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ORIGINAL ARTICLE

Self-efficacy enhancement can facilitate hypnotic tapering in patients with primary insomnia

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Abstract

Self-efficacy plays an important role in motivating behavior change. The present study implemented a self-efficacy enhancement procedure to examine its influence on hypnotic tapering. Twenty-four long-term hypnotic users underwent a self-efficacy enhancement procedure prior to undergoing a systematic gradual tapering program, and another 24 hypnotic users underwent the systematic tapering program only to serve as a control group. Self-efficacy in tapering off hypnotics was significantly increased following the self-efficacy enhancement procedure. The increase could predict the percentage of dosage reduction after controlling for baseline self-efficacy level. Further, patients in the self-efficacy enhancement group showed a greater percentage of dosage reduction than those in the control group. In terms of sleep parameters, the program resulted in shorter waking time after sleep onset than the control program, but did not show significant effects on the other sleep parameters. The findings support the facilitating effect of self-efficacy enhancement on hypnotic tapering.

Key words: hypnotic, insomnia, self-efficacy, tapering.

INTRODUCTION

Insomnia is a highly prevalent health complaint and hypnotics are among the most common choice of treatment. It has been estimated that up to 11% of the general adult population and 33% of patients with insomnia use prescribed medication that promote sleep during the course of a year.[1] Insomnia tends to be chronic in nature,[2] but most hypnotics are only approved for a limited time of less than 5 weeks.[3] Although there is inadequate empirical evidence demonstrating that hypnotics remain efficacious over longer periods of time, many patients with chronic insomnia use them for a prolonged period of time.[3,4] A survey study showed that about 31% of hypnotic users had been using the drug for over 5 years, 42% between 1 and 5 years, and 9% between 6 months and 1 year.[5] In addition, benzodiazepine (BZD) use is reported to be associated with a high rate of adverse effects[6,7] and withdrawal symptoms[8–11] after chronic use. Although the newer benzodiazepine receptor agonists (BZRAs) are reported to have less overall risk of adverse effects and withdrawal symptoms,[7,12,13] these agents can nevertheless cause impaired memory, psychomotor retardation, and complex sleep-related behaviors.[14,15] Several recent studies further report cases of BZRA dependence, which show elevated daily dosage after long-term use.[16–18]

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Different strategies have been developed to assist the tapering of hypnotic medication. For example, one common strategy is to instruct the patients to reduce their use of hypnotics by decreasing the dosage by 25% every week, or every other week, until the smallest minimal dosage is reached. Several studies have shown that this approach is effective for both young and older adult patients.[19,20] One study provided an initial psychological support session and telephone consultations during gradual tapering and reported a success rate as high as 80% in helping elderly patients with insomnia to discontinue medication.[9] Tapering programs have often been combined with cognitive and behavioral techniques to generate better results. For example, one study added two sessions of stimulus control treatment,[21] while another study added relaxation training to a gradual hypnotic withdrawal program.[19] Both found that the additional component did not enhance the effectiveness of hypnotic tapering, but improved outcomes in terms of nocturnal sleep, and daytime functioning or withdrawal symptoms. Multi-component CBT-I has also been shown to enhance the effect of a systematic tapering program in several studies. Two studies reported that more participants in the CBT-I group completely discontinued hypnotic medication than those in the systematic tapering group.[20,22] However, a follow-up study showed no significant difference in the long-term relapse rates of programs with and without CBT-I.[23] A recent randomized control study comparing systematic tapering alone with drug withdrawal plus CBT-I and drug withdrawal plus placebo biofeedback also showed no significant difference in medication reduction effect among the three treatments.[24] All the groups demonstrated substantial hypnotic reduction at post-treatment and 1-year follow-up. The group with supplemented CBT-I, however, showed additional benefits in self-reported sleep measures.

