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Prevalence and clinical correlates of co-occurring insomnia and hypersomnia symptoms in depression

Adriane M. Soehner, M.A.[1,2], **Katherine A. Kaplan, Ph.D.**[3], and **Allison G. Harvey, Ph.D.**[1]

[1]Department of Psychology, University of California, Berkeley

[2]Department of Psychiatry, University of Pittsburgh Medical Center

[3]Department of Psychiatry & Behavioral Science, Stanford University Medical Center

Abstract

Background—The aim was to examine the prevalence and consequences of co-occurring insomnia and hypersomnia symptoms in depressed adults drawn from a representative sample of the U.S. population.

Method—Data from 687 National Comorbidity Survey Replication (NCS-R) respondents meeting criteria for a major depressive episode (MDE) in the past year were included. Respondents completed clinical interviews that assessed 12-month DSM-IV disorders, impairment, mental health treatment, and depressive symptom severity. Outcomes were compared between respondents who experienced insomnia symptoms-only (N=404), hypersomnia symptoms-only (N=44), both insomnia and hypersomnia symptoms (N=184) and no sleep problems (N=55) during an MDE.

Results—Insomnia and hypersomnia symptoms co-occurred in 27.7% of respondents with past-year MDEs, most frequently in bipolar spectrum disorders and major depressive disorder with dysthymia. Similar to the insomnia-only group, respondents with co-occurring sleep disturbances had more severe depression, and higher rates of past-year impulse control disorders and suicide planning. Similar to the hypersomnia-only group, respondents with co-occurring sleep disturbances had higher rates of past-year drug use disorders and suicide attempts. Compared to the insomnia-only and no sleep problem groups, respondents with both sleep disturbances were more frequently in mental health treatment, seeing a general practitioner, and taking antidepressants.

Limitations—The NCS-R is cross-sectional and did not evaluate sleep disorder diagnoses.

Correspondence: Allison G. Harvey, PhD, Psychology Department, Golden Bear Sleep and Mood Research Clinic, University of California, Berkeley, 3210 Tolman Hall #1650, Berkeley, CA 94720-1650, USA, Phone: + 1-510-642-7138, Fax: + 1-510-642-5293, aharvey@berkeley.edu.

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Conclusions—Co-occurring insomnia and hypersomnia symptoms were associated with a more severe MDE. Further research is warranted to more fully understand the joint presentation of insomnia and hypersomnia in depression.

Keywords

Mood disorders; depression; insomnia; hypersomnia

Introduction

Sleep disturbances are present in up to 90% of depressed patients, and can profoundly impact course of illness (Tsuno et al., 2005, Kaplan and Harvey, 2009). A broad spectrum of sleep disturbances occur in depression, including symptoms of insomnia (difficulty falling asleep, difficulty staying asleep, early morning awakening) and hypersomnia (Tsuno et al., 2005, Benca, 1996, Armitage, 2007). Research on insomnia and hypersomnia in depression has predominantly focused on these sleep problems as distinct entities (Sunderajan et al., 2010, Ford and Kamerow, 1989). However, growing evidence indicates that insomnia and hypersomnia can co-occur. Psychometric work on sleep complaints in psychiatric disorders found that insomnia and hypersomnia/lassitude factors exhibited a substantial positive correlation (Koffel and Watson, 2009). In general population studies, 6% of adults (Ohayon, 2012) and 8% of young adults (Breslau et al., 1996) experienced comorbid insomnia and hypersomnia. Furthermore, these sleep problems co-occurred in 10% of children with Major Depressive Disorder (MDD; Liu et al., 2007) and 11% of older adults in a depressive episode (Roberts et al., 2000).

Initial studies suggest a detrimental impact of co-occurring insomnia and hypersomnia. Their joint presentation was associated with a longer history of depression, recurrent episodes and greater depression severity in children diagnosed with MDD (Liu et al., 2007), new depression onset in older adults (Roberts et al., 2000), and a greater number of lifetime psychiatric disorders in a general population sample (Breslau et al., 1996). Women were also more likely to experience both sleep disturbances (Breslau et al., 1996). However, definitions of insomnia and hypersomnia were not consistent across studies, and differences between mood disorders, functional impairment outcomes, and treatment utilization remain unexplored.

