SLEEP AND BIOLOGICAL RHYTHMS
THE JAPANESE SOCIETY OF SLEEP RESEARCH

Sleep and Biological Rhythms 2015; **13**: 41–48 doi:10.1111/sbr.12100

ORIGINAL ARTICLE

Subjective sleep characteristics in primary insomnia versus insomnia with comorbid anxiety or mood disorder

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Abstract

We assessed subjective sleep measures in a cohort of 146 patients with chronic insomnia and hypothesized that these measures may differ depending on the presence as well as the type of comorbid psychiatric disorders. All patients were consecutively referred to a third line sleep medicine center and underwent an extensive clinical intake by both a sleep physician and a psychologist. Psychodiagnostics were performed according to the DSM-IV criteria. Subjective sleep was assessed by sleep diaries and the insomnia severity index. Insomniacs with anxiety disorders showed a relatively higher total sleep time and higher sleep efficiency than the two other groups. Furthermore, the number of awakenings was higher and time in bed after the final awakening was lower in patients with comorbid anxiety disorders when compared to the two other groups. Although subjective total bedtimes where comparable, patients with comorbid anxiety disorders on average reported a striking 2 h more sleep per night and around a 20% higher sleep efficiency than patients with comorbid mood disorders. Patients with comorbid mood disorders showed a trend towards a higher Insomnia Severity Index-score when compared to primary insomniacs. Insomniacs with comorbid anxiety disorders present with a markedly higher sleep efficiency and total sleep time. On the other hand, these patients describe more fragmented sleep. Our findings may have practical implications for more tailored cognitive behavioral treatment in insomniacs with and without different types of psychiatric comorbidity.

Key words: comorbid psychiatric disorders, insomnia, sleep diary, subjective sleep.

INTRODUCTION

Insomnia is a highly prevalent disorder that is known for its negative effect on daytime functioning.[1] Clinically, there are several different subtypes. The term primary insomnia is used when symptoms cannot be attributed to a medical or psychiatric cause, while in comorbid insomnia the sleep complaint is accompanied with mental disorders. Comorbid insomnia comprises about 50% of insomnia patients referred to a sleep clinic.[2,3]

Insomnia is characterized by problems in the initiation of sleep, early morning awakenings, maintenance of sleep and/or nonrestorative sleep. In the clinical evaluation of insomnia, a sleep diary can give insight in the subjective severity of problems in initiating and maintaining sleep. The sleep diary is a self-report of individual sleep and wake times, usually over a period of one to two weeks. Several sleep measures can be derived from this method, including total bed time (TBT), total sleep time (TST), wake after sleep onset (WASO) and number

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Accepted 3 June 2014.

of awakenings (NOA). These sleep measures provide a good indication of the subjective disturbance of several different aspects of sleep.

Studies on objective sleep measures have been a main topic in primary and comorbid insomnia. In primary insomniacs polysomnographic measures showed a reduced sleep duration, lower sleep efficiency and an increased arousal index when compared to normal controls.[4] In depressed insomniacs and patients with panic disorders a lower sleep efficiency, lower total sleep time and a longer sleep onset latency and more wakefulness in the total sleep period were found when compared to normal controls.[5,6] Patients with generalized anxiety disorders also generally showed longer sleep latency, increased time awake and reduced sleep efficiency.[5] Concluding, it seems that objective measures of insomnia are very comparable between patients with and without different types of comorbid psychiatric disorders.

Although subjective perception of sleep disruption is likely to differ between primary and comorbid insomnia, research on sleep diary differences between these groups is scarce. Kohn and Espie compared patients with primary and comorbid insomnia on several subjective and objective sleep variables.[7] Based on the results, the authors suggested that primary and comorbid insomnia may be on a continuum of insomnia severity, rather than categorically distinct. There were no differences in (self-reported) sleep variables between primary and comorbid insomniacs. Note, that in this study the group of comorbid insomniacs was not further specified although examination of insomniacs with specific subtypes of comorbid psychiatric disorders would clinically be highly relevant. Sleep diary studies in comorbid insomnia subtypes may reveal differences in the severity of subjective sleep disturbances, as well as insight in specific characteristics of the reported insomnia complaint.

