



ORIGINAL ARTICLE

The Chinese version of the Severity of Dependence Scale as a screening tool for benzodiazepine dependence in Taiwan

Jui-Hsiu Tsai ^{a,b}, Tze-Chun Tang ^{b,c}, Yi-Chun Yeh ^{b,c}, Yi-Hsin Yang ^{d,e}, Tsang Hin Yeung ^f, Shing-Yaw Wang ^{b,c}, Cheng-Chung Chen ^{f,*}

^a Department of Psychiatry, Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung, Taiwan

^b Department of Psychiatry, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

^c Department of Psychiatry, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

^d Statistical Analysis Laboratory, Department of Clinical Research, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

^e Department of Oral Hygiene, College of Dental Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

^f Department of Community Psychiatry, Kaohsiung Kai-Suan Psychiatric Hospital, Kaohsiung, Taiwan

Received 4 November 2010; accepted 20 April 2011

Available online 22 September 2011

KEYWORDS

Benzodiazepine dependence;
Sensitivity;
Specificity;
Validity

Abstract The development of an instrument to estimate the incidence, characteristics, and risk factors of benzodiazepine (BZD) dependence broadly in Taiwan is an important task. This study assessed the validity of the Chinese version of the Severity of Dependence Scale (SDS^[Ch]) among regular BZD users in Taiwan ($n = 228$). A positive correlation was shown between SDS^[Ch] and Mini-International Neuropsychiatric Interview diagnosed of BZD dependence. Thirty-six percent of the users received a Mini-International Neuropsychiatric Interview diagnosis of current BZD dependence. The dependent users tended to be divorced/widowed; not schizophrenic; and have higher SDS^[Ch] scores, a longer duration of use, and multiple-BZD use. The SDS^[Ch] for BZD dependence was shown to have high diagnostic utility (area under the receiver operating characteristic curve = 0.779), a sensitivity of 80.5%, and a specificity of 85.7%, with a cutoff point of 7. The findings support that the SDS^[Ch] is a valid brief self-reported questionnaire for the assessment of BZD dependence among chronic users in Taiwan.
Copyright © 2012, Elsevier Taiwan LLC. All rights reserved.

* Corresponding author. Kaohsiung Kai-Suan Psychiatric Hospital, 130, Kai-Suan 2nd Road, Ling-Ya District, Kaohsiung 802, Taiwan.
E-mail addresses: ccchen@kcg.gov.tw, faanvangogh@gmail.com (C.-C. Chen).

Introduction

Up to 40% of the general population annually suffers from insomnia that causes significant morbidity, mortality, and public health concern [1–5]. Although benzodiazepine (BZD) hypnotics are proven to be among the fastest, safest, most effective, and widely prescribed medications for insomnia, the issue of BZD dependence is still a concern for prescribing physicians and patients [2,6,7]. This BZD dependence exists with physical and psychological dependence. Physical dependence is a natural physiological adaptation for pharmacological tolerance and withdrawal symptoms or rebound phenomenon on rapid dose reduction or discontinuation of BZD use. Psychological dependence is a behavioral psychological adaptation for loss of self-confidence, overreliance on the need for BZD, and varying degrees of drug-seeking behavior. Among chronic BZD users, psychological dependence is more relevant than physical dependence [8–11]. The incidence of BZD dependence among chronic users has been estimated to range from 15% to 44% [12–15]; however, no statistics are yet available for Taiwan.

BZD dependence and BZD-related problems result in an array of negative health consequences and produce an increased public health burden in Taiwan [16]; however, few instruments have been developed to assess these problems. The Severity of Dependence Scale (SDS) is a self-administered, five-item questionnaire that measures the degree of psychological dependence on different types of illicit drugs. It is easy to understand and can be completed by most users in less than 1 minute [9,17–19]. The SDS, originally designed in English [17], was first used to screen for BZD dependence among regular users [18]. The scale was subsequently translated into many languages [20] and put into widespread use for different illicit drugs across different cultures.

The Chinese version of the SDS (SDS^[Ch]) was developed to measure the severity of dependence on heroin among Taiwanese (Chinese) users [21], but it has not been validated on BZD users. This scale should be easy to use and provide a broader assessment of BZD dependence among chronic users in Taiwan. The present study explored the validity of the SDS^[Ch] when used to measure the severity of BZD dependence among chronic users as part of a broader research project to estimate the incidence, characteristics, and risk factors associated with the development of BZD dependence in Taiwan.