Drawing from National Comorbidity Survey-Replication (NCS-R) respondents, the overarching aim of the present investigation was to examine the prevalence and consequences of co-occurring insomnia and hypersomnia symptoms in depressed adults, using empirically-derived quantitative definitions for both hypersomnia (Kaplan et al., 2011) and insomnia symptoms (Lichstein et al., 2003). Our first aim was to examine the prevalence of four presentations of sleep disturbance (co-occurring insomnia and hypersomnia symptoms, insomnia symptoms-only, hypersomnia symptoms-only, and no sleep problems) during depressive episodes in NCS-R respondents meeting criteria for MDD, MDD with Dysthymia, and Bipolar Spectrum Disorders. The second aim was to evaluate whether co-occurring insomnia and hypersomnia symptoms were associated with

specific sociodemographic characteristics, more severe clinical features and functional impairment, and mental health treatment utilization.

Methods

Sample

Participants were identified from the National Comorbidity Survey – Replication (NCS-R), a nationally representative community household survey of mental illness conducted in the United States between February 2001 and April 2003 (Kessler et al., 2004). Study procedures have been described elsewhere (Soehner and Harvey, 2012). The 2-part survey included 9,282 respondents and had an overall response rate of 70.9% (Kessler et al., 2004). The analyses reported are based on NCS-R respondents meeting *DSM-IV* criteria for a major depressive episode (MDE) in the past year, who had completed Quick Inventory of Depressive Symptoms Self-Report (Rush et al., 2003) items 1-4 (N=687).

Diagnostic Assessment

The *WHO-CIDI* (Kessler and Ustun, 2004) interview evaluated past-year *DSM-IV* psychiatric disorders, age of MDE onset, number of MDEs, past-year MDE duration, history of psychiatric hospitalization and suicide attempts, past-year suicidal behavior (ideation, plans, attempts), past-year mental health service utilization, and past-year psychiatric medication usage. Within the subsample meeting MDE criteria (N=687), 455 had MDD-Only, 109 had MDD with dysthymia, and 123 had a bipolar spectrum disorder (Type 1 N=37, Type 2 N=51; Subthreshold N=35). Other past-year *DSM-IV/CIDI* disorders included anxiety disorders, drug and alcohol use disorders, and impulse-control disorders.

Depression Severity, Insomnia & Hypersomnia

Depression severity was evaluated using the Quick Inventory of Depressive Symptoms-Self Report (*QIDS-SR*; Rush et al., 2003) focusing on the most severe month of depression in the past year. The *QIDS-SR* assessed sleep complaints, including difficulty falling asleep (item 1), difficulty maintaining sleep (item 2), early morning awakening (item 3) and hypersomnia (item 4). Each item is scored on a scale of 0–3, with higher scores indicating greater severity. *QIDS-SR* items 1-3 and item 4 have been validated as measures of insomnia symptom severity and hypersomnia severity, respectively, showing agreement with a weekly sleep diary (Manber et al., 2005, Kaplan et al., 2011).

To quantify insomnia symptoms, cut-points for *QIDS-SR* items 1-3 were selected based on sleep continuity complaints of >30 minutes for ≥ 3 days/week (Lichstein et al., 2003). Insomnia symptoms were coded as present if respondents had: difficulty falling asleep (QIDS-SR item 1 score ≥ 2), difficulty maintaining sleep (QIDS-SR item 2 score= 3), or early morning awakening (QIDS-SR item 3 score ≥ 1). The cut-off for difficulty maintaining sleep is 20 minutes, rather than 30 minutes, due to the phrasing of *QIDS-SR* item 2. However, only 3.1% of respondents experiencing insomnia symptoms reported *only* difficulty maintaining sleep. For hypersomnia, a cut-off of ≥ 1 on *QIDS-SR* item 4 (sleeping up to 10+ hours per day) was selected based on previous work (Tam et al., 1997, Kaplan et al., 2011). Among respondents with a past-year MDE (N=687), four groups were formed on

the basis of insomnia or hypersomnia symptoms: (1) no sleep problems (NSP; N=55), (2) hypersomnia symptoms-only (HYP-Only; N=44), (3) insomnia symptoms-only (INS-Only; N=404), and (4) both insomnia and hypersomnia symptoms (INS-HYP; N=184).

Impairment

The Sheehan Disability Scales (SDS; Leon et al., 1997) assessed MDE-related role impairment, focusing on the most severe month of depression in the past year. Respondents also estimated the number of days in the past 365 when they were "totally unable to work or carry out your normal activities" because of depression.