Because anxiety and mood disorders are the most common psychiatric disorders in insomniacs, we specifically focus on these two comorbid groups in the present study.[2,3] We hypothesized that there are clear differences in nature and severity of subjective sleep variables depending on presence and type of psychiatric comorbidity and that patients with comorbid psychiatric disorders will generally show more severe insomnia.

METHODS

General study design and setting

We performed a cohort study comprising consecutive patients seen in Sleep Medicine Centre Kempenhaeghe, a tertiary referral centre. Patients were referred for further examination of insomnia complaints and included between June 2010 and May 2011. All patients had a complaint of chronic insomnia with symptoms lasting at least 3 months. Patients between 18 and 65 years of age were included if they did not work in shifts and did not suffer from a current psychotic disorder or had a history of developmental disorders. Subjects were medically examined by a sleep physician. If there were signs of another primary sleep disorder besides insomnia, additional diagnostic studies – such as polysomnography – were performed. Patients with a somatic disease or other sleep disorder that could explain the insomnia were excluded (e.g. sleep apnea, restless legs syndrome, epilepsy, chronic pain). Patients with alcohol or drug abuse were also excluded. Groups were defined according to the presence of psychiatric comorbidity. The classification of primary insomnia was based on the DSM-IV criteria.[8] Patients using hypnotic medication were kept in the analyses, as all patient groups used this type of medication to a comparable degree. Antidepressant or anxiolytic medication was only used by some patients with psychiatric comorbidity, and as these drugs may influence sleep, these patients were excluded from further analyses. The study design was approved by the local medical ethical committee and all participants gave written informed consent.

Psychopathology

Semi-structured interview for mental disorders

All patients were examined by a trained clinical psychologist following the criteria of the DSM-IV.[8]

This was achieved through a semi-structured interview for psychiatric disorders comprising 16 screening questions referring to the main types of DSM axis-I disorders, including different types of anxiety and mood disorders.[9] Insomniacs suffering from more than one type of psychiatric disorder were excluded.

Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS) is a 14-item screening instrument, measuring severity of depression and anxiety symptoms.[10,11] The questionnaire contains a separate depression and anxiety scale. Each scale is evaluated by seven items on a four-point Likert Scale.

Table 1 Sleep diary characteristics

Total bed time (TBT)	Time spent in bed during the night
Total sleep time (TST)	Time slept during the night
Sleep efficiency (SE)	Proportion of time in bed actually asleep
Sleep onset latency (SOL)	Time from moment in bed to first sleep
Wake after sleep onset (WASO)	Amount of awake time after falling asleep for the first time
Number of awakenings (NOA)	Number of awakenings during the night
Time in bed after awakening (TIBAA)	Time spent in the bed after the final awakening
Total daytime sleep (TDS)	Time slept during the day

Sleep variables

Sleep diary

All patients filled in a sleep diary during one week, recording each bedtime and time of getting out of bed. Furthermore, patients recorded the time spent in bed, either awake or sleeping. Afterwards, several variables were extracted from the sleep diaries, as defined in Table 1.[12]

Insomnia Severity Index

The Insomnia Severity Index (ISI) is a seven-item validated questionnaire assessing the nature, severity and impact of insomnia.[12,13] A five-point Likert scale is used to rate each of these items, yielding a total score ranging from 0–28. Scores are classified in four severity categories: (0–7): absence of insomnia, (8–14): mild insomnia symptoms, (15–21): moderate insomnia, (22–28): severe insomnia. This questionnaire is an important addition to the sleep diary, because besides nighttime variables, daytime impact is assessed.

Data analysis

Data were analyzed using SPSS 20 for Windows. To examine possible differences in independent demographic and general clinical characteristics between primary insomniacs, patients with comorbid mood disorders and patients with comorbid anxiety disorders, χ^2 tests and Kruskal–Wallis tests were performed. Kruskal–Wallis tests were also used to compare the three diagnostic groups on various sleep variables. Because of the unequal group sizes Tamhane post-hoc analyses were performed to identify specific differences between the separate subgroups. Bonferroni corrections for multiple testing were applied.

