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Research Article

Predictors of New Onset Sleep Medication and Treatment Utilization Among Older Adults in the United States

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Abstract

Background: Sleep disturbances are common among older adults resulting in frequent sleep medication utilization, though these drugs are associated with a number of risks. We examine rates and predictors of new prescription sleep medications and sleep treatments, as well as sleep treatments without a doctor's recommendation.

Methods: Participants were 8,417 adults aged 50 and older from two waves of the nationally representative Health and Retirement Study (HRS) who were not using a sleep medication or treatment at baseline (2006). Logistic regression analyses are run with sociodemographic, health, and mental health factors as predictors of three outcomes: new prescription medication use, sleep treatment use, and sleep treatment out of a doctor's recommendation in 2010.

Results: New sleep medication prescriptions were started by 7.68%, 12.62% started using a new sleep treatment, and 31.93% were using the treatment outside of their doctor's recommendation. Common predictors included greater severity of insomnia, worsening insomnia, older age, and use of psychiatric medications. New prescription medication use was also associated with poorer mental and physical health, whereas new sleep treatment was associated with being White, higher educated, and drinking less alcohol.

Conclusions: Starting a new prescription sleep medication may reflect poorer health and higher health care utilization, whereas beginning a sleep treatment may reflect an individual's awareness of treatments and determination to treat their problem. Clinicians should be aware of predictors of new sleep medication and treatment users and discuss various forms of treatment or behavioral changes to help patients best manage sleep disturbance.

Keywords: Depression—Medication—Sleep

Sleep disturbance and insomnia symptoms are commonly experienced across adulthood with prevalence increasing with age. The National Sleep Foundation (1) reports that 44% of adults aged 55–84 years report a few nights of disturbed sleep a week. Other studies suggest that sleep disturbances are reported in up to half of community-dwelling older adults (2,3). Normal changes with age, stress, health problems, and institutionalization are all reasons why sleep disturbances increase with age. Sleep disturbance impacts health and mood and has been shown to be associated with shorter survival (4). Therefore, treating sleep problems may improve quality and even length of life.

Pharmacotherapy, through both prescription and over-the-counter (OTC) medications, is a common way of managing insomnia

symptoms. Although studies vary in ages sampled and length of sleep medication use, studies find that approximately 8%–11% of adults have used sleep medications in the past year with up to 19% reporting lifetime use (5–7). Sleep medication utilization is particularly high among older adults. A study of Canadian adults aged 60 and older reported that 16% of participants took a sleep medication (either prescription or OTC) in the past year (8). In the United States, more than 2 million adults older than 60 years take OTC sleep medications at least once a month, with 35% of these individuals taking them more than 20 days in a month (9).

The Beer's list, however, warns that commonly used sleep medications may be "potentially inappropriate" for use in people aged

65 years and older and are associated with adverse events (10). For example, benzodiazepines, commonly prescribed to treat sleep problems, are associated with risk for falls, fractures, delirium, and cognitive impairment. Older adults metabolize medication more slowly than younger adults and are more highly sensitive to benzodiazepines (10,11). Anticholinergic agents commonly found in OTC sleep medications can lead to side effects such as dry mouth, constipation, confusion, and toxicity (10,11). Drug–drug reactions are a further concern given the number of medications many older adults consume (12). More than half of older adults report using at least five OTCs, prescription medications, and/or dietary supplements (11,12). Older adults may not be aware of potential interactions, especially when they have previous experience with a medication (11). Further, given that older adults may be receiving medications from multiple prescribers, the prescriber may not be monitoring for these interactions.

Compounding these issues, many older adults are self-managing their sleep problems outside of their doctor's knowledge and care. For example, Hohagen and colleagues (13) found that in approximately half of incidences of insomnia (48% for severe insomnia), older adults' primary care doctors were unaware of the problem. Another study (14) examined sleep problems by interviewing older adult patients and also examining medical records. At least one sleep problem was reported by 69% of patients with 45% reporting insomnia, but sleep problems were only mentioned in medical records for 19% of patients. Other studies have found 7% to 15% of older adults report using nonprescribed sleeping pills (8,15).

Prior research has identified sociodemographic, behavioral, and clinical predictors of current sleep medication utilization. Among individuals reporting sleep problems, Whites, females, older adults, those with higher socioeconomic status, more persistent insomnia, more depressive symptoms, and poor self-rated health were more likely to use a sleep medication (5,7,8,15–17). Additionally, current alcohol use was associated with nonprescribed sleep medication use (15). This article extends this work by considering patterns of *new* sleep treatment utilization in a nationally representative sample of older adults in the United States from the Health and Retirement Study (HRS) utilizing a longitudinal design.