While the beneficial effects of psychological and behavioral techniques in improving sleep has been well documented,[25,26] their effects on hypnotic reduction are not consistently better than systematic tapering alone. One possible reason is that these additional techniques are designed primarily for insomnia symptoms, not for a behavioral change in medication use. One study added behavioral analysis, which focuses on examining the actual contingencies between antecedent behavior (including medication use behavior) and short-term and long-term consequences, to CBT-I and showed good results in medication reduction.[27] Seventy-nine percent of the patients receiving combined therapy were able to taper their daily dose of hypnotics to 50% or less of baseline and 38% were free of medication at the end of treatment, while only 24% reduced to a dose of 50% or less and 4% discontinued medication in the treatment-as-usual control group. However, the beneficial effect of the behavioral analysis component could be evaluated because the study did not compare the combined therapy with CBT-I alone and/or systematic tapering alone. Nevertheless, the results suggest that addressing the psychological mechanisms associated with behavior change could be important.

A psychological variable that has been addressed in previous studies of hypnotic discontinuation is self-efficacy. It is defined as people's beliefs about their capability to achieve designated levels of performance that influence events in their lives and can make a significant contribution to people's motivation to initiate and/or persist in pursuing a difficult goal.[28] Self-efficacy has been well documented in other areas of behavior change and substance use, and is shown to be an important determinant of successful behavior change.[29,30] It is proposed to be a mediator of change in several health-related behaviors.[31] Self-efficacy is also included as one of the main principles of motivational interviewing and is considered to be effective in the treatment of disorders related to substance use.[32] Hypnotic withdrawal, like other health-enhancing behaviors, can be conceptualized as a behavior change. One study in participants taking BZD for either anxiety or insomnia found that those who successfully discontinued the use of BZD showed higher self-efficacy at the end of a 20-week tapering program than those who failed; however, the two groups were no different in their initial levels of self-efficacy.[33] Studies in hypnotic tapering have also found that success in tapering is associated with higher self-efficacy during the latter part of tapering programs for elderly hypnotic users.[34,35] Similarly, decreased self-efficacy is reported for subjects who relapsed at a 3-month follow-up.[35] The authors suggested that higher self-efficacy in those who succeed in discontinuing medication is more likely to reflect the consequence of medication tapering. However, it is also possible that some of the difference may stem from increased self-efficacy during the tapering process.

The present study therefore aims to further investigate the association between self-efficacy and hypnotic tapering by implementing a self-efficacy enhancing procedure prior to hypnotic tapering. The purposes of the study is twofold: (i) to clarify the association between initial level and changes of self-efficacy and hypnotic tapering with a quasi-experimental design; (ii) to exam the effect of

a self-efficacy enhancement program in facilitating hypnotic tapering. According to Bandura,[28] people's beliefs in their efficacy can be developed by four main sources of influence, namely (i) past experiences of mastery, (ii) vicarious experiences of social models, (iii) social persuasion that one has the capability to succeed in a given activity, and (iv) inferences from somatic and emotional states that are indicative of personal strengths and vulnerabilities. Therefore, self-efficacy may be deliberately enhanced by manipulating these sources. The self-efficacy enhancement procedure in the present study was designed to promote some of these sources through a review of outcome data in previous studies, vicarious learning using videotape, and reducing the impact of prior unsuccessful experiences in two weekly sessions prior to a standard systematic tapering program. The levels of self-efficacy were assessed at baseline prior to the program, after the 2-week self-efficacy enhancement intervention, and at the end of the tapering program in order to evaluate the differential contributions of self-efficacy at different time points on hypnotic reduction. It was hypothesized that the level of self-efficacy should increase after the 2-week procedure and this increase can predict the outcome of hypnotic tapering while controlling for baseline self-efficacy. The level of self-efficacy at the end of the tapering should also be associated with the tapering outcome as shown in previous studies.[34,35] Further, the program should generate additional benefit than a control group that underwent the systematic tapering program alone.

