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DYSFUNCTIONAL BELIEFS AND ATTITUDES ABOUT SLEEP (DBAS -16) SCALE IN PATIENTS REFERRED TO PSYCHIATRIC OUTPATIENT CLINIC FOR SLEEP CONSULTATION IN FINLAND – A REGISTRY-BASED STUDY

ABSTRACT

Background: *Dysfunctional assumptions about sleep are characteristic of chronic insomnia and an important target of treatment. The Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16) scale identifies clinically significant levels of unhelpful beliefs related to sleep and differentiates insomnia patients from "non-insomnia" patients. More information is needed about DBAS measurement properties in psychiatric patients with sleep complaints. The aim of this study was to find a DBAS-16 cut-off value to identifying clinical insomnia among patients with psychiatric comorbidity to recognize patients who would benefit from Cognitive Behavioural Therapy for Insomnia (CBT-I), which is the primary evidence-based treatment for insomnia.* ***Methods:*** *The register-based sample comprised 115 psychiatric outpatients referred to the University Hospital Psychiatric Outpatient Clinic for Sleep Consultation, where their sleep complaints were evaluated comprehensively for symptoms and diagnosis. The DBAS scores of cases with insomnia disorder were compared with those without comorbid insomnia disorder by analysis of variance, and the optimal cut-off point was calculated using the Youden index.* ***Results****: Mean age of patients was 40.1 years (SD 12.5). DBAS of patients with insomnia disorder (mean 6.26) was significantly higher than that of non-insomnia patients (mean 5.35). Organic sleep disorders, such as sleep apnoea, restless legs syndrome and delayed sleep phase, had no independent effect on DBAS. The optimal cut-off point for discriminating insomnia in psychiatric patients was 6.3, with sensitivity of 0.64 and specificity of 0.67.* ***Conclusions:*** *In a psychiatric outpatient sample, the DBAS cut-off value should be set higher than in a population sample to recognize patients who would benefit from Cognitive Behavioural Therapy for Insomnia (CBT-I).*

KEYWORDS: DBAS, INSOMNIA, SLEEP COGNITION, SLEEP DISORDER, PSYCHIATRIC DISORDER, VALIDATION

HIGHLIGHTS

- Dysfunctional sleep-related cognition plays an important role in the development, maintenance and exacerbation of insomnia.
- Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16) is a 16-item self-report measure designed to evaluate a subset of sleep-related cognitions. It is a well-established instrument in studies of populations of "good sleepers" as well as in populations of patients with insomnia without a comorbid psychiatric disorder.
- In a psychiatric outpatient sample, the DBAS cut-off value should be higher than in a population sample.

INTRODUCTION

Insomnia is highly prevalent among patients with psychiatric disorders and it is a common symptom of major depressive disorder, dysthymia, generalized anxiety disorder and post-traumatic stress disorder (1,2).

Clinical assessment of insomnia emphasizes the patient's subjective experience of difficulty falling or staying asleep, which is associated with significant distress or impairment in daytime functioning (1), leading to maladaptive sleep habits and dysfunctional cognitions or beliefs about sleep (3).

Depression and sleep complaints, particularly insomnia, have a well-established bidirectional relationship (4-6). Dysfunctional, inaccurate thoughts and beliefs are common

in depression and are often targeted as a point of treatment for depression during cognitive therapy (7,8).

Maladaptive negative thought patterns in depression and anxiety disorders extend to sleep-related content that contributes to development of chronic insomnia together with circadian dysregulation (e.g. selective negative perceptions and interpretations about sleep, exaggerated pessimistic beliefs concerning the daytime consequences of disturbed sleep, and worry, fear and helplessness related to sleep) (9,10).

Cognitive models of insomnia stress the relevance of worry and rumination in the development and maintenance of insomnia (3). Dysfunctional beliefs about sleep belong to the major pathophysiological mechanisms of insomnia (11) and have been shown to be correlated with the treatment effects of CBT-I, so that the clinical treatment response is in parallel with decrease of DBAS scores (12-14).

The tool most widely used for assessing the maladaptive beliefs in insomnia is a 16-item self-report measurement, the Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16) scale (10). The DBAS is a frequently used and well-established instrument in studies of populations of "good sleepers" as well as in populations of patients with insomnia without a comorbid psychiatric disorder (15). Carney et al. (16) examined the properties of DBAS-16 in various insomnia sufferers and healthy controls ("good sleepers") (n=1384). A validity analysis suggested that in healthy control group a DBAS-16 index score of >3.8 is associated with clinically significant insomnia.

