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Original Article

The use of mind-body medicine among US individuals with sleep problems: analysis of the 2017 National Health Interview Survey data

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ABSTRACT

Background: Being a major health risk and very prevalent in the population, sleep problems are an important health care issue.
Methods: We used the 2017 National Health Interview Survey (NHIS) to study the prevalence of sleep problems and the use of mind body medicine (MBM) among individuals with sleep problems in a representative sample of the US population (N = 26,742). Using chi-squared tests and backward stepwise multiple logistic regression analyses, predictors of sleep problems and of MBM use in the past 12 months were identified.
Results: The prevalence of sleep problems was 49.3%, with higher prevalence being associated with higher age, being female, being non-Hispanic White, and higher education. Among individuals with sleep problems, 29.8% used MBM vs. only 17.5% without. Being less than 30 years of age, female, non-Hispanic White, living in the Western US, having a higher education, and being diagnosed with heart disease predicted MBM use among individual's with sleep problems. Yoga (16.3%), spiritual meditation (13.6%), and mindfulness meditation (7.5%) were the most used MBM approaches.
Conclusion: The characteristics of individuals with sleep problems were largely in line with the literature, while notably Whites were more prone to sleep problems than other ethnicities. MBM treatments commonly used were yoga, spiritual meditation and mindfulness meditation; although evidence supports its use for sleep problems, tai chi was used rarely by the wider population. Further studies should explore reasons for ethnical differences in MBM use and why some effective MBM approaches are not commonly used.

1. Introduction

Sleep problems are common in the United States' population with 36% reporting at least one symptom of insomnia in the previous twelve month [1]. Insomnia is defined by the European guideline for the diagnosis and treatment of insomnia as “difficulties initiating or maintaining sleep, or early morning awakening associated with impaired daytime functioning, for example, reduced cognitive performance, fatigue or mood disturbances” [2]. The long term consequences of sleep problems are manifold, ranging from decreased quality of life [3] to proneness to accidents [4] and decreased job performance [5]. Furthermore, sleep problems are associated with a range of conditions like mental disorders and pain disorders [6]. Therefore, researching effective treatments for sleep problems is of high relevance.

While pharmacological therapies, mainly treatments with benzodiazepines, non-benzodiazepines or antidepressants, are effective in treating insomnia in the short term (≤4 weeks), there is little evidence of the long-term effects and they bear a risk of negative effects for the patients [7]. The European guideline for the diagnosis and treatment of insomnia does not recommend to use major pharmacological drugs like benzodiazepines and benzodiazepine receptor agonists in the long term treatment of insomnia [2].

Considering the safety concerns of pharmacological treatments for insomnia many patients search for other treatment approaches. According to Barnes et al. [8], there is increasing use of complementary and integrative medicine (CIM), with almost 40% of the

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adult population using some form of CIM in the last 12 months. In 2012 nearly 35% of adults in the United States used some form of CIM in the last 12 months [9]. An important part of CIM is the use of mind body medicine (MBM) which is defined as "A health practice that combines mental focus, controlled breathing, and body movements to help relax the body and mind. It may be used to help control pain, stress, anxiety, and depression, and for overall health. Examples of mind-body practices include meditation, hypnosis, guided imagery, yoga, and tai chi." [10].

MBM has a positive influence on sleep quality [11] and proved to be effective in the treatment of insomnia in a variety of studies [12–18]. Especially in the longer term (6–24 months), behavioral approaches proved to be more effective in comparison to either pharmacological treatments alone or a combination of both [19]. The positive effects of behavioral treatment were maintained even at 24 month follow-up while the pharmacological treatment and the combination of both lost the clinical benefits in the long-term.

Because of the immense adverse effects of sleep problems and the effectiveness of MBM in their treatment, it seems important to address this health issue. In our analysis individuals reporting troubles falling asleep, troubles staying asleep or both were defined as having sleep problems. The purpose of this analysis is to examine the prevalence of individuals with sleep problems and their MBM use in the US population, to identify patterns of demographic variables in individuals with sleep problems and to detect predictors of MBM use among those with sleep problems.