Understanding patterns of new sleep treatment utilization is important for several reasons. Identifying characteristics of "likely" new users helps clinicians recognize individuals in need of sleep treatment, discuss behavioral and/or pharmacological treatment options and treatment guidelines, and prevent inappropriate use. Most individuals report a desire for nonpharmacological sleep treatment (7), yet may not be aware of options. Thus early identification may increase the likelihood of safe, guideline-driven intervention. We consider incidence of new use of both prescription sleep medication and any form of sleep treatment. Sociodemographic, health, and clinical factors associated with new use are examined, including use of sleep treatment outside a doctor's recommendation.

Methods

Study Population

Begun in 1992, the HRS is a biennial longitudinal survey of a nationally representative sample of the U.S. population older than the age of 50 years. The sampling involves a multistage area probability design with geographic stratification and clustering. HRS oversamples Black and Hispanic households at about twice the rate of Whites and has been highly successful at recruiting and retaining these research respondents (18). In addition, the 2010 wave of

data collection included a supplemental screening effort to increase the sample of Black and Hispanic respondents from the Baby Boom cohorts. The study produces sample weights that can be applied analytically in order to account for the differential probability of selection into the study and differential nonresponse. Details are provided in Sonnega and colleagues (19). For most variables, we used the RAND HRS data, a cleaned and ready-to-use version of HRS data (20). HRS is funded by the National Institute on Aging (NIA U01AG0097) and housed at the University of Michigan (UM) Institute for Social Research. All respondents have provided written consent, and the study protocol has been approved by the UM Institutional Review Board.

HRS began collecting data on the use of sleep medications in 2006. We began with 17,106 respondents who participated in the 2006 wave (baseline for the present study) and had a nonzero weight, that is, were older than 50 years. Next, in order to investigate risk factors for beginning use of sleep medications, we removed 6,075 respondents who reported using sleep medication in 2006 and 2,614 respondents who were missing data on sleep medication use in 2010 for a resulting analytic sample of 8,417.

Outcomes

Use of sleep medications

To examine new use of sleep medications and treatment, we used three items from the 2010 wave: regular prescription medication use ("Do you regularly take prescription medications to help you sleep?"), current sleep treatment use ("In the past two weeks, have you taken any medications or used other treatment to help you sleep?"), and for those who responded yes to the latter question, a follow-up question asked "Were these medications or other treatments recommended to you by a doctor?" to define sleep treatment out of a doctor's recommendation. Outcomes were coded as yes or no.

Predictors

Insomnia symptoms

Insomnia symptoms were indicated by four questions. Respondents were asked how often they have trouble with "falling asleep," "waking up during the night," "waking up too early and not being able to fall asleep again," and "you feel really rested when you wake up in the morning?" Response categories were "most of the time," "sometimes," and "rarely or never." As in Kaufmann and colleagues (21), we defined a symptom as positive if a participant endorsed having it "most of the time" or "sometimes" for the first three items and "sometimes" or "rarely or never" for the fourth item. We then created a symptom index ranging from 0 to 4 for the number of insomnia symptoms. We used this index to create a variable that indicated a change in insomnia symptoms between 2006 and 2010. A positive number on this variable indicated an increase in symptoms, zero was no change, and a negative score indicated a decrease in symptoms over time.

Sociodemographics

All remaining covariates were taken from the 2006 survey wave except for gender, race, and education which were taken from the participant's baseline. A continuous age variable was used for respondent's age. Gender was coded so that female was the referent category (1 = female, 0 = male). Race was coded with White as the referent and separate risk estimated for Black and other race. We used a continuous variable for years of education. A continuous

variable for total household income was divided by 10,000 so that the regression coefficient can be interpreted as the effect of a $10,000 unit increase in household income.

Health status
Respondents reported their overall health on a 5-point scale as poor, fair, good, very good, or excellent with a higher number indicating poorer health. Following common practice, a dichotomous indicator of fair or poor health compared with good, very good, or excellent health was used. HRS assesses the presence of high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis. We used a summary score that ranged from 0 to 8 for the number of chronic health conditions respondents reported. Self-reported pain was a dichotomous (yes/no) response to "Are you often troubled with pain?" *Health Behaviors*. A continuous variable was used to indicate the number of alcoholic drinks consumed per day conditional on consuming alcohol. A dichotomous indicator was used for current smoking (1 = smoker).