DBAS score correlates well with subjective methods of assessing insomnia, anxiety and depression symptoms but poorly with objective polysomnography findings (10,14). DBAS scores are also increased in sleep disorders other than primary insomnia that cause sleep-related dysfunctional attitudes and beliefs about sleep (14). The DBAS is the primary instrument for detecting sleep-related cognitions in clinical insomnia studies and to determine treatment response for CBT-I, which is the primary evidence-based treatment for insomnia. CBT-I has been shown to have moderate to large effects on dysfunctional beliefs about sleep (12-14).

A few previous studies have investigated beliefs about sleep in a sample of patients with a range of psychiatric illnesses using the DBAS-16 scale (17) (18), but more information is needed to determine the DBAS threshold score discriminating chronic insomnia among psychiatric outpatients with sleep complaints.

We hypothesize that the DBAS cut-off value distinguishing insomnia from non-insomnia is higher in psychiatric outpatients than in the rest of the population on average (>3.8, (16)).

The aim of this study was as follows: 1) to assess the discriminative capacity of DBAS for chronic insomnia diagnosis in a psychiatric sample with sleep complaints, and 2) to determine an insomnia-specific cut-off value in the psychiatric population to identify patients with chronic insomnia who would benefit from cognitive behavioural therapy for insomnia (CBT-I).

MATERIALS AND METHODS

PARTICIPANTS

Our naturalistic clinical registry sample (n=115) consists of patients referred to the Psychiatry Outpatient Clinic for sleep consultation at Helsinki University Hospital (HUS) between February 2016 and December 2017, who were assessed by a sleep nurse and a psychiatrist under somnologist supervision, according to standard three-step protocol: 1. Laboratory screening and summary of earlier patient files, 2. Sleep nurse interview, Structured symptom assessment and Sleep diary, and 3. The medical diagnostic assessment of sleep disorders by a clinician with sleep recordings when needed.

MEASUREMENTS

The main outcome was DBAS-16 (10). In DBAS-16, each item is rated by the patient on a scale from 0 (strongly disagree) to 10 (strongly agree), and the average is reported.

The register of patient consultations also included the Insomnia Severity Index (ISI) scale (19), which is a 7-item self-report questionnaire assessing the nature, severity and impact of insomnia symptoms (19), which has been identified as the best sleep measure to screen clinical insomnia in a psychiatric population (20).

Psychiatric symptom scales included the Beck Depression Inventory (BDI) (21) and the Overall Anxiety Severity and Impairment Scale (OASIS) (22).

STATISTICAL ANALYSIS

Data analysis was performed using the Statistical Package for Social Sciences (SPSS), version 22. We used parametric statistical methods because the DBAS data was normally distributed (23). We used the Student's t-test for comparing DBAS scores between two groups (insomnia vs. no insomnia; psychiatric comorbidity vs. no comorbidity). Student's t-test was also used for testing the generalizability of patients who filled in DBAS by comparing them to those with missing DBAS data. For this purpose, chi-square test was used for comparing categorical variables between those who had DBAS sores to those without DBAS scores. Pearson correlation test was used

to test the intercorrelations between psychometric symptom scores. Univariate analysis of covariance (ANCOVA) was used to analyse the effect of other diagnoses on DBAS variance. To estimate cut-off values, the OptimalCutpoints function from R package OptimalCutpoints (24) was used. Youden index was chosen as a criterion to maximize both sensitivity and specificity. R version 4.1.2 was used for this analysis.

RESULTS

SAMPLE CHARACTERISTICS

The sample consisted of 115 patients, aged 19-70 (mean 40, SD 12.5) years. There were 63 females (55%) and 52 (45%) males. Most of the patients (n=95, 83%) were referred from primary care, the rest from somatic specialized care (n=11, 10%), psychiatric care (n=5, 4%) and occupational healthcare (n=4, 3%).

The most common indication for referral was persistent insomnia (n=84, 73%). Of the patients, 37 (32%) were employed and working; the remainder were either unemployed (n=61, 51%) or receiving disability compensation (n=17, 15%). Most of the patients in the whole sample, 88 (77%), had comorbid psychiatric disorders, and 17 (15%) had no current psychiatric diagnosis other than a sleep disorder diagnosis. The most common current psychiatric diagnosis was mood disorder (n=69, 60%), followed by anxiety disorder (n=45, 39%).