2. Methods

2.1. Study design

This was a secondary analysis of data from the 2017 US National Health Interview Survey (NHIS), a nationally representative survey monitoring the health of the US population in 2017. The NHIS used multistage sampling techniques, and was conducted by the National Center for Health Statistics (NCHS) (https://www.cdc.gov/nchs/index.htm). More information on survey composition, sampling strategy, and administration of the NHIS is provided by the Centers for Disease Control and Prevention (CDC) (http://www.cdc.gov/nchs/nhis/about_nhis.htm). A total of 32,617 households participated in the 2017 NHIS and 26,742 adults provided data (response rate: 80.7%) (ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2017/srvydesc.pdf). Population-based estimates were calculated using weights calibrated to the 2010 census-based population. Data from the NHIS Person File and NHIS Sample Adult File were used for the current analyses.

The NHIS assessed data on health-related and sociodemographic characteristics, including age, sex, ethnicity, region, marital status, education, and employment; as well as data on the use of complementary health including mind-body medicine. The use of the following modalities within the past 12 months was queried: meditation (mantra/mindfulness/spiritual), guided imagery, progressive relaxation, yoga, tai chi, and qi gong. Sleep problems were queried as troubles falling asleep and troubles staying asleep in the past week. The average number of hours of sleep in a 24-h period was further assessed.

2.2. Statistical analysis

The prevalence and pattern of sleep problems in the general US population was analyzed descriptively, as was the 12-month prevalence of mind-body medicine use among individuals with sleep problems. Results are reported as means and standard deviations, weighted frequencies, and distributions as eligible. Sociodemographic and clinical characteristics were compared between individuals with and without sleep problems using chi-squared tests. Likewise, among those with sleep problems, characteristics were compared between individuals using and those not using mind-body medicine. Independent predictors of mind-body medicine use in the past 12 months were identified using multiple logistic regression analysis. The following potential sociodemographic predictors were tested: age (categories: 18–29; 30–39; 40–49; 50–64, 65 years or older); sex (categories: female; male); ethnicity (categories: non-Hispanic White; Hispanic; African American; Asian; Other); region (categories: West; Northeast; Midwest; South); marital status (categories: not in relationship; in relationship); education (categories: less than college; some college or more); and employment (categories: employed; unemployed). Furthermore, diagnoses of heart disease (coronary heart disease, angina pectoris, heart attack, other heart condition/disease) or chronic obstructive pulmonary disease (COPD) COPD/emphysema in the past were tested as potential clinical predictors.

A backward stepwise procedure with a logistic regression statistic p-value of ≤ 0.05 was used, and adjusted odds ratios with 95% confidence intervals were calculated. Statistical analyses were performed using the Statistical Package for Social Sciences software (IBM SPSS Statistics for Windows, release 25.0. Armonk, NY: IBM Corp.).

3. Results

A weighted total of 87,215,197 participants (35.4%) reported having trouble falling asleep, 94,818,545 (38.4%) reported trouble staying asleep with a large overlap between categories. Overall, a weighted total of 121,548,305 participants (49.3%) reported sleep problems. On average, individuals with sleep problems reported trouble falling asleep on 2.6 ± 2.6 nights per week, trouble staying asleep on 3.4 ± 2.8 nights per week, taking medication for sleep 1.02 ± 2.2 times per week and waking up unrested on 3.7 ± 2.6 days per week. Individuals with sleep problems differed from those without sleep problems on several sociodemographic and clinical characteristics (Table 1). Among others, those with sleep problems had higher age, were more often female, non-Hispanic White, higher educated (college educated or above), unemployed and/or suffering from heart disease, COPD or emphysema. Individuals without sleep problems indicated to sleep 7.4 ± 1.3, those with sleep problems 6.8 ± 1.4 h per night. Among participants with sleep problems 4.9% reported sleeping 4 h or less per night and 42.2% slept 6 h or less. Of those without sleep problems, 1.0% reported sleeping 4 h or less and 22.3% 6 h or less per night.

Mind-body medicine was used more often by individuals with (weighted n = 36,240,609; 29.8%) than those without sleep problems (weighted n = 21,866,354; 17.5%). Among individuals with problems falling asleep 29.8% (weighted n = 26,003,764) used mind-body medicine; among those with problems staying asleep 30.0% (weighted n = 28,408,310).

The most commonly used mind-body practice for individuals with sleep problems was yoga (weighted n = 19,873,086; 16.3%), followed by spiritual meditation (weighted n = 16,494,431; 13.6%), mindfulness meditation (weighted n = 9,059,234; 7.5%), progressive relaxation (weighted n = 6,603,063; 5.4%), mantra meditation (weighted n = 6,558,712; 5.4%), guided imagery (weighted n = 5,134,605; 4.2%), tai chi (weighted n = 2,233,318; 1.8%), and qi gong (weighted n = 741,706; 0.6%). Those with sleep problems using mind-body medicine used a mean of 1.8 ± 1.3 different mind-body practices. Among individuals with sleep problems, those using and those not using mind-body medicine differed on several sociodemographic and clinical characteristics (Table 2). The use of mind-body medicine was independently predicted by being less

Table 1
Comparison of characteristics between individuals with and without sleep problems. Weighted frequencies are reported; P-values are derived from chi-squared tests.