Depressive symptoms
A modified 8-item version of the Center for Epidemiologic Studies Depression Scale (CES-D) was used for measurement of depressive symptoms [22]. Respondents reported the extent to which in the previous week, they felt depressed, everything was an effort, sleep was restless, that he or she could not get going, lonely, that he or she enjoyed life, sad, and happy. To deal with differences in response categories over waves, RAND codes these dichotomously as yes or no. To minimize operational confounding of this predictor with our outcome, we removed the item about restless sleep. We reverse coded the positive items and summed the remaining six items for a count of recent depressive symptoms ranging from 0 to 7.

Mental health medication use
A dichotomous indicator for use of psychiatric medications was created from the HRS variable asking "Do you regularly take prescription medications for any of the following common health problems . . . to help relieve anxiety or depression?"

Statistical Analyses
Statistical analyses were performed using Stata version 13 (Stata Corporation, College Station, TX). HRS produces sample weights that can be applied analytically in order to account for the differential probability of selection into the study and differential nonresponse. All analyses were weighted, and variance estimation accounted for the complex sample design. We generated weighted sample descriptive statistics but report the unweighted sample sizes.

We conducted a set of nested logistic regression models to evaluate the effects of predictors on three outcomes: (i) regular prescription sleep medication use, (ii) current sleep treatment use, and (iii) new sleep treatment use outside of a doctor's recommendation. Note that the sample for the third set of models was 1,062 who answered affirmatively to using sleep treatments. For each of the three outcomes, Model I evaluated the effect of insomnia symptoms at baseline in 2006 and worsening insomnia between 2006 and 2010. Model II added controls for sociodemographics including age, gender, race, education, and household income. Model III added controls for baseline alcohol consumption, smoking, self-rated health, chronic medical conditions, and pain. Model IV further adjusted for presence of depressive symptoms. The last model added use of psychiatric medications. Odds ratios (ORs) and 95% confidence intervals (CIs) are reported.

Table 1. Sample Characteristics

	Mean or %	Standard Error	95% Confidence Interval
Age	65.88	0.17	65.53–66.22
Female	54.76%	0.54	53.67–55.84
Race			
White	85.05%	0.82	83.40–86.70
Black	10.06%	0.58	8.89–11.22
Other	4.90%	0.47	3.96–5.84
Years of education	12.87	0.08	12.70–13.03
Household income	64,008	2,016.21	59,954.12–68,061.84
Number of alcoholic drinks per day	0.73	0.02	0.69–0.77
Current smoker	12.11%	0.53	11.04–13.17
Self-reported poor health	24.68%	0.73	23.21–26.14
Chronic health conditions	2.06	0.02	2.02–2.10
Troubled with pain	32.87%	0.64	31.59–34.15
Depressive symptoms	1.05	0.03	1.00–1.11
Psychiatric medication use	14.0%	0.56	12.88–15.12
Insomnia symptoms	1.77	0.02	1.73–1.81
Change in insomnia severity			
% Increase	36.00%	0.60	34.79-37-21
No change	36.55%	0.60	35.36–37.75
% Improvement	27.45%	0.59	26.28–28.63
Regular prescription sleep med user[†]	7.68%	0.27	7.14–8.22
Current sleep treatment user[†]	12.42%	0.36	11.69–13.15
Treatment outside doctor's recommendation[†]	31.93%	1.71	28.50–35.36

Notes: Unweighted *n* = 8,417.

*Fractions and means are weighted using 2006 Core weights as described in the text.

[†]Indicates outcome variables taken from 2010. All other variables taken from 2006.

Results

Participants were 8,417 adults who on average reported 1.76 insomnia symptoms in 2006 of which 36.0% had increasing insomnia symptoms between 2006 and 2010. Among participants (those not using a sleep medication or treatment in 2006), 7.68% started using a regular prescription(s) sleep medication (unweighted frequency 684) and 12.42% started using a current sleep treatment between 2006 and 2010 (unweighted frequency 1062). Of those using a current sleep treatment in 2010, 31.93% were using the treatment outside of their doctor's recommendation (unweighted frequency 333). Full sample information can be found in Table 1.

Next, three logistic regression models were run in stepwise fashion. In the final model, more insomnia symptoms (OR = 1.61, CI: 1.46–1.77), worsening insomnia (OR= 1.40, CI: 1.26–1.55), older age (OR = 1.02, CI: 1.01–1.04), poorer self-reported health (OR = 1.40, CI: 1.09–1.80), more depressive symptoms (OR = 1.11, CI: 1.04–1.18), and psychiatric medication use (OR = 1.91, CI: 1.46–2.50) were associated with new regular prescription sleep medication use. Chronic health conditions were a significant predictor in Model 3 until controlling for depressive symptoms in Model 4 (Table 2).

