dropout from self-help cognitive-behavioral therapy for insomnia (CBT-I) potentially diminishes therapeutic effect and poses clinical concern. We analyzed the characteristics of subjects who did not complete a 6-week internet-based CBT-I program. Receiver operator characteristics (ROC) analysis was used to identify potential variables and cutoff for predicting dropout among 207 participants with self-report insomnia 3 or more nights per week for at least 3 months randomly assigned to self-help CBT-I with telephone support ( $n = 103$ ) and self-help CBT-I ( $n = 104$ ). Seventy-two participants (34.4%) did not complete all 6 sessions, while 42 of the 72 (56.9%) dropped out prior to the fourth session. Significant predictors of non-completion are total sleep time (TST)  $\geq 6.82$  h, Hospital Anxiety and Depression Scale depression score  $\geq 9$  and Insomnia Severity Index score  $< 13$  at baseline in this ranking order. Only TST  $\geq 5.92$  h predicts early dropout. Longer TST and less severe insomnia predict dropout in this study of self-help CBT-I, in contrast to shorter TST as a predictor in 2 studies of face-to-face CBT-I, while greater severity of depression predicts dropout in both this study and a study of face-to-face CBT-I. Strategies for minimizing dropout from internet-based CBT-I are discussed.

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## 1. Introduction

Insomnia is a common sleep problem which affects 10–15% of the adult population worldwide (Chung et al., 2015; Ohayon, 2002). It is associated with negative health consequences (Taylor et al., 2007), work absenteeism (Kessler et al., 2011; Kleinman, Brook, Doan, Melkonian, & Baran, 2009), motor car accidents (Daley et al., 2009), and increased healthcare utilization (Walsh, 2004). Cognitive behavioral therapy for insomnia (CBT-I) is a multi-component intervention including sleep hygiene education, sleep restriction, stimulus control, cognitive restructuring and relaxation training (Morin et al., 2006). With benefits of low cost and easy accessibility, self-help CBT-I has been used as an efficacious and acceptable entry-level treatment in a stepped-care delivery model of CBT-I (Espie, 2009; Ho et al., 2015). However, dropout from treatment potentially diminishes its therapeutic effect and poses

clinical concern. A sense of dissatisfaction or failure can be developed and result in the worsening of symptoms. In addition, a reduced motivation to receive further therapist-administered CBT-I can occur, hence reducing the likelihood of receiving effective treatment. Therefore, strategies for preventing or minimizing dropout from self-help CBT-I are important.

The term “dropout” can be defined as withdrawal prior to completing adequate treatment. Dropout from psychological treatment typically, but not always, occurs early and before significant improvement is achieved (Ogrodniczuk, Joyce, & Piper, 2005); in such circumstances, and when there appears to be no justifiable reason, dropout is considered to be inappropriate. Due to differences in study design, sample characteristics and “dropout” definition, previous studies reported a wide range of dropout from self-help CBT-I, ranging from 0% to 44.4%, with an average of 15.6% (Ho et al., 2015). Some factors may contribute to the decision to terminate prematurely (Ogrodniczuk et al., 2005). For example, subjects may feel that the self-help program is impersonal, inconvenient, hard to follow, or that it is not meeting their expectations. Subjects may have insufficient motivation, low psychological mindedness, or may dropout when improvement is not quick

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enough. Specific to CBT-I, participants may dropout because they find the treatment recommendations counterintuitive, experience significant daytime sleepiness early in treatment, complain of boredom and lack of activities upon the advice to reduce time in bed, or are ambivalent about changing their sleep-wake habit (Riedel & Lichstein, 2001).

Although dropout from self-help CBT-I is clinically relevant, research on factors related to dropout is scarce, especially for self-help CBT-I. Ong et al. found no significant predictor of dropout from group CBT-I that lasted 7 sessions, but shorter total sleep time (TST) and greater severity of depression at baseline were associated with dropout prior to the fourth session (Ong, Kuo, & Manber, 2008). Age, sex, chronotype, dysfunctional attitudes about sleep, and use of sleep medications were not associated with treatment non-completion or early dropout. Perlis et al. examined 85 patients with primary insomnia and found that those who did not accept individual CBT-I or dropped out prior to the fourth session had shorter baseline TST and greater number of awakenings than those who received at least 4 sessions (Perlis et al., 2000). Age, sex, marital status, race, prevalence of medical or psychiatric disorders, anxiety and depression severity, and self-reported sleep onset latency (SOL) and wake after sleep onset (WASO) were not associated with treatment non-acceptance or early dropout. Another study showed that longer TST at baseline, not shorter, and psychiatric comorbidity were predictive of dropout from a 5-week internet-based sleep hygiene educational program (Hebert, Vincent, Lewycky, & Walsh, 2010). The authors found that the Theory of Planned Behavior (Ajzen, 1991) and the Transtheoretical Model of Behavior Change (Prochaska & DiClemente, 1983) were not able to predict dropout from the self-help program. Essentially, it means that the level of intention and stage of preparation at baseline were unrelated to dropout.