METHODS

Participants and procedure

The study is a non-randomized open trial with quasi-experimental design. Fifty-seven potential participants were recruited from a psychiatric clinic and a sleep clinic in a medical center. Potential subjects were screened by a board certified psychiatrist specialized in sleep medicine for major psychiatric disorders and other sleep disorders. They were referred only if their insomnia symptoms had improved and stabilized under medication and were required to meet the following criteria: (i) between 18 and 65 years old; (ii) subjective complaints of difficulty initiating sleep, maintaining sleep, and/or unrefreshed sleep, as well as meeting the diagnostic criteria of primary insomnia in the DSM-IV-TR[36] before taking medication; (iii) used hypnotics for more than three days per week for at least 3 months and maintained a stable dosage of medication for at least four weeks; (iv) used no more than two types of hypnotics; (v) no current or past history of other psychiatric or sleep disorders; (vi) no current or past history of medical disorders that may affect sleep, and; (vii) not be a shift-worker. In addition, the hypnotics used should be BZDs and/or BZD receptor agonists. If low-dose antidepressants were used for a depressed mood associated with sleep disturbances, participants were instructed to maintain the dosage.

Twenty-eight patients who fulfilled the criteria were initially recruited for the self-efficacy enhancement group (SEE group). Four of them dropped out due to the occurrence of life stressors. Therefore, 24 patients completed the procedure (female : male = 15:9; mean age = 48.29 ± 9.92) of which, 17 used BZRA; three used long-acting BZD; and four used two hypnotic medications (two BZDs or BZD plus BZRA). Among them, nine also used low-dose antidepressants at the same time. Twenty-nine patients were recruited from the same hospital by the same physician to participate in the systematic tapering program as a control group of which, five dropped out: four due to medical conditions and one due to life stressors. Thus, 24 participants (female : male = 16:8; mean age = 45.37 ± 8.60) completed the study. In terms of the hypnotics used, 17 subjects used BZRA, two used long-acting BZD, and five used two hypnotic medications (two BZDs or BZD plus BZRA). Among them, 10 were using both hypnotic and low-dose antidepressants.

The experimental procedure lasted for 10 weeks. Participants in the SEE group underwent a 2-weekly-session self-efficacy enhancement procedure (week 1 and week 2) followed by an 8-week systematic discontinuation program (week 3 to week 10). Participants had to meet with the physician and the researcher in the first 2 weeks to receive the self-efficacy enhancement procedure (described below) and to set up a tentative tapering schedule for the following weeks. Subsequently, they went through the systematic discontinuation program (described below) with brief consultation sessions held during the fifth week and the last week for the mid-treatment and final evaluations, respectively. During the other weeks, participants were contacted by phone for a brief consultation to answer questions and to set up the dosage for the following week. Participants had to fill out sleep logs throughout the experimental period and had to rate their self-efficacy on a single item visual analog scale during the consultation session.

Participants in the control group had baseline evaluations during the first 2 weeks and then underwent the