RESULTS

General sample characteristics

Figure 1 represents the inclusion/exclusion flowchart. More than half of the insomniacs showed a form of psychiatric comorbidity (51% of the total). As expected, mood disorders (31%) and anxiety disorders (26%) were most common and therefore selected for further analysis.[2,3] Other psychiatric disorders included undifferentiated somatoform disorder/burnout (14%), undifferentiated somatoform disorder/chronic fatigue syndrome (14%), adaptation disorder (12%) and ADHD (6%). Of the 63 patients with comorbid mood and anxiety disorders, 30% used antidepressants or anxiolytics and were excluded. Two patients (9%) with a primary mood disorder in addition suffered from an anxiety disorder and four patients (19%) with a primary anxiety disorder suffered from a mood disorder as well, and these six were excluded. The final group consisted of 107 primary insomniacs, 20 insomniacs with comorbid mood disorder and 19 insomniacs with comorbid anxiety disorder. Specific subtypes of mood and anxiety disorders in our research population are shown in Table 2.

Demographic data and clinical characteristics

There were no significant differences in age and gender between the three insomnia subgroups, so confounding effects of these factors on between group differences in sleep characteristics are not likely (Table 3). As expected, patients with comorbid mood and anxiety disorders clearly showed higher HADS-scores than primary insomniacs.

Insomnia characteristics

There were no differences in the duration of insomnia and sleep medication use between the three insomnia groups (Table 3). Patients with comorbid mood disorders showed a trend towards higher ISI-scores compared to primary insomniacs.