In view of the mixed results in previous studies and limited data on dropout from self-help CBT-I, we aimed to identify the characteristics of subjects who could not complete a 6-week internet-based CBT-I program. Based on findings in previous studies, we hypothesized that baseline severity of insomnia and depression can predict non-completion and early dropout from self-help CBT-I.

## 2. Method

### 2.1. Sample

Data of the present study were obtained from a randomized controlled trial of self-help CBT-I (ClinicalTrials.gov Identifier: NCT01719120) (Ho, Chung, Yeung, Ng, & Cheng, 2014). We recruited participants through the internet, emails, social networking websites, public talks, and mass media. The inclusion criteria were: (1) Hong Kong residents aged 18 years or above; (2) self-reported difficulty in initiating or maintaining sleep, early morning awakening, or non-restorative sleep that were associated with significant distress or impairment in occupational, social and other important areas of functioning for at least 3 nights per week for more than 3 months; (3) having the ability to read Chinese and type in Chinese or English; and (4) having an email account and internet access. Participants were excluded if they reported any suicidal ideas. No monetary incentive was provided, but the treatment was free of charge.

### 2.2. Procedure

All procedures used in the present study was reviewed and approved by the local institutional review board. Participants that showed an interest in the study were directed to a website. Informed consent was obtained prior to all study procedures. After

online screening, participants were provided with a username and password and were required to complete a 1-week sleep diary as well as a set of questionnaires. Three-hundred and twelve participants completed the assessment and were randomly assigned to self-help CBT-I with telephone support ( $n = 103$ ), self-help CBT-I without telephone support ( $n = 104$ ), and waiting-list control ( $n = 105$ ). We reviewed the 207 participants randomized to receive self-help CBT-I and analyzed the baseline variables that predict non-completion and early dropout.

### 2.3. Intervention

The internet-based self-help CBT-I lasted for 6 weeks, with treatment materials delivered once per week. The content was adopted from a well-established CBT-I manual (Morin & Espie, 2003). We summarized the most salient information of the treatment manual, edited the language in Hong Kong Chinese, and used examples that we believed were most relevant in the local setting. Most of the materials were presented in text, together with some diagrams and a 15-min audio clip on relaxation training. Session 1 consists of a program overview, basic facts about sleep, etiological model of insomnia, the roles of cognition and behavior as perpetuating factors, the influence of temperature, age and psychosocial factors on sleep, and goal setting. Session 2 includes sleep hygiene, activity scheduling, and relaxation training. Session 3 begins with a revision of the sleep hygiene rules, followed by an introduction of stimulus control and sleep restriction. Session 4 begins with a revision of the stimulus control and sleep restriction principles, followed by cognitive therapy. Session 5 focuses on cognitive therapy and relaxation training. The last session summarizes the major points of previous sessions, reviews the treatment goal, and covers relapse prevention. Full details of the program are described in our paper (Ho et al., 2014).

Weekly telephone support was provided by the author (YYH), a psychology graduate, using a semi-structured script. YYH answered participants' questions about treatment content, encouraged participants to read the materials and complete the assignments, and reviewed their treatment progress. The telephone support was limited to 15 min each time.

### 2.4. Measures

#### 2.4.1. Socio-demographic variables and medical and psychiatric history

Participants reported their age, gender, year of full-time education, marital status, occupation, insomnia duration, medical and psychiatric history, and current use of hypnotics by using the online questionnaire.

#### 2.4.2. Expanded Consensus Sleep Diary for Morning (CSD-M)

The CSD-M is a prospective self-report measure developed by a group of experts in an effort to standardize sleep diary assessment. Participants were asked to complete CSD-M everyday within 1 h of getting out of bed for 7 consecutive days (Carney et al., 2012). The average SOL, WASO and TST were analyzed.

#### 2.4.3. Insomnia Severity Index (ISI)

In this study, both the ISI and TST were included as potential predictors. The ISI is a 7-item self-rating scale that was used to assess the perceived severity of insomnia and the associated functional impairment in the previous week (Bastien, Vallieres, & Morin, 2001), while the TST only assesses the sleep length. The ISI is a 5-point Likert scale with anchor points ranging from "none" to "very severe", "very satisfied" to "very dissatisfied" and "not at all noticeable, worried, or interfering" to "very much noticeable,

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