Methods

Patients

The eligible individuals were 228 outpatients who visited the psychiatric departments of Kaohsiung Medical University Hospital or Kaohsiung Municipal Hsiao-Kang Hospital from January 2009 to December 2009. All had been prescribed BZD hypnotics, including zolpidem (Stilnox®), for 3 months or longer. Other eligibility criteria included age greater than 18 years and a stable maintenance dosage of the BZD hypnotics at the time of entry into the study. Patients with a current diagnosis of dementia, mental retardation, organic brain

syndrome, history (in the past 12 months) of alcohol or other substance dependence, acute or unstable psychotic or physical disorders, and/or any problem that could interfere with understanding this test were excluded. The study protocol was approved by our Institutional Ethics Committee, and all eligible patients gave their written informed consent.

Measures

All eligible patients completed the SDS^[Ch] and were asked to give a global rating of their addiction to or dependence on BZDs. The patients self-reported their level of dependence using a 4-point scale (0, never/almost never; 1, sometimes; 2, often; 3, always/nearly always for Items 1–4). The substance use section of the Mini-International Neuropsychiatric Interview (MINI) used to assess mental disorders according to the definitions and criteria of *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition* (American Psychiatric Association, 1994) [22] was administered to each patient by a senior psychiatrist who was blind to the SDS^[Ch] results. A current diagnosis of BZD dependence was given if three or more symptoms had occurred in the last year. The reliability and validity of MINI has been established. Other data for the eligible individuals, including demographic characteristics and daily dosage of BZD, were also collected.

Statistical analysis

The MINI was used to classify these patients into BZD-dependent and non-BZD-dependent groups. The receiver operating characteristic (ROC) curve was then used to identify the cut-off point on the total score (0–15) of the SDS^[Ch]. The ROC curve is a plot of sensitivity against (1 – specificity) for a screening test, where the different points on the curve correspond to different cutoff points used to designate a positive test. The area under the ROC curve (AUC) is a reasonable summary of the overall diagnostic accuracy of the test. In general, for two screening tests for the same disease, the test with the higher AUC is considered the better test, unless some particular level of sensitivity or specificity is especially important in comparing the two tests. The cutoff point was determined by choosing the point on the ROC curve closest to the point of (0, 1). The logistic regression was also estimated for the odds ratios of BZD dependence, which adjusted for significant factors identified in Table 1. Statistical analysis was performed using SPSS version 14.0 (SPSS Inc., Chicago, IL, USA). All statistical tests were two tailed, and *p* values less than 0.05 were considered significant.

Results

Thirty-six percent of the 228 patients received a MINI diagnosis of current BZD dependence. These BZD-dependent patients tended to be divorced/widowed (*p* = 0.032) as well as to have diagnoses other than schizophrenia (*p* = 0.008), higher SDS^[Ch] scores (*p* < 0.001), a longer duration of use (*p* = 0.022), and use of multiple BZDs (*p* < 0.001). Age, gender, education level, employment, and other habits (smoking cigarettes, chewing betel quid,

Table 1 Demographic characteristics of BZD-dependent and non-BZD-dependent users

Characteristic	BZD-dependent users (n = 82)	Non-BZD-dependent users (n = 146)	p
Age (y)	43.9 ± 10.7	45.7 ± 11.3	0.397
Gender, n			0.163
Men/women	29/53	66/80	
Education level (y)	13.5 ± 2.6	13.4 ± 2.8	0.791
Employment, n			0.104
Job/jobless	52/24	106/29	
Marital status, n (%)			0.032
Single	18 (22.0)	38 (26.0)	
Married	39 (47.6)	85 (58.2)	
Divorced/widowed	25 (30.5)	23 (15.8)	
Co-diagnosis, n (%)			0.008
Schizophrenia	7 (8.8)	31 (21.8)	
Affective disorders	41 (51.3)	47 (33.1)	
Others	32 (40.0)	64 (45.1)	
Cigarette smoking habit, n			0.173
Never/ever/current	86/3/33	100/4/42	
Alcohol drinking habit, n			0.180
Never/ever/current	56/18/8	112/28/6	
Betel chewing habit, n			0.051
Never/ever/current	68/5/6	138/4/3	
Coffee drinking habit, n			0.713
Never/ever/current	46/15/16	76/29/35	
Tea drinking habit, n			0.413
Never/ever/current	32/12/33	50/32/58	
SDS ^[Ch] score	8.8 ± 2.8	5.6 ± 3.2	<0.001
BZD use			
Duration (mo)	54.2 ± 44.0	74.6 ± 67.3	0.022
Types, n	1.7 ± 0.6	1.3 ± 0.5	<0.001