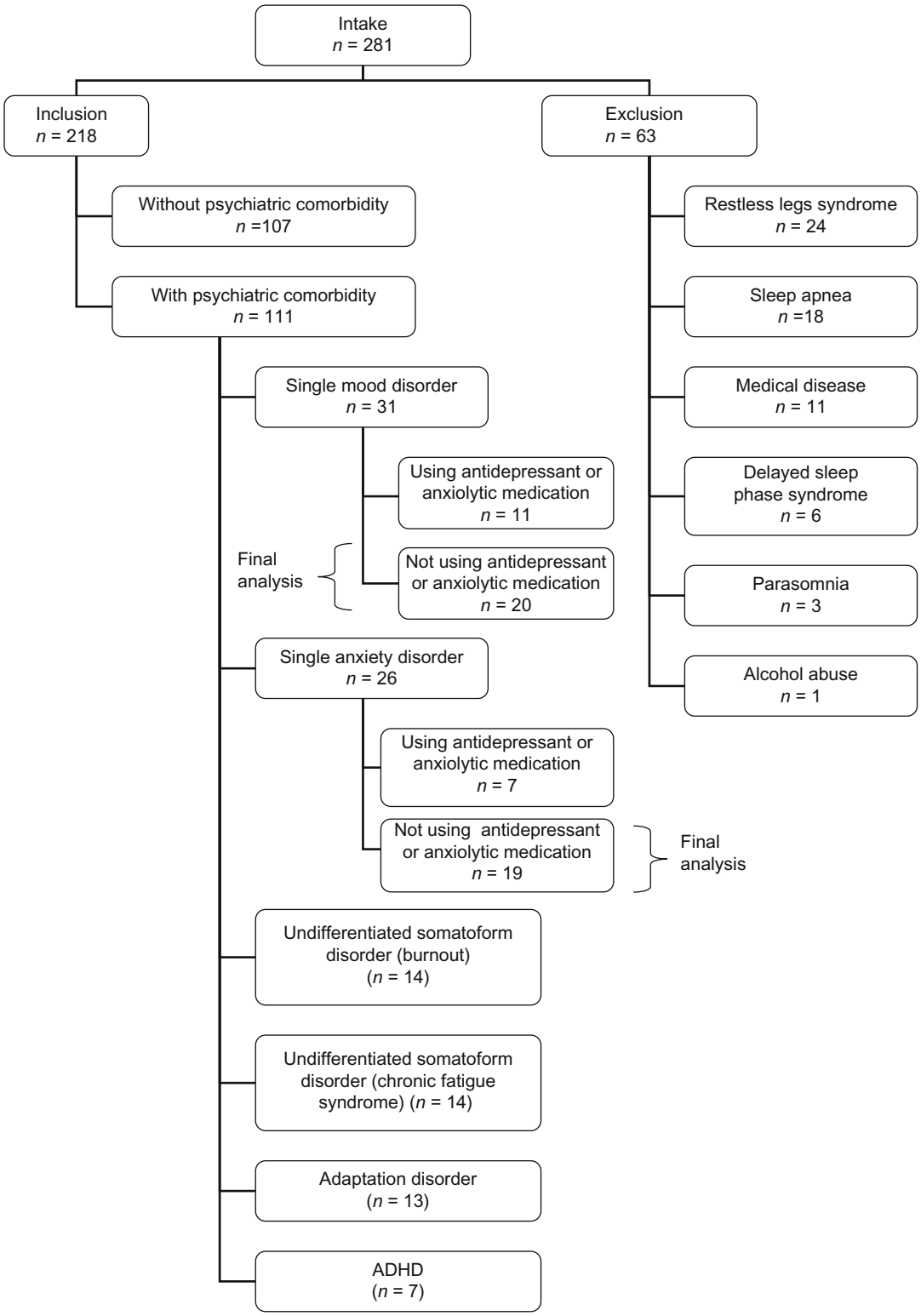

Figure 1 Flowchart of patients initially referred for diagnosis of insomnia complaint.

Table 2 Psychiatric diagnoses in research population (n = 39)

	Type of DSM-IV diagnosis	n (%)
Mood disorders (n = 20)	Depressive disorder	16 (41%)
	Dysthymic disorder	4 (10%)
Anxiety disorders (n = 19)	Generalized anxiety disorder	8 (21%)
	Panic disorder	5 (13%)
	Social phobia	3 (8%)
	Posttraumatic stress disorder	1 (3%)
	Obsessive compulsive disorder	1 (3%)
	Anxiety disorder not otherwise specified	1 (3%)

Sleep diary variables

Primary insomniacs and patients with comorbid depressive disorders showed comparable sleep diary characteristics. However, specific differences were found between these two groups and patients with comorbid anxiety disorders. Patients with comorbid anxiety disorders showed a substantially higher total sleep time (TST) and sleep efficiency (SE) than the other two groups (Table 3). On average, they slept 2 h longer and showed a 20% higher SE than patients with comorbid mood disorders. Also, there was a trend for insomniacs with comorbid anxiety disorders staying shorter in bed after final awakening. However, patients with comorbid anxiety disorders showed a higher number of awakenings (NOA) when compared to primary insomniacs and insomniacs with comorbid mood disorders. They reported two to three times as many awakenings during the night when compared to primary insomniacs and insomniacs with comorbid mood disorders, respectively. There were no significant correlations between HADS anxiety or depression subscales and sleep diary variables (Table 4).

DISCUSSION

In line with our hypothesis, there were clear variations in the nature and severity of subjective sleep variables in our cohort of insomniacs depending on the presence and type of comorbid psychiatric disorder. In our study, patients with comorbid anxiety disorders showed a higher subjective SE and longer TST when compared to the other two groups. Although total bedtime (TBT) was

Table 3 Demographic, clinical and insomnia characteristics in chronic primary insomniacs and insomniacs with specified psychiatric comorbidity