Data Analysis

Analyses were conducted with sample weighting from NCS-R Part I using Stata 12.0 (Stata Corporation, College Station, TX, 2011). Because the sample design used weighting and clustering, all parameters were estimated by using the Taylor series linearization method. Further information on NCS-R sample weighting procedures can be found elsewhere (Kessler et al., 2004). Analyses aimed to identify differences between the four sleep disturbance groups (NSP, INS-Only, HYP-Only, INS-HYP). Rao-Scott chi-square tests and logistic regressions were used to detect design-corrected between-group differences in categorical outcomes. Multiple linear regressions evaluated differences between groups for continuous outcomes. Regressions controlled for age, sex and education status. Statistical significance was evaluated using a 2-sided design with alpha=0.05.

Results

Prevalence of Sleep Problems

Among respondents with an MDE in the past year (N=687), 7.2% had NSP, 59.1% had INS-Only, 5.9% had HYP-Only, and 27.7% had INS-HYP. Within the MDD-Only group (N=455), 8% had NSP, 58.8% had INS-Only, 7.5% had HYP-Only, and 25.6% had INS-HYP. Similarly, in respondents with MDD and Dysthymia (N=109), 6.5% had NSP, 57.4% had INS-Only, 3.8% had HYP-Only and 32.3% had INS-HYP. Finally, in Bipolar Spectrum Disorders (N=123), 4.9% had NSP, 62.0% had INS-Only, 2.0% had HYP-Only, and 31.1% had INS-HYP.

Features Associated with Sleep Problems

Table 1 describes the demographic characteristics, depression outcomes and functional impairments by sleep disturbance group. Table 2 describes psychiatric comorbidity and mental health treatment for each group.

Sociodemographic Characteristics—HYP-Only respondents were significantly younger than the other three groups, and INS-HYP respondents were significantly younger than the INS-Only group (*p*s<0.05). The INS-HYP and HYP-Only groups were more likely to be female, unmarried and out of the labor force compared to the other two groups (*p*s<0.05). The INS-HYP group had fewer years of education relative to HYP-Only and NSP (*p*s<0.05). Race, income, smoking status and obesity did not differ between groups (*p*s>0.05).

Course and Severity of Depression—No group differences emerged for age of depression onset, duration of current episode or rates of prior psychiatric hospitalization (*p*s>0.05). INS-Only respondents experienced more lifetime depressive episodes relative to NSP or HYP-Only respondents (*p*s<0.05). INS-HYP, INS-Only, and HYP-Only endorsed higher rates of suicide attempts in their history compared to the NSP group (*p*s<0.05).

Relative to the NSP group, the three sleep disturbed groups endorsed greater *QIDS-SR* depression severity (*p*s<0.05). Excluding sleep items, *QIDS-SR* depression severity in the INS-Only and INS-HYP groups remained elevated relative to NSP (*p*s<0.05). The INS-HYP group endorsed higher rates of past-year suicidal ideation than the INS-Only group. Relative to the NSP group, there were higher rates of past-year suicide planning in the INS-HYP and INS-Only groups, and past-year suicide attempts in the INS-HYP and HYP-Only groups (*p*s<0.05).

Psychiatric Comorbidity—INS-HYP respondents were more likely to have a bipolar spectrum disorder, and less likely to have MDD-Only, compared to HYP-Only respondents (*p*s<0.05). The INS-Only group was more likely to have bipolar II disorder relative to the NSP group (*p*s<0.05). The odds of experiencing MDD with dysthymia, bipolar I disorder, and subthreshold bipolar disorder did not differ between groups (*p*s>0.05).

Impulse-control disorders were more common in INS-HYP and INS-Only relative to NSP or HYP-Only (*p*s<0.05). Drug use disorders occurred at higher rates in INS-HYP than INS-Only (*p*<0.05), and in the HYP-Only group compared to the NSP or INS-Only groups (*p*s<0.05). The groups did not differ in likelihood of having an anxiety disorder or an alcohol use disorder (*p*s>0.05).

Impairment—INS-HYP respondents were significantly more impaired than the three other groups in the relationship, social, and overall *SDS* domains (*p*s<0.05), while the INS-Only and HYP-Only groups were more impaired than NSP (*p*s<0.05). In *SDS*-home management, HYP-Only respondents were more impaired relative to NSP (*p*<0.01). The groups did not differ in work impairment or days out of role (*p*s>0.05).