BZD = benzodiazepine; SDS^[Ch] = Chinese version of the Severity of Dependence Scale.

drinking coffee or tea) were not significantly associated with the incidence of BZD dependence. The demographic characteristics of BZD-dependent and non-BZD-dependent users in Taiwan are compared in Table 1.

For SDS^[Ch] scores, the outcome values ranged from 0 to 15. The cutoff point was determined by computing the corresponding sensitivity (1 – specificity) and choosing the point where sensitivity and 1 – specificity were closest to (0, 1). As shown in Table 2, a value of 7 showed the smallest distance; therefore, for this screening test, if a patient scored 7 or higher on these five questions, then he or she could be classified as a BZD-dependent user. A cutoff point of 7 or higher on the SDS^[Ch] was shown to have high diagnostic utility (AUC = 0.779), a sensitivity of 80.5%, and a specificity of 85.7% in identifying problematic BZD users. For SDS^[Ch] Question 4 “Did you wish you could stop?” the scores between BZD-dependent and non-BZD-dependent groups showed no statistical difference ($p = 0.101$). Scores on the other four items were significantly different ($p < 0.001$). For all questions, the AUCs ranged from 0.718 to 0.566, where Question 3 had the highest value and

Question 4 the lowest value. The results are shown in Table 3 and Fig. 1. The logistic regression was also conducted to estimate adjusted odds ratios of BZD dependence; analysis variables also included marital status, comorbid diagnosis, and duration and types of BZD use. The adjusted odds ratios were from 2.284 to 1.281 and the detailed data are shown in Table 4.

The concurrent validity analyzed by Spearman’s product-moment correlation coefficients between SDS^[Ch] total scores and the sum of the *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition* dependence items ranged from 0.016 to 0.336. Construct validity assessed by principal components analysis showed two dimensions in which SDS^[Ch] Questions 1–3 and 5 presented in one dimension and SDS^[Ch] Question 4 in the other. The communalities of each SDS^[Ch] question ranged from 0.58 to 0.81. Internal reliability using Chronbach’s alpha was 0.63. When the MINI was used to classify these patients into BZD-dependent and non-BZD-dependent groups—and a score of 7 or higher on the SDS^[Ch] screened for BZD dependence—those patients with false diagnoses tended to be

Table 2 Cutoff points for SDS^[Ch]

SDS ^[Ch] score	True positive	True negative	False positive	False negative	Sensitivity	1 – Specificity
15	5	143	3	77	0.0610	0.0205
14	6	143	3	76	0.0732	0.0205
13	6	139	7	76	0.0732	0.0479
12	14	138	8	68	0.1707	0.0548
11	24	134	12	58	0.2927	0.0822
10	33	129	17	49	0.4024	0.1164
9	38	119	27	44	0.4634	0.1849
8	54	108	38	28	0.6585	0.2603
7 ^a	66	96	50	16	0.8049	0.3425
6	74	79	67	8	0.9024	0.4589
5	78	64	82	4	0.9512	0.5616
4	80	41	105	2	0.9756	0.7192
3	82	22	124	0	1.0000	0.8493
2	82	9	137	0	1.0000	0.9384
1	82	3	143	0	1.0000	0.9795
0	82	0	146	0	1.0000	1.0000

^a The best cutoff point on the SDS^[Ch]

SDS^[Ch] = Chinese version of the Severity of Dependence Scale.

jobless ($p = 0.023$) and to have higher SDS^[Ch] scores ($p < 0.001$).