Characteristics	Individuals without sleep problems (weighted n = 125,108,966)	Individuals with sleep problems (weighted n = 121,548,305)	P
Age			<0.001
18–29 years	292,581,18 (23.4%)	226,530,87 (18.6%)	
30–39 years	22,365,301 (17.9%)	19,849,299 (16.3%)	
40–49 years	19,712,910 (15.8%)	19,983,889 (16.4%)	
50–64 years	29,125,335 (23.3%)	34,182,347 (28.1%)	
65 years and up	24,647,302 (19.7%)	24,879,683 (20.5%)	
Sex			<0.001
Male	66,741,089 (53.3%)	52,248,999 (43.0%)	
Female	58,367,877 (46.7%)	69,299,306 (57%)	
Ethnicity			<0.001
Non-Hispanic White	72,258,747 (57.8%)	87,070,403 (71.6%)	
Hispanic	23,828,589 (19.0%)	15,587,154 (12.8%)	
Black	17,948,912 (14.3%)	12,237,325 (10.1%)	
Asian	9,608,864 (7.7%)	5,330,882 (4.4%)	
Other	1,463,854 (1.2%)	1,322,541 (1.1%)	
Region			<0.001
West	28,507,014 (22.8%)	29,870,458 (24.6%)	
Northeast	24,021,090 (19.2%)	21,147,970 (17.4%)	
Midwest	24,823,847 (19.8%)	28,968,922 (23.8%)	
South	47,757,015 (38.2%)	41,560,955 (34.2%)	
Employment			<0.001
Unemployed	43,830,480 (35.0%)	48,439,026 (39.6%)	
Employed	81,229,371 (64.9%)	73,081,725 (60.1%)	
Education[a]			<0.001
Less than college	48,698,264 (38.9%)	39,885,033 (32.8%)	
Some college or more	75,721,423 (60.5%)	81,347,357 (66.9%)	
Marital status[a]			0.037
Not in a relationship	50,364,525 (40.3%)	47,436,089 (39.0%)	
In a relationship	74,514,118 (59.6%)	73,965,614 (60.8%)	
Heart disease			<0.001
Yes	113,900,457 (91.0%)	104,542,390 (86.0%)	
No	11,208,509 (9.0%)	17,005,915 (14.0%)	
COPD/emphysema			<0.001
Yes	121,429,354 (97.1%)	115,979,037 (95.4%)	
No	3,679,612 (2.9%)	5,569,268 (0.06%)	

[a] Due to missing data no 100%.

than 30 years of age, female, non-Hispanic White, living in the Western US, having a higher education, and being diagnosed with heart disease (Table 3).

4. Discussion

We found that 49.3% of participants in this US nationally representative sample reported sleeping problems defined as troubles falling asleep and troubles staying asleep in the past week with slightly more individuals having problems staying asleep (38.4%) versus falling asleep (35.4%). Specifically, among individuals with sleep problems, 4.9% reported sleeping 4 h or less per night, 42.2% slept 6 h or less. Among those without sleep problems, 1.0% and 22.3% reported sleeping 4 h or less and 6 h or less per night, respectively. Individuals with sleep problems were of higher age, more often female, non-Hispanic White, higher educated, unemployed and/or suffering from heart disease, COPD or emphysema. More individuals among those with sleeping problems used MBM (29.8%) versus individuals without sleeping problems (17.5%); the predictors of MBM use were being less than 30 years of age, female, non-Hispanic White, living in the Western US, having a higher education and being diagnosed with heart disease. Most commonly those individuals used yoga, spiritual meditation or mindfulness meditation.

This analysis of NHIS data of 2017 confirms characteristics of earlier studies of insomnia in different populations. In line with the literature we found that sleep problems were associated with female sex and higher age which was found before in Canadian [20], English [21] and Swedish population [22]. Especially the severity of insomnia was shown before to increase with age [23]. Particularly the accumulation of health conditions contributes to sleep problems in higher age while sleep problems themselves further affect health conditions [23]. In the literature African-Americans were found to have poorer sleep quality subjectively as well as objectively than the Caucasian American population [24]. In contrast to these studies we found non-Hispanic white individuals to be more prone to have sleep problems. Patel et al., showed socio-economic status to be a significant mediator in ethnicity for sleeping problems for impoverished individuals [25] and in our analysis unemployed individuals had greater sleeping problems. On the other hand some studies did not find any differences on self-reported symptoms of insomnia between Blacks and Whites [26]. Further studies should clarify this especially with regard to socio economic status as a mediating variable.