Treatment—Compared to the NSP or INS-Only groups, the INS-HYP group was generally more likely to be receiving treatment for emotional problems, and more frequently saw a general practitioner and were prescribed antidepressants (*p*s<0.05). The INS-HYP group more frequently received treatment from a psychiatrist and were prescribed medication compared the INS-Only group (*p*s<0.05). HYP-Only respondents were more likely to be seeing a psychologist, social worker, or counselor compared to INS-Only respondents (*p*s<0.05). Sedative hypnotic use was more frequent in respondents with INS-Only compared to NSP (*p*<0.05). Use of stimulants, tranquilizers and antipsychotics did not differ between the groups (*p*s>0.05).

Discussion

The goal was to examine the prevalence of co-occurring insomnia and hypersomnia symptoms during depressive episodes, and to evaluate whether the presence of both sleep

disturbances is associated with a more severe clinical profile (Breslau et al., 1996, Liu et al., 2007). Hypersomnia and insomnia symptoms co-occurred in over a quarter (27.7%) of respondents with depression. These sleep disturbances jointly presented more frequently in bipolar spectrum disorders and MDD with dysthymia (31.1-32.3%) compared to MDD-Only (25.6%). Interestingly, hypersomnia rarely occurred *without* insomnia symptoms (5.9%). The observed rate of co-occurring insomnia and hypersomnia was higher than previous reports in depressed children (Liu et al., 2007) and older adults (Roberts et al., 2000), which could be due to the focus on sleep disturbance *symptoms* rather than sleep *disorders* in this investigation.

No clear sociodemographic profile emerged to differentiate respondents with co-occurring hypersomnia and insomnia symptoms from the other groups. Some similarities were shared with hypersomnia-only group, such as being female, unmarried, and out of the labor force, consistent with previous work (Matza et al., 2003, Breslau et al., 1996). Despite a lack of age differences, respondents with both sleep disturbances had fewer years of education relative to the groups with hypersomnia symptoms-only and no sleep problems.

There was some evidence to support adverse consequences of jointly presenting insomnia and hypersomnia symptoms. Respondents with co-occurring sleep problems experienced functional impairment overall, and particularly in social/relationship domains. Similar to the insomnia-only group, respondents with co-occurring sleep disturbances had more severe depression, and higher rates of past-year impulse control disorders and suicide planning. Similar to the hypersomnia-only group, respondents with co-occurring sleep disturbances had higher rates of past-year drug use disorders and suicide attempts. These findings support (Breslau et al., 1996) and extend (Bernert et al., 2005) prior work. Notably, differences in mental health treatment emerged compared to the insomnia-only and no sleep problem groups; respondents with both sleep disturbances were more frequently in treatment, seeing a general practitioner, and taking antidepressants. In contrast to a study of childhood MDD (Liu et al., 2007), here the overall course of depression did not differ for the group with co-occurring sleep disturbances. Overall, these findings extend and partially support several published reports on the detrimental impact of combined insomnia and hypersomnia during depression (Roberts et al., 2000, Breslau et al., 1996, Liu et al., 2007).

Several limitations merit consideration. First, while *QIDS-SR* sleep items have been validated against gold-standard sleep diary reports (Manber et al., 2005, Kaplan et al., 2011), previous research observed that self-report sleep measures can yield overestimation or underestimation of sleep complaints in psychiatric samples (Bliwise et al., 1993). Second, we adopted a quantitative definition for hypersomnia (Tam et al., 1997, Kaplan et al., 2011), but acknowledge that this definition does not include excessive sleepiness, a diagnostic feature of ICD-10 and DSM-5 hypersomnia. Third, we emphasize that these sleep measurements allow comment on insomnia and hypersomnia *symptoms*, but not as *disorders*. Finally, unmeasured group differences, such as medication class, dosage, and adherence, could have affected the present findings.