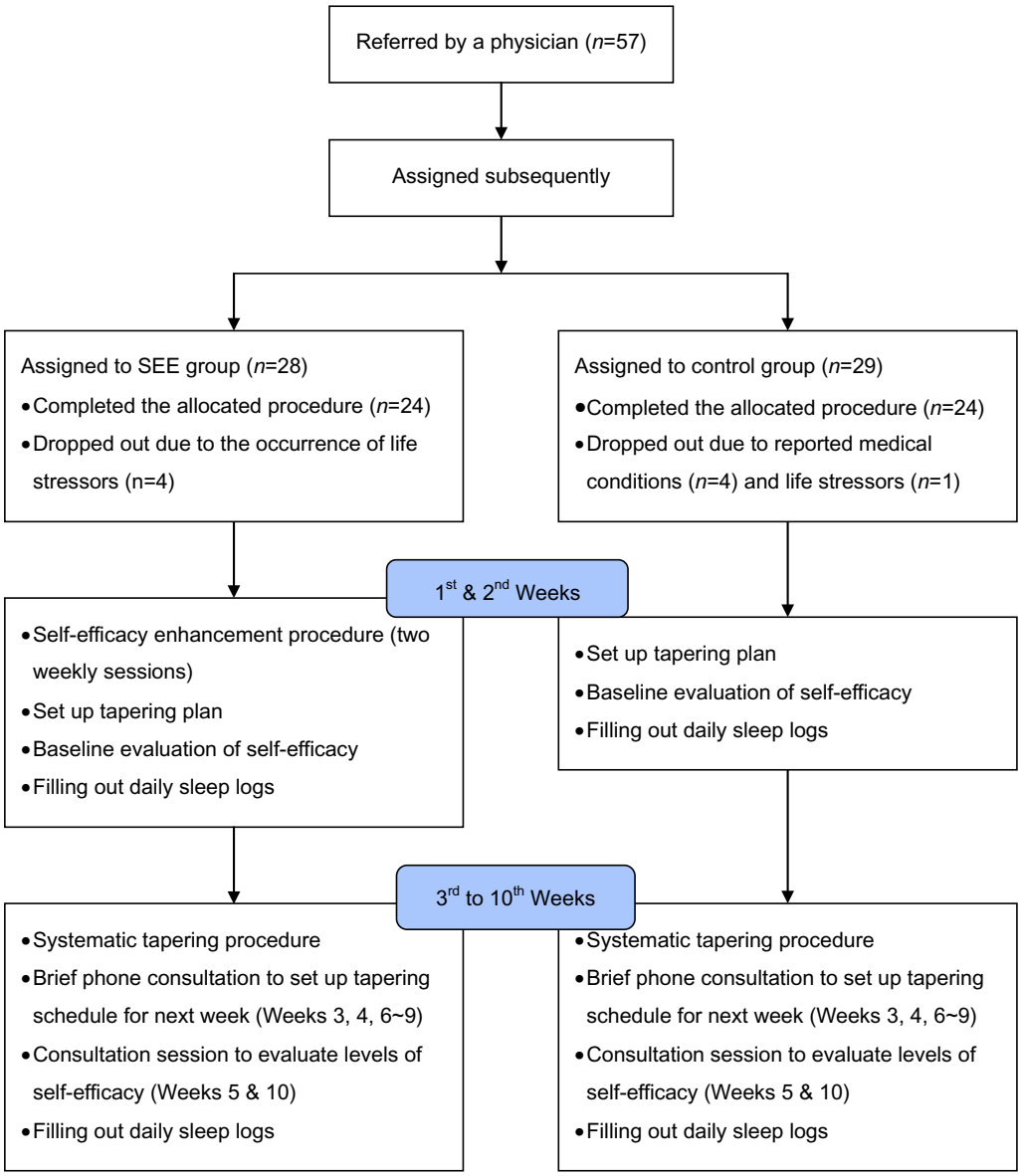

Figure 1 Study flow chart.

same 8-week systematic discontinuation program as those in the SEE group (Fig. 1).

Self-efficacy enhancement procedure

The self-efficacy enhancement procedure was designed to increase self-efficacy by promoting the sources of self-efficacy as theorized by Bandura,[28] including: (i) providing positive vicarious experiences by presenting and discussing successful cases; (ii) social persuasion by a discussion of empirical studies that show the positive outcomes of hypnotic tapering, and (iii) reducing the impact of previous unsuccessful experiences by reviewing the obstacles in prior tapering attempts. It included two visits, each of about 30 min duration, during the first 2 weeks. Details of systematic tapering were introduced in the first week, along with previous research that had shown positive outcomes. Participants' prior unsuccessful experiences were also reviewed and their inappropriate strategies were identified in order to reduce the impact of these experiences. The second visit included a video presentation of individuals who had

successfully discontinued the use of hypnotics and a subsequent discussion. The video was based on interviews with real patients who had completed a tapering procedure and successfully discontinued their medication. Their narratives were transcribed and reorganized to form the script that was played out by actors in the videotape. These individuals shared their experiences of chronic insomnia; their feelings and thoughts during the tapering procedure; the best and worst experiences they had during tapering; and the way they remained drug-free. They also provided advice and encouragement to other patients who wanted to quit hypnotics. After the video presentation, the experimenter had a brief discussion with the subjects to answer the questions they might have regarding the content of the video presentation.