In the final model, more insomnia symptoms (OR = 1.61, CI: 1.50–1.73), worsening insomnia (OR = 1.44, CI: 1.33–1.56), older age (OR = 1.01, CI: 1.00–1.02), being White (OR = 0.51, CI: 0.40–0.66), higher education (OR = 1.03, CI: 1.00–1.06), having less alcoholic drinks in a day (OR = 0.92, CI: 0.86–0.99), and psychiatric medication use (OR = 1.58, CI: 1.25–2.01) were associated with current sleep treatment. Depressive symptoms were a significant predictor in Model 4 until controlling for psychiatric medication use in Model 5 (Table 3). Among those utilizing a current sleep treatment in 2010, being Black (OR = 1.54, CI: 1.07–6.03), having higher income (OR = 1.04, CI: 1.01–1.08), and being troubled with pain (OR = 1.58, CI: 1.09–2.31) were associated with using the treatment outside of one's doctor's recommendation (Table 4).

Discussion

Within a nationally representative sample of older adults in the United States, new onset of sleep medication and treatment utilization over 4 years is common, consistent with prior studies (5–8,23). Among individuals not reporting prescription sleep medication or sleep treatment use in 2006, approximately 8% started regularly using a prescription sleep medication by 2010 and almost 13% used a new sleep treatment or medication in the past 2 weeks. Additionally a significant 32% were using these sleep treatments outside of their doctor's recommendations. Given the risks associated with sleep medications and their association with poor physical health (24), it is important for clinicians, public health experts and researchers alike to recognize the characteristics of older adults who begin a new treatment so that they may be identified and provided appropriate medical advice.

Predictors of new, regular prescription sleep medication and current sleep treatment utilization were largely consistent. As in prior research (7,8,16,17), common predictors included older age, greater severity of insomnia symptoms, and insomnia symptoms that increased over time. Extending prior work, we find psychiatric medication use as a common predictor over and above inclusion of depressive symptoms alone. Although severity and worsening of insomnia are clear indicators of need for sleep treatment, many other factors were associated with new utilization. Psychiatric medication use likely indicates greater severity of depressive mood or anxiety, both conditions of which sleep disturbance is a common symptom and comorbid issue. Further, individuals using psychiatric medication are already receiving health care for physical and psychiatric symptoms and may be more likely to disclose and accept treatment for sleep disturbance. Being White compared with Black, having a

Table 2. Predictors of New, Regular Prescription Sleep Medication Use

	Model I		Model II		Model III		Model IV		Model V	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Insomnia symptoms	1.76***	1.64–1.89	1.75***	1.59–1.91	1.64***	1.50-.180	1.60***	1.45–1.76	1.61***	1.46–1.77
Worsening insomnia	1.47***	1.36–1.59	1.44***	1.32–1.58	1.41***	1.29–1.56	1.40***	1.26–1.55	1.40***	1.26–1.55
Age			1.02**	1.00–1.03	1.02*	1.00–1.03	1.02**	1.01–1.03	1.02**	1.01–1.04
Female			1.08	0.84–1.39	1.09	0.84–1.41	1.08	0.83–1.41	1.03	0.80–1.33
Black			0.83	0.60–1.13	0.78	0.57–1.07	0.74†	0.53–1.04	0.79	0.57–1.11
Other			1.19	0.73–1.93	1.14	0.70–1.87	1.03	0.63–1.69	1.13	0.69–1.85
Education			0.98	0.94–1.01	1.00	0.96–1.04	1.01	0.97–1.05	1.00	0.96–1.04
Household income ($10.000)			1.00	0.99–1.01	1.01	1.00–1.02	1.01	1.00–1.02	1.01	1.00–1.02
Drinks per day					0.98	0.89–1.08	0.97	0.88–1.07	0.98	0.89–1.08
Current smoker					0.93	0.66–1.33	0.85	0.58–1.27	0.83	0.55–1.24
Self-reported health					1.53***	1.20–1.94	1.38*	1.07–1.77	1.40**	1.09–1.80
Chronic health conditions					1.11*	1.01–1.22	1.06	0.98–1.15	1.02	0.94–1.11
Troubled with pain					1.18	0.94–1.48	1.07	0.84–1.35	1.05	0.83–1.34
Depressive symptoms							1.14***	1.07–1.22	1.11**	1.04–1.18
Psychiatric medication use									1.91***	1.46–2.50
X^2 (d*f*)	259.56 (2)***		237.37 (8)***		303.08 (13)***		331.33 (14)***		497.58***	

Notes: CI = confidence interval.