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Table 1

Demographic characteristics, course and severity of depression, and functional impairment, by sleep disturbance group

	No Sleep Problems (N=55)		Hypersomnia Only (N=44)		Insomnia Only (N=404)		Insomnia+Hypersomnia (N=184)		Analysis	
Sociodemographic Variables									**F(3,40)[a]**	***p***
Age, years	41.3	3.1	32.9	2.2	40.6	0.7	37.5	1.1	5.66	.002
Female (%)	60.2	6.7	81.5	6.3	60.4	2.6	70.9	4.0		.027
Race (%)										.123
Caucasian	81.7	5.7	77.6	7.6	72.0	2.8	77.9	3.8		
Black	15.2	5.0	10.8	4.5	9.7	1.5	8.9	2.3		
Hispanic	3.1	1.8	5.0	3.6	11.8	1.9	9.9	3.1		
Other	0	0	6.7	4.0	6.6	1.0	3.4	1.0		
Household Income (%)										.478
Low	4.3	3.1	17.4	5.9	8.5	2.1	10.6	2.4		
Low-average	46.1	6.9	50.9	7.3	50.3	3.1	51.8	4.9		
High-average	27.2	5.7	11.6	4.5	21.4	2.0	19.7	3.3		
High	22.5	6.0	20.2	6.0	19.8	2.4	17.9	2.2		
Education Level (%)										.047
< 12 years	6.2	3.4	8.3	4.0	18.0	1.4	23.2	2.9		
12 years	27.1	5.73	23.4	6.3	30.4	2.7	30.7	3.9		
13-15 years	45.3	5.1	38.4	9.0	33.2	2.2	24.7	2.9		
>15 years	21.5	4.7	30.0	8.1	18.4	2.5	21.3	3.4		
Employment Status (%)										.027
Employed	64.6	7.2	64.1	8.2	63.6	2.9	53.4	3.7		
Unemployed	9.5	3.8	6.5	3.8	2.5	0.8	2.5	5.1		
Not in Labor Force	25.8	7.8	29.4	8.1	33.9	2.8	41.6	3.4		
Marital Status (%)										.006
Married/Cohabiting	44.1	7.6	35.7	6.4	46.6	2.9	34.7	3.2		
Divorced	27.6	5.0	18.7	5.1	28.4	2.5	25.2	2.8		
Never Married	28.3	7.5	45.6	8.0	25.0	2.5	40.1	3.3		
Smoker (%)	67.9	6.6	57.7	7.3	59.1	2.5	62	4.0		.550
Obese (BMI>30 kg/m^2; %)	23.7	5.7	23.5	6.1	29.2	2.0	25.5	3.8		.630

	No Sleep Problems (N=55)		Hypersomnia Only (N=44)		Insomnia Only (N=404)		Insomnia+Hypersomnia (N=184)		Analysis	
Sociodemographic Variables									**F(3,40)[a]**	***p***
Course & Severity of Depression Outcomes									F(3,40)[a]	*p*
Age of first MDE, years	23.1	1.8	27.7	1.7	24.9	0.6	24.0	0.8	2.18	.105
Duration of current MDE, days	130.9	21.3	107.6	25.1	117.6	7.7	119.0	10.1	7.65	.107
QIDS-SR total	7.2	0.5	11.1	0.7	15.0	0.2	17.5	0.3	190.21	<.001
QIDS-SR total (no sleep items)	6.1	0.6	7.6	0.9	8.4	0.2	9.8	0.3	36.76	<.001
Number of MDEs	13.0	3.3	9.6	2.5	25.1	5.1	20.2	4.5	5.75	.002
Suicidal Ideation (past year %)	45.0	8.3	46.1	5.6	36.0	2.9	47.6	4.0		.065
Suicidal Plan (past year %)	7.1	2.8	17.6	5.9	15.1	2.2	20.9	3.5		.067
Suicidal Attempt (past year %)	4.2	2.5	16.4	5.4	11.8	2.1	15.5	3.0		.181
Suicide Attempt (lifetime %)	6.6	3.2	28.1	11.1	21.8	2.5	28.2	5.1		.148
Psychiatric Hospitalization (lifetime %)	14.9	4.8	25.7	5.8	16.6	2.0	16.9	2.1		.396
Impairment Outcomes									F(3,40)[a]	*p*
SDS home management	4.4	0.4	5.5	0.5	5.5	0.2	5.9	0.2	7.65	<.001
SDS relationships	3.8	0.4	4.3	0.5	5.5	0.2	5.6	0.2	20.50	<.001
SDS social	4.8	0.4	5.5	0.4	6.0	0.2	6.4	0.2	32.23	<.001
SDS work	4.1	0.4	4.6	0.6	5.0	0.2	5.4	0.3	11.61	<.001
SDS overall	4.3	0.4	5.0	0.4	5.5	0.1	5.9	0.2	24.38	<.001
SDS days out of role	40.8	14.2	45.3	14.3	45.4	4.5	44.3	7.8	2.42	.079

Note. *N*s are unweighted values. Mean and percentages are weighted. Means with standard error (SE) are presented, unless noted as a percentage; MDE=Major Depressive Episode; *QIDS-SR*= Quick Inventory of Depressive Symptomatology – Self Report Version; *SDS*=Sheehan Disability Scale;

[a]Adjusted for age, sex and education status; Rao-Scott chi-square test was used for categorical variables.