	Primary insomnia	With comorbid mood disorder	With comorbid anxiety disorder	$P^{\dagger}$	Post-hoc analyses‡
n	107	20	19		
Age (years)	44.1 ± 11.8 (18.0–65.0)	45.8 ± 9.7 (24.0–64.0)	40.4 ± 11.2 (23.0–63.0)	.289	
Male (n)	34 (32%)	9 (45%)	7 (37%)	.503	
HADS (total score)	10.4 ± 4.5 (1.0–22.0)	19.5 ± 4.9 (13.0–34.0)	17.7 ± 4.6 (10.0–27.0)	.000**	PI < WCM, WCA
Insomnia duration (years)	10.3 ± 12.1 (0.3–64.0)	13.2 ± 13.0 (0.8–45.0)	10.3 ± 9.7 (1.0–32.0)	.644	
Using sleep medication (N)	62 (58%)	14 (70%)	8 (42%)	.209	
Insomnia severity index (score)	19.9 ± 4.1 (10.0–28.0)	22.7 ± 3.0 (15.0–27.0)	20.7 ± 3.9 (13.0–26.0)	.011*	PI < WCM
Total bed time (hours)	8.5 ± 0.9 (6.1–10.9)	9.0 ± 1.6 (7.0–14.0)	8.7 ± 0.7 (7.1–10.3)	.294	
Total sleep time (hours)	5.0 ± 1.3 (1.5–7.9)	3.9 ± 1.9 (0.0–6.8)	5.9 ± 0.8 (4.6–8.1)	.001**	PI, WCM < WCA
Sleep efficiency (%)	58.9 ± 14.6 (18.5–85.8)	45.8 ± 23.6 (0.0–84.9)	67.9 ± 10.8 (48.4–93.5)	.003**	PI, WCM < WCA
Sleep onset latency (hours)	1.2 ± 0.7 (0.0–4.0)	1.9 ± 1.5 (0.3–6.1)	1.0 ± 0.6 (0.0–2.2)	.080	
Wake after sleep onset (hours)	1.1 ± 0.7 (0.0–3.1)	0.8 ± 0.9 (0.0–3.3)	1.3 ± 0.7 (0.2–2.5)	.056	
Total daytime sleep (hours)	0.0 ± 0.1 (0.0–.9)	0.0 ± 0.2 (0.0–0.8)	0.1 ± 0.2 (0.0–0.7)	.400	
Number of awakenings	1.3 ± 1.0 (0.0–4.7)	0.9 ± 1.0 (0.0–3.6)	2.4 ± 1.6 (0.1–5.3)	.003**	PI, WCM < WCA
Time in bed after awakening (hours)	1.1 ± 0.8 (0.0–4.0)	1.9 ± 1.6 (0.0–5.1)	0.6 ± 0.6 (0.0–2.3)	.006*	PI, WCM > WCA

Continuous data are shown as mean ± SD (min – max); categorical data as number (% of total), $^{\dagger}\chi^2$ test or Kruskal–Wallis tests, $^{*}P \leq .05$, $^{**}P \leq .003$ (.05/14), ‡Post-hoc testing using Tamhane test, HADS, Hospital Anxiety and Depression Scale; PI, Primary insomnia; WCA, Insomnia with comorbid anxiety disorder; WCM, Insomnia with comorbid mood disorder.

Table 4 Correlations between Hospital Anxiety and Depression (HADS) and sleep diary variables

	HADS anxiety scale		HADS depression scale	
Sleep variables	Pearson's rho	*P*	Pearson's rho	*P*
Total bed time	0.008	0.93	0.002	0.98
Total sleep time	0.079	0.35	–0.107	0.20
Sleep efficiency	0.099	0.24	–0.098	0.24
Sleep onset latency	–0.075	0.37	0.038	0.65
Wake after sleep onset	–0.068	0.42	–0.047	0.57
Total daytime sleep	0.064	0.45	–0.028	0.74
Number of awakenings	–0.041	0.63	–0.070	0.41
Time in bed after awakening	–0.042	0.62	0.008	0.93

Data shown are Pearson's rho correlation coefficient, with associated significance level. No significant correlations were found.

comparable, subjective TST and SE were substantially higher in patients with comorbid anxiety disorders (amounting to 2 h more sleep per night and a 20% higher SE than patients with comorbid mood disorders). While there was a clear difference in TST and SE, the ISI score was comparable between groups, indicating that although nighttime variables suggest a less severe insomnia phenotype in patients with comorbid anxiety disorders, they experience a similar impact of their sleep disorder. A possible explanation would be that patients with comorbid anxiety disorders worry more about their sleep and tend to seek medical help in the presence of less severe nighttime sleep problems. There was no relationship between the severity of anxiety or depressive complaints and sleep diary variables.