Systematic discontinuation program

The program consists of 8 weeks that was conducted from the third to the 10th weeks. Patients were instructed to reduce their initial dosage of hypnotic medication by 25% during the third week, 50% during the fifth week, and to completely discontinue hypnotic use by the end of the ninth week. Medication-free nights were introduced once the smallest dose was reached. At first, patients were free to choose the nights it would be easier for them to refrain from taking sleep medication, such as weekends. Subsequently, medication-free nights were pre-selected and observed until the hypnotics had been totally eliminated.

The procedures were conducted by two trained graduate students who were majoring in clinical psychology and had completed a one-year internship, which included 6 months in a behavioral sleep medicine program. They were under the supervision of a licensed clinical psychologist with the American Academy of Sleep Medicine accreditation in Behavioral Sleep Medicine. A written informed consent was obtained from all participants. The procedure adhered to the ethical standards of the Taiwan Psychological Association.

Measurements

Sleep logs

Participants were required to complete sleep logs daily in the morning throughout the experimental period in order to monitor their sleep and medication use. The parameters monitored on their sleep logs included bedtime, rising time, sleep-onset latency, number and duration of awakenings, and medication intake. The variables derived for analyses were based on standard outcomes assessment in insomnia research;[37] these included sleep onset latency, wake after sleep onset, total sleep time, sleep efficacy, and dosage of medication intake.

Self-efficacy rating scale

Participants' self-efficacy on the discontinuation of hypnotics was assessed with a single-item scale. Participants had to rate their confidence in achieving the goal of medication reduction for the next week on a 0 to 100 bipolar scale anchored by the statements "not at all capable" (0%) and "fully capable" (100%), with the instruction. A similar single-item scale for self-efficacy was used in a previous study to measure perceived self-efficacy throughout a hypnotic tapering program and was found to predict the final results.[34] In addition, a single-item measure of self-efficacy has been shown to correlate well with a 20-item well-established self-efficacy rating scale. This measure has also been shown to predict young adults' relapse into substance use after discharge from an in-patient treatment program as compared to the 20-item scale.[38]

Statistical analysis

Independent-sample *t*-tests were conducted to compare the demographic data, self-efficacy, hypnotic-use related variables, and percentage of medication reduction between the SEE group and the control group. The percentage of medication reduction was calculated by dividing the dosage reduced at the end of the intervention by the initial dosage. Gender distribution and the number of patients who were medication-free at the end of the intervention of the two groups were compared with χ^2. A hierarchical regression was conducted to examine the extent to which the final reduction of medication could be explained by the initial level and the changes in self-efficacy. Three predictors derived from the self-efficacy ratings in the first week (SE1), the second week (SE2), and the 10th week (SE10) were included in the regression model. These predictors were baseline self-efficacy (SE1), increase of self-efficacy after the enhancement program was applied (SE2–SE1), and change in self-efficacy through the systematic tapering program (SE10–SE2). In terms of sleep parameters, sleep onset latency, total sleep time, wake time after sleep onset, and sleep efficacy from the sleep logs of the first and the last weeks were analyzed. Mixed-design

two-way ANOVAs, with a within-subject variable (Time) consisting of two levels (the first week vs the last week) and a between-subject variable (Group) consisting of two groups (SEE group vs control group), were conducted. *t*-tests with Bonferroni corrections were performed as post-hoc comparisons if significant interaction was obtained.

RESULTS

Independent-sample *t*-tests showed no significant difference between the two groups in terms of demographic data, including age and education, as well as hypnotic-use related variables (see Table 1). Gender distribution also showed no significant difference between the two groups ($\chi^2_{(1)} = 0.091$, $P = 0.763$).