Sample *n*: Model 1 = 8,295; Model 2 = 7,014; Model 3 =6,955; Model 4 = 6,684; Model 5 = 6,682; Wald chi-squares reported.

*p < .05. **p < .01. ***p < .001. †p < .10.

Table 3. Predictors of New, Current Sleep Treatment

	Model I		Model II		Model III		Model IV		Model V	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Insomnia symptoms	1.65***	1.55–1.75	1.66***	1.54–1.79	1.63***	1.51–1.75	1.60***	1.49–1.72	1.61***	1.50–1.73
Worsening insomnia	1.42***	1.33–1.52	1.45***	1.34–1.57	1.45***	1.34–1.57	1.44***	1.32–1.57	1.44***	1.33–1.56
Age			1.01*	1.00–1.02	1.01†	1.00–1.02	1.01†	1.00–1.02	1.01*	1.00–1.02
Female			1.22*	1.00–1.48	1.19†	0.98–1.45	1.20†	0.97–1.48	1.16	0.94–1.44
Black			0.51***	0.40–0.67	0.50***	0.39–0.65	0.49***	0.38–0.64	0.51***	0.40–0.66
Other			0.90	0.61–1.34	0.89	0.60–1.34	0.91	0.61–1.37	0.97	0.64–1.47
Education			1.03†	1.00–1.06	1.03*	1.00–1.06	1.04*	1.00–1.07	1.03*	1.00–1.06
Household income ($10.000)			1.00	0.99–1.01	1.00	0.99–1.01	1.00	0.99–1.01	1.00	0.99–1.01
Drinks per day					0.93*	0.87–1.00	0.92*	0.86–0.99	0.92*	0.86–0.99
Current smoker					0.94	0.69–1.29	0.94	0.67–1.31	0.92	0.66–1.29
Self-reported health					1.07	0.80–1.43	1.05	0.78–1.42	1.06	0.79–1.43
Chronic health conditions					1.05	0.98–1.13	1.03	0.96–1.11	1.01	0.94–1.08
Troubled with pain					1.06	0.90–1.24	1.03	0.87–1.21	1.02	0.86–1.20
Depressive symptoms							1.05*	1.01–1.10	1.03	0.98–1.08
Psychiatric medication use									1.58***	1.25–2.01
X^2 (df)	260.06 (2)***		222.13 (8)***		343.55 (13)***		340.73 (14)***		355.95 (15)***	

Notes: CI = confidence interval.

Sample *n*: Model 1 = 8,295; Model 2 = 7,014; Model 3 = 6,955; Model 4 = 6,684; Model 5 = 6,682; Wald chi-squares reported.

*$p < .05$. **$p < .01$. ***$p < .001$. †$p<.10$.

higher educational attainment, and drinking less alcohol per day were associated with starting a recent sleep treatment but not a prescription sleep medication. Future work may consider the possible mediational or moderational role of health behaviors such as exercise and alcohol consumption in the pathway to sleep medication utilization. Educational attainment may increase exposure to different sleep treatments or increase self-determination in managing personal health challenges. Further, Whites on average have higher use of health care services (25,26). In general, Black's use fewer medications, are less likely to view antidepressants as acceptable (27), and are less likely to take prescribed medications than Whites (28,29).

In contrast, reporting poorer health and more depressive symptoms (even after controlling for psychiatric medication use) was associated with regular prescription medication use but not recent sleep treatment. Medication use has been found to be generally high among those with poor health status (30). Regarding the specificity of predictors between outcome measures, it may be that prescription medications are used most commonly by individuals with comorbid conditions (ie, reporting poor health and depressive symptoms, in addition to psychiatric medication use). These individuals may see their doctor more frequently and thus have a greater likelihood of receiving a prescription sleep aid. In contrast, individuals with higher education may take more initiative to self-treat and, as noted, Whites are more likely to seek health care than Blacks, thereby utilizing more sleep treatments, which may or may not require a prescription.