After assessment, 78 patients (68%) had a diagnosis of chronic insomnia, whereas the rest had other sleep disorder diagnoses. Other common sleep disorder diagnoses were sleep apnoea in 40 (35%), delayed sleep phase in 30 (26%), restless legs syndrome (RLS) in 30 (26%), nightmare disorder in 11 (10%) and sleep terror in 7 (6%) of the patients. The most commonly occurring psychiatric diagnosis with insomnia was mood disorder (n=35, 66%), followed by anxiety disorder (n=18, 34%). The most frequently comorbid sleep disorders with insomnia were sleep apnoea (n=25, 22%) and RLS (n=25, 22%).

Comparison between the patients who reported DBAS scores and those who did not, are presented in *Table 1*. The patients with insomnia diagnoses had more systematically filled in DBAS questionnaires.

Table 1. Sample characteristics and comparison between the patients with DBAS scores and those without (* significant difference). The patients with missing DBAS scores were significantly different from others only with regard to insomnia diagnoses.

Characteristics of the patient sample	DBAS scores available n=105	DBAS scores missing n=10	Significance p value	Method
Age, mean (SD)	40.7 (12.6)	34.3 (10.3)	0.124	t-test
ISI, mean (SD)	18.3 (5.60)	15.1 (7.77)	0.120	t-test
BDI, mean (SD)	19.7 (11.8)	21.1 (12.8)	0.770	t-test
OASIS, mean (SD)	9.34 (5.61)	7.64 (5.06)	0.442	t-test
Gender			0.312	Chi-Square
Male (n)	49	3		
Female (n)	56	7		
Referring organization			0.480	Chi-Square
Primary care (n)	100	10		
Other (n)	0	5		

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Characteristics of the patient sample	DBAS scores available n=105	DBAS scores missing n=10	Significance p value	Method
Indication of Referral			0.331	Chi-Square
Treatment-resistant insomnia (n)	78	6		
Diagnostics and comorbidity (n)	27	4		
Vocational status			0.840	Chi-Square
Outside of work and education	56	5		
Employed or student	49	5		
Disability			0.696	Chi-Square
No disability	67	7		
Disability	38	3		
Organic sleep disorder (ICD-10 group G-diagnosis)				
Sleep apnoea	37	3	0.740	Chi-Square
Restless legs syndrome	27	3	0.768	Chi-Square
Circadian sleep disorder	27	3	0.768	Chi-Square
Functional sleep disorder (ICD-10 group F-diagnosis)				
Insomnia	74	4	0.049*	Chi-Square
Parasomnias	16	1	0.656	Chi-Square
Psychiatric diagnoses				
Mood disorders	105	10	0.499	Chi-Square
Anxiety disorders	43	2	0.187	Chi-Square
Psychosis	5	1	0.477	Chi-Square

Note: DBAS = Dysfunctional Beliefs and Attitudes about Sleep, ISI = Insomnia Severity Index, BDI = Beck Depression Inventory, OASIS = Overall Anxiety Severity and Impairment Scale

DBAS OUTCOMES

The mean DBAS score of the whole sample was 6.26 (SD 1.70). The all-symptom scores for different groups are presented in *Table 2*.

Patients diagnosed with an insomnia disorder scored significantly (t=-3.694, p=0.001) higher in DBAS (mean 6.67) than patients without insomnia diagnosis (mean 5.35)(*Figure 1*). DBAS scores of patients with psychiatric diagnoses (n=88) were slightly, but significantly (t=2.024, p=0.046) higher than the DBAS scores of patients without psychiatric diagnoses (n=17). The results are presented in *Table 2* and *Figure 2*.