Discussion

This study found that the incidence of BZD dependence among our sample was 36%. Risk factors for developing BZD dependence were marital status, comorbid diagnosis, and duration and type of BZD use. In identifying BZD dependence, a cutoff point of 7 or higher on the SDS^[Ch] had a high diagnostic utility (AUC = 0.779), a sensitivity of 80.5%, and a specificity of 85.7%. We also found that the SDS^[Ch] questions, except for Question 4, were key to the diagnosis of clinical BZD dependence in Taiwan.

BZD hypnotics are the most widely prescribed medications for insomnia, but most prescribing physicians and patients worry about the adverse effects of BZD dependence. Most previous studies have indicated that the

incidence of BZD dependence among chronic users is in the range of 15–44% [12–15]. Risk factors for the development of BZD dependence include advanced age, female gender, use of multiple BZDs, high dosage, and a long duration of use [9,12,15,23]. The present study showed that the incidence of BZD dependence in Taiwan among regular users for 3 months or longer was 36%. This was consistent with the results of previous studies [12–15]. The use of multiple BZDs and a long duration of use were also factors involved in BZD dependence. BZD dependence was higher among women than men, but the difference was not significant. This was insufficiently consistent with previously reported results [15]. A higher rate of BZD dependence was shown in our middle-aged group, a younger group than that previously reported [15,23]. Our results were similar to those of de las Cuevas et al. [9], and the characteristics of the study sample might explain this. Our sample was composed primarily of middle-aged patients, and the elderly group (aged 65 years or older) was too small with only 13 patients.

Table 3 Proportion of scores on the Chinese version of the Severity of Dependence Scale questions between BZD-dependent and non-BZD-dependent users

Question	Question content	BZD-dependent users ($n = 82$)	Non-BZD-dependent users ($n = 146$)	p	Area under ROC curves
1	Did you think your use of tranquilizers was out of control?	1.41 ± 1.08	0.67 ± 0.96	<0.001	0.707
2	Did the prospect of missing a dose make you anxious or worried?	1.77 ± 1.11	1.12 ± 1.10	<0.001	0.659
3	Did you worry about your use of tranquilizers?	1.80 ± 1.08	0.92 ± 1.03	<0.001	0.718
4	Did you wish you could stop?	1.56 ± 1.09	1.31 ± 1.12	0.101	0.566
5	How difficult would you find it to stop or go without your tranquilizers?	2.28 ± 0.79	1.62 ± 0.98	<0.001	0.689
Total		8.83 ± 2.82	5.64 ± 3.24	<0.001	0.779

BZD = benzodiazepine; ROC = receiver operating characteristic curve.

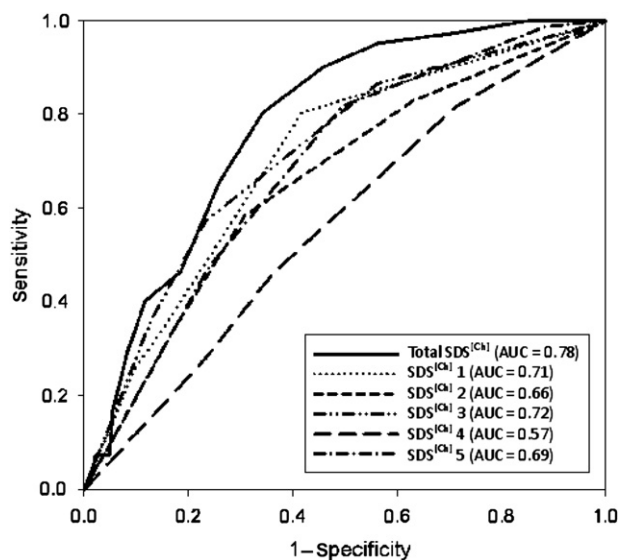


Figure 1. Receiver operating characteristic curve and AUC for various questions about benzodiazepine dependence on the SDS^[Ch]. AUC = area under the ROC curve; SDS^[Ch] = Chinese version of the Severity of Dependence Scale.

Marital status affected the development of BZD dependence in our study, which is different from the results of most previous studies [9,12,15,23].