In terms of the association between self-efficacy and drug reduction, the results of a hierarchical regression shows that the three levels of self-efficacy (SE1, SE2–SE1, and SE10–SE2) altogether could explain a total of 69% of the variance in the percentage of drug reduction (see Table 2). The baseline self-efficacy could explain 15% of the hypnotic reduction ($F_{(1,42)} = 7.487$, $P < 0.01$). The increased self-efficacy after the self-efficacy enhancement program (SE2–SE1) explained an additional 22% of the variance ($F_{(1,41)} = 14.238$, $P < 0.01$). Finally, the increase of self-efficacy throughout the systematic tapering (SE10–SE2) explained an additional 32% of the variance in medication reduction ($F_{(1,40)} = 41.531$, $P < 0.001$). As presented in Table 3, *t*-tests showed no significant difference between the two groups at baseline ($t_{(46)} = 1.419$, $P = 0.163$), but significantly higher self-efficacy for the SEE group were seen in the second, fifth, and 10th weeks (Week 2: $t_{(46)} = -2.278$, $P < 0.05$; Week 5: $t_{(41)} = -2.349$, $P < 0.05$; Week 10: $t_{(42)} = -3.017$, $P < 0.01$).

Two indices were used to measure the tapering outcome: the percentage of reduction in medication usage and the percentage of participants who had stopped taking the medication. In terms of the percentage of drug reduction, an independent sample *t*-test showed that the SEE group (78.62%; *SD* = 18.26) achieved significantly more reduction than the control group (64.10%; *SD* = 32.27; $t_{(46)} = 1.918$, $P < 0.05$). A χ^2 was used to compare the number of subjects who had stopped taking medication. The percentage of drug-free

Table 1 Comparisons of demographic data and clinical characteristics before the hypnotic tapering program

	Group					
	Self-efficacy enhancement group (n = 24)		Control group (n = 24)			
Variables	*Mean*	*SD*	*Mean*	*SD*	*t*	*P*-value
Age (years)	48.29	9.92	45.37	8.60	1.09	0.28
Education (years)	12.83	3.19	13.04	3.01	–0.23	0.82
Duration of insomnia (months)	103.17	60.59	86.33	112.24	0.65	0.52
Hypnotic-use related variables						
Duration (months)	79.50	48.74	53.83	71.47	1.45	0.15
Dosage (pills/week)	5.56	1.74	5.46	1.69	0.21	0.83
Self-efficacy (%)	52.50	17.32	61.67	26.48	–1.42	0.16

Table 2 Increased percentage of the self-efficacy of hypnotic tapering and the percentage of medication reduction in the hierarchical regression model

Predictive variables	*R*	R^2	Adjusted R^2	ΔR^2	ΔF	ΔP
SE1	0.389	0.151	0.131	0.151	7.487	0.009**
SE1, SE2-SE1	0.608	0.370	0.339	0.219	14.238	0.001**
SE1, SE2-SE1, SE10-SE2	0.831	0.691	0.668	0.321	41.531	<0.001***

Note: **$P < 0.01$. ***$P < 0.001$. SE1= baseline self-efficacy. Participants in the self-efficacy enhancement group had not undergone a self-efficacy enhancement program; SE2–SE1, the increased percentage of self-efficacy after a self-efficacy enhancement program. Participants in the self-efficacy enhancement group had not undergone a systematic discontinuation program; SE10–SE2, the increased percentage of self-efficacy after an eight-week systematic discontinuation program.

Table 3 Self-efficacy at different time points during the self-efficacy enhancement group's and control group's hypnotic tapering

	Group						
	Self-efficacy enhancement (n = 24)		Control (n = 24)				Effect Size
Variable	*Mean*	*SD*	*Mean*	*SD*	*t*	*P*-value	Cohen's *d* (95% CI)
Week 1[†]	52.50	17.32	61.67	26.48	1.419	0.163	–
Week 2[‡]	74.58	12.59	61.25	25.76	–2.278	0.027*	0.66 (0.08–1.24)
Week 5	73.75	9.46	58.42	30.23	–2.349	0.024*	0.68 (0.10–1.26)
Week 10	77.50	10.83	56.50	32.04	–3.017	0.004**	0.87 (0.28–1.46)

*P < 0.05. **P < 0.01. [†]Baseline level. [‡]At this point in time, participants in the self-efficacy enhancement group had undergone a self-efficacy enhancement program, but participants in the control group had not started the tapering program.