Table 2

Adjusted odds ratios (ORs)[a,b] and 95% confidence intervals (CI) for 12-month DSM-IV disorders and mental health treatment, by diagnostic group.

	Hypersomnia Only (N=44)			Insomnia Only (N=404)			Insomnia + Hypersomnia (N=184)		
Psychiatric Comorbidity	**OR**	**95%CI**	***p***	**OR**	**95%CI**	***p***	**OR**	**95%CI**	***p***
Major Depressive Disorder	2.1	0.4-9.7	.340	0.6	0.3-1.6	.334	0.6	0.2-1.5	.253
Major Depressive Disorder Only	1.7	0.6-4.7	.336	0.7	0.4-1.4	.303	0.6	0.3-1.3	.176
Major Depressive Disorder with Dysthymia	0.8	0.2-3.2	.738	1.1	0.4-2.8	.835	1.4	0.5-4.0	.479
Bipolar Spectrum Disorders	0.5	0.1-2.2	.340	1.5	0.6	.334	1.7	0.7-4.2	.253
Bipolar Disorder, Type 1	1.1	0.1-7.6	.974	1.3	0.3-5.3	.708	2.2	0.5-10.5	.308
Bipolar Disorder, Type 2	2.5	0.1-44.7	.520	7.6	1.2-47.2	.031	6.5	0.8-54.7	.085
Bipolar Disorder, Subthreshold	-	-	-	0.7	0.2-2.6	.552	0.6	0.1-3.0	.521
Anxiety Disorder	1.4	0.5-3.7	.457	2.1	0.9-4.7	.071	1.8	0.8-4.3	.147
Drug Abuse and/or dependence	11.7	1.2-17.3	.037	1.6	0.2-15.5	.664	4.7	0.5-44.0	.172
Alcohol Abuse and/or dependence	1.1	0.2-6.8	.946	1.5	0.4-6.3	.547	1.9	0.5-7.2	.336
Impulse Control Disorder	1.5	0.3-7.8	.591	4.6	1.3-16.0	.017	5.6	1.7-18.09	.006
Mental Health Treatment	OR	95%CI	*p*	OR	95%CI	*p*	OR	95%CI	*p*
Any treatment	2.7	1.0-7.8	.061	1.4	0.7-3.0	.331	2.6	1.3-5.3	.009*
Psychiatric hospitalization	1.4	0.1-13.1	.790	2.0	0.7-5.2	.166	-	-	-
Psychiatrist	2.8	0.9-8.3	.065	1.3	0.5-3.3	.524	2.5	1.0-6.2	.053
General Practitioner	1.4	0.6-3.7	.442	1.3	0.6-2.8	.431	2.3	1.1-4.9	.028*
Psychologist, social worker, or counselor	2.2	0.9-5.4	.088	1.0	0.5-1.7	.895	1.5	0.8-2.9	.178
Any Medication	0.5	0.0-5.8	.587	0.7	0.2-2.4	.551	2.4	0.6-9.2	.211
Sedative Hypnotic	1.1	0.3-5.1	.860	2.9	1.0-8.7	.050	2.9	0.8-10.7	.111
Antidepressants	2.2	0.9-5.1	.066	1.5	0.7-3.5	.323	2.7	1.2-6.3	.021
Tranquilizer	1.4	0.3-6.4	.635	1.6	0.6-4.4	.314	1.2	0.4-3.4	.754
Antipsychotic	0.8	0.0-15.6	.886	2.0	0.3-5.5	.498	1.0	0.1-10.9	.968
Stimulant	0.9	0.1-10.6	.960	0.4	0.1-1.3	.117	-	-	-

Note. *N*s are unweighted values.;

[a] Adjusting for age, sex, education status;

[b] Reference Category: No Sleep Problems (N=55)