The SDS has been a reliable and valid questionnaire when used to assess the degree of dependence on different types of illicit drugs [17,18]. In one study, the SDS was used to screen for BZD dependence among neurotic patients for whom a Compositing International Diagnostic Interview 2.1 diagnosis of BZD dependence had been made. A cutoff score of 7 or higher on the SDS had high diagnostic utility (AUC = 0.991), high sensitivity (97.9%), and high specificity (94.2%) [18]. In our study, the SDS^[Ch] diagnosis of BZD dependence had the same high diagnostic utility as the SDS and the same cutoff score [18]; however, our results for AUC, sensitivity, and specificity were lower than the previous results for the SDS [18]. There might be many factors to affect these results, including diagnostic tools,

clinical samples, comorbid diagnoses, cultural factors, and so on. These different results might have been the result of the criteria used to establish the diagnosis (MINI vs. Compositing International Diagnostic Interview 2.1) and characteristics of the clinical populations. Our patients came from two outpatient mental health services in a medical center and a regional hospital, whereas those in another study came from only one neurotic service center in the Canary Islands [18]. Our patients came from two hospitals and also had more complicated comorbid diagnoses. Cultural factors might have an effect on shape the subjective distress that accompanies medication taking and physiological dependence, which would, therefore, lead to an elevated score on a subjective scale. Although we found that both the sensitivity and specificity of the instrument were lower than expected, the SDS^[Ch] is still of diagnostic utility among Taiwanese (Chinese) users.

On the analysis of the SDS^[Ch] question items, the scores on SDS^[Ch] of Question 4 among BZD-dependent users were not different from those of the non-BZD-dependent users. This was obviously different from previous results [17–19] and might have affected our AUC, sensitivity, and specificity data. This also implies that the SDS^[Ch] questions, except for Question 4, are key to the diagnosis of clinical BZD dependence in Taiwan. On further analysis of other factors affecting validity, our results indicated that false diagnoses tended to be associated with joblessness and higher SDS^[Ch] scores. BZD users without a job might show more drug-seeking behaviors. It is, therefore, important to pay attention to special groups, especially jobless patients with high SDS^[Ch] scores, while using SDS^[Ch] for broad screening of BZD dependence among regular users.

This study has some limitations. First, the study population was representative only of outpatients attending a medical center and a regional hospital. Further study is needed in general or community populations. Second, our study population was limited to BZD users. Further studies are needed to determine whether the same cutoff point can be used with abusers of other substances.

In conclusion, the incidence of dependence among this Taiwanese sample of outpatients who used BZDs for 3 months or longer was estimated to be 36%. These dependent

Table 4 The adjusted odds ratios of benzodiazepine dependence on Chinese version of the Severity of Dependence Scale questions

Question	Question content	Adjusted odds ratios (95% CI)	<i>p</i>
1	Did you think your use of tranquilizers was out of control?	1.825 (1.307, 2.548)	<0.001
2	Did the prospect of missing a dose make you anxious or worried?	1.874 (1.362, 2.577)	<0.001
3	Did you worry about your use of tranquilizers?	2.027 (1.469, 2.789)	<0.001
4	Did you wish you could stop?	1.281 (0.945, 1.735)	0.111
5	How difficult would you find it to stop or go without your tranquillizers?	2.284 (1.524, 3.423)	<0.001
Total		1.383 (1.224, 1.563)	<0.001

Adjusted with analysis variables also included marital status, comorbid diagnosis, and duration and type of benzodiazepine use. CI = confidence interval.

users tended to be divorced or widowed; not schizophrenic; and have higher SDS^[Ch] scores, a longer duration of use, and multiple-BZD use. The SDS^[Ch] was shown to have a high diagnostic utility with a cutoff point of 7 in identifying problematic BZD users. It is, therefore, a valid brief self-reported questionnaire for the assessment of BZD dependence among regular BZD users in Taiwan.

Acknowledgments

The authors thank Vincent Chin-Hung Chen et al. for agreeing to provide us with the SDS^[Ch]. The primary data were reported at the 1st AsCNP Congress in Kyoto, Japan, November 13–14, 2009. None of the authors has any conflict of interest. This study was supported by a research grant from the National Bureau of Controlled Drugs, Department of Health, Executive Yuan, Taiwan (DOH98-NNB-1028).