When examining only those who indicated using a current sleep treatment, use of this treatment outside of a doctor's recommendation was associated with being Black, having a higher income, and being troubled with pain. Higher income may lead to greater agency in seeking one's own solution to a sleep problem and those troubled with pain may have particular urgency to relieve pain through restorative sleep. Further, although Whites were more likely than Blacks to be using a current sleep treatment, Blacks were more likely to use treatment outside recommendation. This

may reflect a generally reported mistrust in medical care among Black adults (31) leading to self-seeking for a solution. In sum, our models extend prior work by comparing and contrasting new regular prescription use and current sleep treatment and also considering predictors of self-treating outside a doctor's recommendation in a nationally representative sample of older adults. Future work should examine whether rates of self-treating for sleep are higher than for other medical conditions.

Limitations

One limitation of this study is that HRS does not ask about the specific types of sleep treatments participants utilized. Sleep treatments may range from prescription or OTC medications, to continuous positive airway pressure machines, or other natural remedies or behavioral therapies. There is also likely overlap between the sleep treatment and prescription sleep medication use outcome variables as some individuals may have responded affirmatively to both items based on their prescription medication use. Furthermore, the prescription sleep medication item asks about regular use, whereas the sleep treatment item asks about use in the past 2 weeks. We cannot, therefore, rule out the possibility that someone had previously used a sleep treatment in 2006, however, it may be safe to assume that it was not regular use if not used in the prior 2 weeks. Given the breadth of the HRS survey, all items are not asked consistently across waves, and thus the 4-year interval between 2006 and 2010 was the smallest to examine our hypotheses. Furthermore, HRS does not assess psychiatric medication use for reasons other than depression and anxiety and therefore we could not control for other psychiatric medication use.

In conclusion, new sleep medication and treatment use is common among a nationally representative sample of older adults in the United States with increasing sleep problems. Prior work by Omvik and colleagues (7), however, found that among individuals reporting sleep medication use, 80.3% reported they would prefer a

Table 4. Predictors of Sleep Treatment Utilization Outside of Doctor's Recommendation

	Model I		Model II		Model III		Model IV		Model V	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Insomnia symptoms	1.06	0.92–1.23	1.09	0.92–1.28	1.04	0.89–1.22	1.03	0.89–1.20	1.04	0.89–1.21
Worsening insomnia	1.04	0.90–1.20	1.08	0.92–1.27	1.05	0.90–1.23	1.08	0.92–1.26	1.08	0.92–1.26
Age			1.02	0.99–1.04	1.02†	1.00–1.04	1.02†	1.00–1.04	1.02†	1.00–1.05
Female			1.20	0.84–1.72	1.19	0.82–1.73	1.25	0.84–1.87	1.24	0.82–1.88
Black			2.77*	1.25–6.14	2.59*	1.11–6.05	2.52*	1.06–5.97	1.54*	1.07–6.03
Other			1.17	0.34–3.98	1.20	0.37–3.89	1.27	0.35–4.59	1.30	0.36–4.71
Education			0.94†	0.89–1.00	0.96	0.90–1.02	0.97	0.91–1.03	0.97	0.91–1.03
Household income ($10.000)			1.02	0.99–1.05	1.04*	1.01–1.07	1.04*	1.01–1.08	1.04*	1.01–1.08
Drinks per day					1.00	0.83–1.19	1.02	0.84–1.24	1.02	0.84–1.24
Current smoker					1.41	0.75–2.64	1.43	0.74–2.74	1.43	0.74–2.77
Self-reported health					1.41	0.94–2.13	1.45†	0.93–2.26	1.46†	0.94–2.26
Chronic health conditions					1.05	0.91–1.22	1.02	0.88–1.19	1.02	0.88–1.19
Troubled with pain					1.59*	1.11–2.27	1.59*	1.10–2.32	1.58*	1.09–2.31
Depressive symptoms							1.02	0.92–1.14	1.02	0.91–1.14
Psychiatric medication use									1.12	0.67–1.88
X^2 (df)	0.70 (2)		29.27 (8)***		54.98 (13)***		53.57 (14)***		59.69 (15)***	

Notes: CI = confidence interval.

Sample *n*: Model 1 = 1,045; Model 2 = 884; Model 3 = 875; Model 4 = 841; Model 5 = 841. Wald chi-squares reported.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

nonpharmacological option. Therefore efforts may be made to spread awareness of sleep hygiene, behavioral modifications, or other therapies that may be undertaken to support healthy sleep patterns, in addition to prescribed sleep medications. Clinicians should further keep in mind sociodemographic and psychiatric factors that may predict use of a new sleep treatment, in addition to severity of sleep disturbance. Managing sleep problems effectively may improve quality of life and even longevity for older adults, resulting in great public health benefit.

Funding

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