Table 4 Means, standard deviations (SDs), and ANOVA results comparing sleep-related variables prior and after the hypnotic tapering programs in both self-efficacy enhancement (SEE) group and control group

	SEE group (n = 24)		Control group (n = 24)		*F*-Value		
Variables	*Mean*	*SD*	*Mean*	*SD*	Time	Group	Time X Group
Sleep onset latency (min)							
Baseline	40.90	19.92	46.07	34.29	0.248	0.000	1.549
Post-treatment	40.00	22.31	38.79	21.53			
Wake after sleep onset (min)							
Baseline	45.45	29.34	58.12	49.54	1.724	5.169*	4.393*
Post-treatment	41.42	24.17	75.67	49.23			
Total sleep time (min)							
Baseline	387.07	52.98	401.55	84.18	2.190	0.014	1.926
Post-treatment	386.25	39.91	376.07	90.56			
Sleep efficiency (%)							
Baseline	81.71	8.09	78.94	10.99	0.911	3.13	1.366
Post-treatment	81.99	6.14	76.16	11.75			

*P < 0.05.

patients at the end of the program was not significantly different in the two groups (self-efficacy enhancement group: 7/24 = 29.2%; control: 4/24 = 16.7%; $\chi^2_{(1)}$ = 1.061, P = 0.303).

ANOVA results on sleep variables showed no significant main effects and interactions on sleep onset latency, total sleep time, and sleep efficiency (see Table 4). A significant interaction ($F_{(1,46)}$ = 4.393, P = 0.042, eta^2 = 0.089) and a group main effect ($F_{(1,46)}$ = 5.169, P = 0.028, eta^2 = 0.103) were obtained on wake-after-sleep-onset. Estimated epsilons (ε) for all variables were equal to one, indicating that the condition of sphericity was met. Post-hoc comparisons showed no significant difference between the two groups prior to the interventions ($t_{(46)}$ = 1.072, P < 0.289) but significantly more waking time after sleep onset for the control group after the intervention ($t_{(46)}$ = 3.047, P < 0.005).

DISCUSSION

The self-efficacy enhancement procedure was found to effectively increase the level of self-efficacy for hypnotic reduction. Further, the results demonstrated significant associations between the degree of self-efficacy and the percentage of reduction in hypnotic use. First, the baseline self-efficacy could explain 15% of the variance in hypnotic reduction, indicating that the level of self-efficacy prior to intervention is important. It may increase the readiness to participate in the tapering program. More importantly, the increased self-efficacy after the application of the self-efficacy enhancement strategies was able to predict 22% of the variance in hypnotic reduction after controlling for baseline self-efficacy. This result supports our hypothesis that deliberately increased self-efficacy can be beneficial for

hypnotic reduction. Lastly, the increase in self-efficacy through to the end of the systematic tapering program had the greatest association with the treatment outcome and could explain an additional 32% of the variance. A similar association between the treatment outcome and increased self-efficacy throughout the treatment has been reported by previous studies.[34,35] This result is expected considering increased self-efficacy could reflect the mastery experience, which Bandura suggested was one of the major sources of self-efficacy, in those participants who obtained a better outcome throughout the intervention.

Hypnotic withdrawal, like other health-enhancing behaviors, can be conceptualized as a behavior change. Self-efficacy has been found to be one of the cognitive factors that mediate different motivational phases.[39,40] For example, a previous study has reported that smokers in the precontemplation phase perceived fewer advantages to quitting and received less support than smokers in the contemplation phase; smokers in the contemplation phase, on the other hand, reported lower self-efficacy expectations than those in the preparation phase, while this group had lower self-efficacy expectations than respondents in the action phase.[41] The researchers therefore suggested that self-efficacy may play a more critical role for those who are in the contemplation and preparation phases. Similarly, self-efficacy in smoking cessation was also shown to increase in a linear fashion; it was higher in the preparation and action phases than in the precontemplation and contemplation phases.[30] Supporting self-efficacy is also included as one of the main principles of motivational interviewing that is effective in the treatment of disorders related to substance use.[32] The participants of the current study were recruited from an outpatient clinic by their physician. Most of them are more likely to be at or beyond the contemplation phase for hypnotic discontinuation. Promoting self-efficacy could be a useful strategy. However, the motivational phases were not assessed in the current study. This issue could be further explored in future study.