References

- [1] Stoller MK. Economic effects of insomnia. *Clin Ther* 1994;16: 873–97.
- [2] Griffiths RR, Johnson MW. Relative abuse liability of hypnotic drugs: a conceptual framework and algorithm for differentiating among compounds. *J Clin Psychiatry* 2005;66(Suppl. 2):31–41.
- [3] Hohagen F, Kappler C, Schramm E, Riemann D, Weyerer S, Berger M. Sleep onset insomnia, sleep maintaining insomnia and insomnia with early morning awakening—temporal stability of subtypes in a longitudinal study on general practice attenders. *Sleep* 1994;17:551–4.
- [4] Janson C, Lindberg E, Gislason T, Elmasry A, Boman G. Insomnia in men—a 10-year prospective population based study. *Sleep* 2001;24:425–30.
- [5] Ford DE, Kamerow DB. Epidemiologic study of sleep disturbances and psychiatric disorders. An opportunity for prevention? *JAMA* 1989;262:1479–84.
- [6] Ekedahl A, Lidbeck J, Lithman T, Noreen D, Melander A. Benzodiazepine prescribing patterns in a high-prescribing Scandinavian community. *Eur J Clin Pharmacol* 1993;44: 141–6.
- [7] Olfson M, Pincus HA. Use of benzodiazepines in the community. *Arch Intern Med* 1994;154:1235–40.
- [8] Ashton H. Toxicity and adverse consequences of benzodiazepine use. *Psychiatr Ann* 1995;31:492–5.
- [9] de las Cuevas C, Sanz E, de la Fuente J. Benzodiazepines: more “behavioural” addiction than dependence. *Psychopharmacology (Berl)* 2003;167:297–303.
- [10] Longo LP, Johnson B. Addiction: Part I. Benzodiazepines—side effects, abuse risk and alternatives. *Am Fam Physician* 2000; 61:2121–8.
- [11] O’Brien CP. Benzodiazepine use, abuse, and dependence. *J Clin Psychiatry* 2005;66(Suppl. 2):28–33.
- [12] Hallstrom C, Lader M. The incidence of benzodiazepine dependence in long-term users. *J Psychiatr Treat Eval* 1982;4: 293–6.
- [13] Tyrer P, Owen R, Dawling S. Gradual withdrawal of diazepam after long-term therapy. *Lancet* 1983;1:1402–6.
- [14] Rickels K, Case GW, Winokur A, Swenson C. Long-term benzodiazepine therapy: benefits and risks. *Psychopharmacol Bull* 1984;20:608–15.
- [15] Kan CC, Breteler MH, Zitman FG. High prevalence of benzodiazepine dependence in out-patient users, based on the DSM-III-R and ICD-10 criteria. *Acta Psychiatr Scand* 1997;96:85–93.
- [16] Fang SY, Chen CY, Chang IS, Wu EC, Chang CM, Lin KM. Predictors of the incidence and discontinuation of long-term use of benzodiazepines: a population-based study. *Drug Alcohol Depend* 2009;104:140–6.
- [17] Gossop M, Darke S, Griffiths P, Hando J, Powis B, Hall W, et al. The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction* 1995;90:607–14.
- [18] de las Cuevas C, Sanz EJ, de la Fuente JA, Padilla J, Berenquer JC. The Severity of Dependence Scale (SDS) as screening test for benzodiazepine dependence: SDS validation study. *Addiction* 2000;95:245–50.
- [19] Gossop M, Best D, Marsden J, Strang J. Test-retest reliability of the Severity of Dependence Scale. *Addiction* 1997;92:353.
- [20] World Health Organization (WHO). Severity of Dependence Scale (SDS). Available from: http://www.who.int/substance_abuse/research_tools/severitydependencescale/en/; 2011.
- [21] Chen VC, Chen H, Lin TY, Chou HH, Lai TJ, Ferri CP, et al. Severity of heroin dependence in Taiwan: reliability and validity of the Chinese version of the Severity of Dependence Scale (SDS[Ch]). *Addict Behav* 2008;33:1590–3.
- [22] American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994.
- [23] American Psychiatric Association Task Force on Benzodiazepine Dependency. *Benzodiazepine dependence, toxicity, and abuse*. Washington, DC: American Psychiatric Association; 1990.