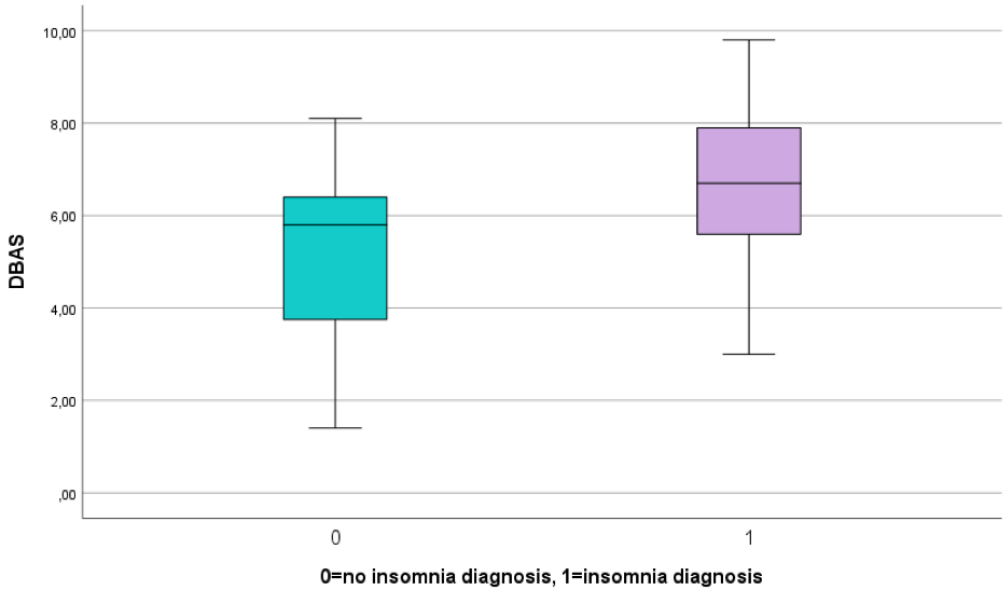
Table 2. The scores of symptom scales DBAS, ISI, OASIS and BDI compared between insomnia versus no insomnia, and psychiatric diagnosis versus no psychiatric diagnosis groups. Only patients that filled in DBAS (n=105) are included.

	Insomnia diagnosis (n=74)	No insomnia diagnosis (n=31)	Significance of difference	Psychiatric diagnosis[1] (n=88)	No psychiatric diagnosis[1] (n=17)	Significance of difference
DBAS Mean (SD)	6.674 (1.54)	5.350 (1.73)	difference	6.429 (1.66)	5.530 (1.77)	t=2.024, p=0.046
DBAS Range	3.0-9.8	1.4-8.1		1.4-9.8	2.6-8.2	
ISI Mean (SD)	19.74 (5.05)	15.68 (6.13)	t=4.663, p<0.001	18.74 (5.36)	15.68 (6.13)	t=2.106, p=0.038
ISI Range	5-28	1-22		2-28	1-25	
OASIS Mean (SD)	9.270 (5.91)	9.633 (4.25)	t=-0.224, p=0.823	10.48 (5.26)	4.567 (4.52)	t=4.010, p<0.001
OASIS Range	0-19	2-15		0-19	0-17	
BDI Mean (SD)	19.88 (12.2)	19.03 (10.8)	t=0.269, p=0.789	22.46 (11.3)	7.969 (5.27)	t=5.004, p<0.001
BDI Range	0-51	1-36		1-51	0-20	

Note: DBAS = Dysfunctional Beliefs and Attitudes about Sleep, ISI = Insomnia Severity Index. OASIS = Overall Anxiety Severity and Impairment Scale, BDI = Beck Depression Inventory

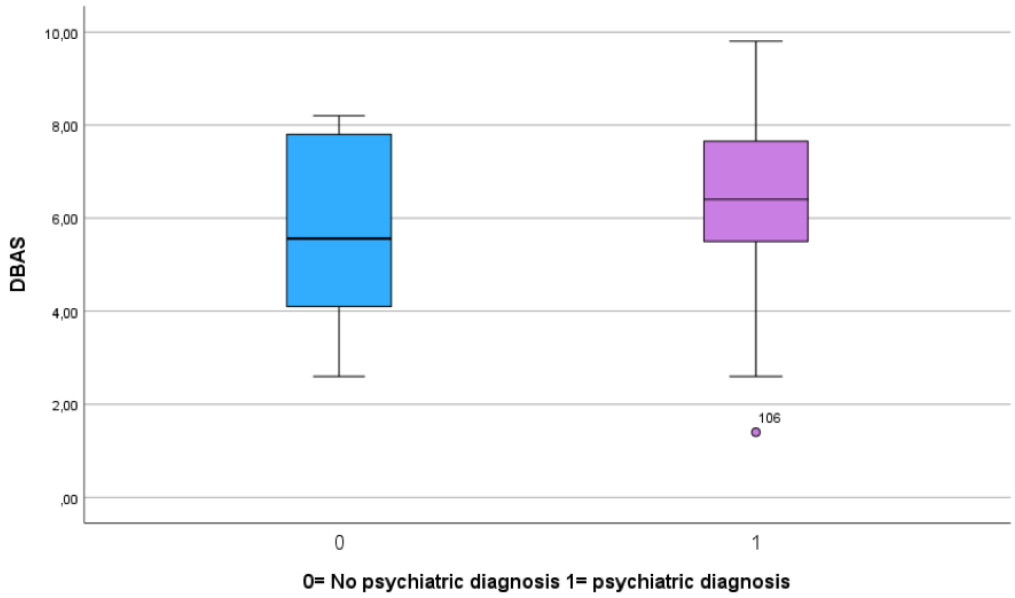
[1]Psychiatric diagnoses here indicate ICD-10 group F diagnoses other than F-coded sleep disorders.