In our study, the NOA was higher in insomniacs with comorbid anxiety disorders, with two to three times more awakenings than the other groups. On the other hand, the wake after sleep onset was not significantly different, which suggests that the time spent awake in bed between the onset of sleep and final awakening was comparable. We conclude that the experience of a highly fragmented sleep is probably the most important insomnia complaint in patients with comorbid anxiety disorders. Time in bed after awakening was shorter in patients with comorbid anxiety disorders. This might yet be another indication of the longer sleep duration in patients with comorbid anxiety disorders. However, it may also reflect a better sleep hygiene with a tendency to get out of bed earlier after the final awakening.

While sleep diary variables were comparable, there was a trend towards a higher ISI-score in insomniacs with comorbid mood disorders when compared to primary insomniacs. The ISI includes items referring to daytime complaints such as fatigue, concentration problems and mood problems, often reported by depressed patients in general. Therefore, a possible explanation is that the higher ISI-score reflects depressive symptomatology instead of greater subjective insomnia severity. Another explanation might be that insomniacs with comorbid mood disorders tend to interpret their sleep problems more negatively and in effect suffer more from comparable nighttime sleep problems.

Because of the cross-sectional design, no cause and effect relationships can be established between insomnia, psychiatric disorders and sleep variables from our data. In addition, the relatively small sample sizes of the groups with comorbid psychiatric disorders precluded an evaluation of possible sleep differences in more specific subgroups, such as different types of anxiety disorders. Future research including larger subgroups of insomniacs with psychiatric comorbidity may be able to answer such questions.

All our variables are based on self-report measures. In the future, it would be interesting to examine and compare additional polysomnographic measures in insomniacs with and without mood and anxiety disorders to evaluate whether our findings can also be generalized to objective sleep measures. Studies on objective sleep measures showed comparable findings in primary insomniacs and insomniacs with different types of mood and anxiety disorders (low sleep efficiency, low total sleep time, high number of awakenings, long time awake in the bed).[4–6] However, these studies only focused on differences between these groups and normal controls, and did not examine differences between primary and comorbid insomniacs. Studying both objective and subjective measures of sleep may provide insight in the role of sleep (mis)perception in the experience and presentation of subjective insomnia complaints in these groups.

Edinger *et al*. compared the effectiveness of cognitive behavioral treatment for insomnia (CBT-I) between primary insomniacs and insomniacs with comorbid psychiatric disorders with the main conclusion that CBT-I produced similar benefits for both groups across most sleep diary and actigraphy measures.[14] Our findings might have therapeutic consequences for cognitive behavioral treatment of different types of insomnia. Stimulus control refers to a behavioral method in which a patient is advised to get up and move to another room when sleep-onset does not occur within 15 min.[15] Because patients with anxiety disorders report more frequent awakenings this method might have an adverse effect, creating very restless nights, frequently getting out and back into the bed. Sleep restriction might be more suitable for these patients. In this method, creating a temporary mild state of sleep deprivation not only helps to bring about a faster sleep onset, but also a greater sleep continuity and quality.[15] In primary insomniacs and patients with comorbid mood disorders stimulus control might be more efficient, especially after the final awakening. Because these patients generally spend 1 to 2 hours in bed after the final awakening (which is a striking 2 to 3 times as much as patients with anxiety disorders) getting up out of bed earlier might be even more important in order to "re-associate" the bed with sleep instead of lying awake. The fact that patients with comorbid anxiety disorders generally show a longer subjective sleep time and a higher sleep efficiency, but still an ISI-score comparable to depressed patients might imply a more negative attribution towards sleep in the first group. Therefore in the treatment of these patients special attention could be given to cognitive therapeutic interventions aiming to reduce magnification and catastrophizing of sleep problems.

In contrast with our hypothesis, comorbid insomniacs do not seem to experience more severe subjective sleep problems in general. Future longitudinal research might focus on the cause and effect relationships between subjective insomnia complaints and psychiatric disorders. The effect of tailored cognitive behavioral treatments for insomnia with and without psychiatric comorbidity would be a relevant research focus.

ACKNOWLEDGMENTS

Sebastiaan Overeem was supported by a VIDI research grant from the Netherlands Organization for Scientific Research (grant no. 016.116.371).

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