The additional benefit of adding this self-efficacy enhancement procedure was also confirmed by comparing the tapering outcome with a control group receiving the systematic tapering only. There was a greater reduction in percentage and dosage of hypnotic use for the group that underwent the self-efficacy enhancement procedure. The average percentage of medication reduction was 62% for systematic tapering alone and 79% when self-efficacy enhancement strategies were added. In spite of the effectiveness in reducing medication use, the number of patients who achieved total discontinuation of hypnotic use in the self-efficacy enhancement group (29.2%) was not significantly higher than the control group (16.7%). Furthermore, the percentages of total discontinuation for both groups were lower than those reported in previous studies of similar systematic tapering programs (38–64%).[20,22,42] The exact reason for this difference is unclear, but there are several possible explanations. The patients in previous studies met with their physician once every week for a brief consultation, whereas our patients only met with the physician and researcher three times. Meeting the physician may have a greater impact on patients' motivation and confidence and frequent meetings may therefore generate a better outcome. Furthermore, the tapering period in our study was 8 weeks, which is shorter than that of most of the previous studies. Our patients may simply not have had enough time to complete tapering off their medication. These possibilities need to be clarified by future studies. Overall, the findings are encouraging and call for further investigation into the use of self-efficacy enhancement strategies to improve the outcome of hypnotic discontinuation.

In light of the fact that the SEE program was not designed to improve the patients' sleep, their sleep parameters from sleep logs were examined to monitor potential detrimental effects on sleep from hypnotic tapering and/or additional beneficial effects of the program. All the sleep parameters showed no significant main effects or interactions except that the duration of waking time after sleep onset was increased for the control group at the end of the interventions. The finding that the SEE program did not generate additional benefit for sleep is not a surprise since the program was designed to enhance self-efficacy specific for hypnotic tapering and not for sleep. Nonetheless, it is encouraging that systematic hypnotic tapering with SEE enhancement did not show detrimental effects on sleep, while systematic hypnotic tapering alone in the control group increased waking time after sleep onset. It is possible that systematic tapering might have generated anxiety and in turn increased arousals during the night. Self-efficacy for hypnotic tapering can decrease the anxiety associated with withdrawal of hypnotic and therefore stabilize sleep. This might also explain why the effect of the systematic tapering alone was limited in comparison to the SEE program.

Although the results of the present study support the association between self-efficacy and hypnotic tapering and have important clinical implications, several limitations should be kept in mind while interpreting the results. First, the study did not conduct a long-term

follow-up. The influence of self-efficacy enhancement on long-term outcome of hypnotic tapering should be established in future studies. Second, participants were not randomly assigned to the two groups. They were recruited subsequently based on the convenience of the hospital arrangement. Future studies with a randomized control design should be conducted to confirm the effectiveness of the self-efficacy enhancement procedure. Third, participants recorded their medication usage in a diary at home. Some might not have complied with the instruction to fill it out daily, but completed it more irregularly, which could have contributed to the outcome. Future studies should consider these factors and seek to effectively control their influence. Forth, the diagnosis of insomnia for the participants was based on clinical history obtained by a board certified psychiatrist specialized in sleep medicine. No quantitative criteria (e.g., SOL > 30 min; ISI score > 7) were applied. One reason why these criteria were not used was because some of the participants' sleep was stabilized on medication and might not meet the criteria commonly used in intervention studies. Future studies may apply more standardized criteria in the recruitment of participants to avoid possible selection bias. Finally, the sample size of the study is relatively small and was not determined by an *a-priori* power analysis. This might have limited the statistic power of the study.

In summary, the present study clarified the role of self-efficacy in the process of hypnotic tapering. It showed that self-efficacy on hypnotic tapering can be deliberately increased through a simple procedure and the increased self-efficacy can lead to higher magnitude of dose reduction when combined with a systematic hypnotic tapering program. This simple and brief self-efficacy enhancement procedure can easily be applied in clinical settings to improve the efficacy of hypnotic tapering.

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