Figure 1. DBAS scores of patients with insomnia diagnoses (n=74) versus patients without insomnia diagnoses (n=31).



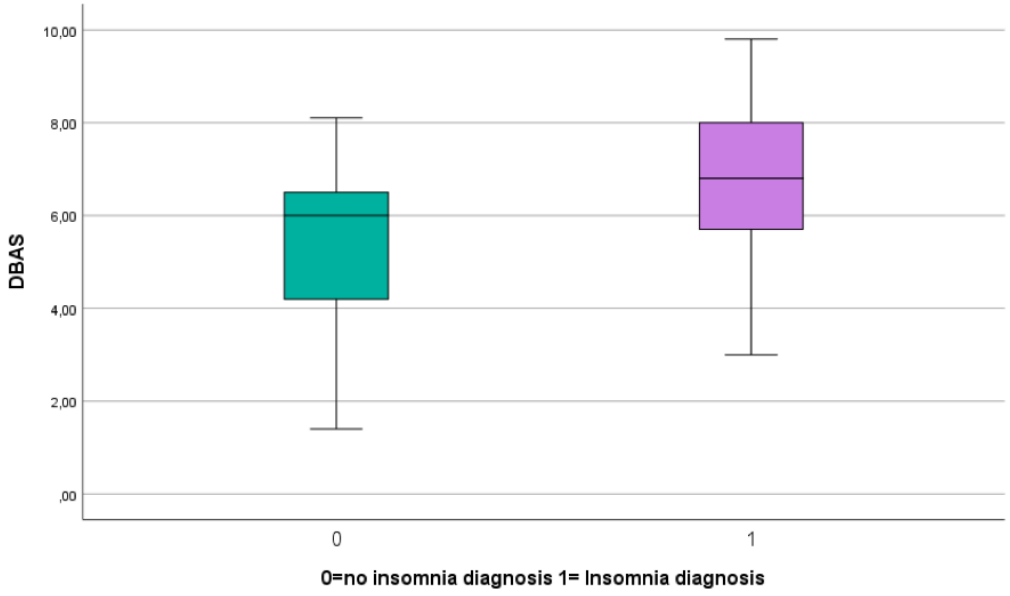
DBAS=Dysfunctional Beliefs About Sleep Scale

Figure 2. DBAS scores of patients with psychiatric diagnoses (n=88) versus patients without psychiatric diagnoses (n=17). Psychiatric diagnoses here indicate group F-diagnoses other than F-coded sleep disorders.



DBAS= Dysfunctional Beliefs and Attitudes about Sleep Scale

Figure 3. DBAS scores of patients with insomnia diagnoses (n=61) versus patients without insomnia diagnoses (n=27) among patients with psychiatric comorbidity.



DBAS= Dysfunctional Beliefs and Attitudes about Sleep Scale

Insomnia diagnosis had the greatest effect on the variance of DBAS scores (p=<00.1, F=16.172), Sleep apnoea diagnosis had a weaker, but still significant effect, (p=0.036, F=4.533) and RLS had no effect (p=0.949, F=0.004) on the variance of DBAS.

The mean DBAS scores (6.71) of sleep apnoea patients (n=37), however, were not significantly different (t=-0.127, p=0.900) from the mean DBAS scores (6.05) of those without sleep apnoea (n=68). After excluding comorbid insomnia in the subgroup analysis, the patients with sleep apnoea and without insomnia (n=12) scored even slightly less in DBAS (5.30 vs. 5.38) than those without sleep apnoea (n=19), but the difference was insignificant (t=-0.127, p=0.900).

In the subgroup analysis of the patients with other current psychiatric diagnoses, insomnia patients still scored significantly (t=3.550, p<0.001) higher (mean 6.821, SD 1.48) in DBAS than non-insomnia patients (mean 5.543, SD 1.73) (*Figure 3*).

Among patients with psychiatric comorbidity (n=95), the DBAS cut-off value was 6.3, with sensitivity of 0.64 and specificity of 0.67 (Area under curve, AUC 0.696 with confidence interval from 0.582 to 0.811).

DBAS scores were significantly correlated with ISI (r=0.625, p<0.0005), BDI (r=0.473, p<0.0005) and OASIS (r=0.440, p<0.0005) scores.

DISCUSSION

This naturalistic clinical registered-based study aimed to identify the DBAS threshold score that discriminates chronic insomnia among psychiatric patients with sleep complaints.

Results confirm our hypothesis that patients with psychiatric disorders and sleep complaints worry significantly about their sleep and hold more dysfunctional beliefs about sleep than people without psychiatric comorbidity. The average DBAS scores were markedly higher in our comorbid sample than reported in the general population (<3.8) (16). In our sample, both insomnia-diagnosed and non-insomnia patients scored higher on average (>5) than the general population.

The mean DBAS-16 total score of insomnia patients in our psychiatric sample (6.67) is in line with previous studies among insomnia patients with psychiatric comorbidity. In Carney et al. (16), patients with a variety of comorbid medical or psychiatric conditions had higher DBAS-16 total scores (6.16) than good sleepers (<3.8). Huthwaite et al. (17) assessed beliefs about sleep in adults with acute psychiatric disorders (schizophrenia and other non-affective psychoses, affective disorders, n=100) recruited from inpatient and outpatient clinics; the average total DBAS-16 score in their study was 5.54. Chang et al. (18) examined maladaptive sleep cognition among psychiatric patients and assessed its association with insomnia. Participants were outpatients (either mood disorder, anxiety disorder or schizophrenia spectrum disorder, n=400) recruited from a tertiary psychiatric hospital in Singapore. DBAS-16 total score among the psychiatric outpatient sample was 6.26.

This study is limited by its small sample size, retrospective nature and the highly selected sample of referred patients in specialized care. No data were reported on other medical conditions which may influence sleep. The subgroup analyses should be interpreted with special caution. These results are not directly generalizable to primary healthcare population because this sample consisted of patients selected by their persistent sleep complaints. Compared to other specialized psychiatric care units, this patient sample had more pronounced sleep problems. Strengths include the naturalistic sample and profound diagnostic procedures.

Several questionnaires that measure sleep-related cognitions have been developed which measure highly overlapping but not identical constructs. The Pre-Sleep Arousal Scale (PSAS) (25) captures manifestations of cognitive (as a "racing mind" and consisting of worry, rumination and an inability to relax your mind) and somatic (such as rapid breathing, a racing heart and muscle tension) arousal at the time before falling asleep. While PSAS assesses current experiences of arousal, DBAS assesses underlying negative thought patterns about sleep that can negatively affect emotions and behaviour during the day, not just before sleep.

Chronic insomnia and common mental disorders are characterized by dysfunctional thought patterns. Sleep-related dysfunctional thoughts are more prevalent in insomnia patients with psychiatric comorbidity than in insomnia patients without psychiatric comorbidity. Despite psychiatric and sleep disorder comorbidity in our sample, DBAS moderately differentiated chronic insomnia patients from those without insomnia diagnosis. However, a higher cut-off value should be applied for patients with psychiatric comorbidity to recognize those who would possibly benefit from CBT-I.

CONCLUSION

Our results revealed that psychiatric comorbidity increases sleep-related dysfunctional beliefs and attitudes. For outpatients with psychiatric disorders and sleep complaints, we tentatively suggest that the DBAS-16 cut-off value to identifying clinically significant levels of unhelpful beliefs related to sleep should be set ≥6 until stronger evidence is obtained from further studies.

Ethics and dissemination

The Coordinating Ethics Committee of the Hospital District of Helsinki and Uusimaa, Finland, approved the study protocol.

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