Previous studies found a broad margin ranging from 4.5% in 2002 [27] to 35% in 2012 [9] of the US population using some form of CIM to treat insomnia. In line with the analysis of the NHIS data of 2012 we found that nearly one third (29.8%) of individuals with sleep problems used some form of MBM. While the 2017 NHIS did not differentiate if MBM use was especially targeted at sleeping problems, the prevalent use of complementary treatments which increased considerably from 2006 to 2017, should be further investigated. Especially the reasons for using MBM would be of interest, considering the difficulties with conventional therapies like pharmacological treatments [2,7] and the reluctance of many individuals with sleep problems to search treatment for insomnia

Table 2
Comparison of characteristics between individuals with sleep problems using or not using mind-body medicine. Weighted frequencies are reported; P-values are derived from chi-squared tests.

Characteristics	Not using mind-body medicine (weighted n = 85,307,696)	Using mind-body medicine (weighted n = 36,240,609)	P
Age			<0.001
18–29 years	14,249,542 (16.7%)	8,403,545 (23.2%)	
30–39 years	13,216,282 (15.5%)	6,633,017 (18.3%)	
40–49 years	13,970,122 (16.4%)	6,013,767 (16.6%)	
50–64 years	24,710,271 (29.0%)	9,472,076 (26.1%)	
65 years and up	19,161,479 (22.5%)	5,718,204 (15.8%)	
Sex			<0.001
Male	40,018,983 (46.9%)	12,230,016 (33.7%)	
Female	45,288,713 (53.1%)	24,010,593 (66.3%)	
Ethnicity			0.001
Non-Hispanic White	60,422,119 (70.8%)	26,648,284 (73.5%)	
Hispanic	11,381,743 (13.3%)	4,205,411 (11.6%)	
Black	8,948,959 (10.5%)	3,288,366 (9.0%)	
Asian	3,564,034 (4.2%)	1,766,848 (4.9%)	
Other	990,841 (1.2%)	331,700 (0.9%)	
Region			<0.001
West	19,481,844 (22.8%)	10,388,614 (30.3%)	
Northeast	14,740,442 (17.3%)	6,407,528 (17.7%)	
Midwest	20,389,739 (23.9%)	8,579,183 (23.7%)	
South	30,695,671 (36.0%)	10,865,284 (30.0%)	
Education[a]			<0.001
Less than college	32,826,775 (38.5%)	7,058,258 (19.5%)	
Some college or more	52,211,256 (61.2%)	29,136,101 (80.3%)	
Employment			<0.001
Unemployed	35,651,108 (41.8%)	12,787,918 (35.2%)	
Employed	49,629,034 (58.2%)	23,452,691 (64.7%)	
Marital status[a]			0.035
Not in a relationship	32,792,815 (38.4%)	14,643,274 (40.4%)	
In a relationship	52,408,318 (61.4%)	21,557,296 (59.5%)	
Heart disease			0.011
No	72,941,367 (85.5%)	31,601,023 (87.2%)	
Yes	12,366,329 (14.5%)	4,639,586 (12.9%)	
COPD/emphysema			<0.001
No	80,890,856 (94.8%)	35,088,181 (96.8%)	
Yes	4,416,840 (5.2%)	1,152,428 (3.2%)	

[a] Due to missing data no 100%.

Table 3
Individual predictors of mind-body medicine use in individuals with sleep problems (n = 13,933). P-values are derived from logistic regression analysis.

	Mind-body medicine use	
	Adjusted odds ratio (95% confidence interval)	p value
Age		<0.001
18–29 years	Reference	
30–39 years	0.81 (0.71–0.92)	0.001
40–49 years	0.71 (0.62–0.81)	<0.001
50–64 years	0.66 (0.59–0.74)	<0.001
65 years and up	0.50 (0.44–0.57)	<0.001
Sex		<0.001
Male	Reference	
Female	1.8 (1.69–1.99)	<0.001
Ethnicity		0.010
Non-Hispanic White	Reference	
Hispanic	0.83 (0.74–0.95)	0.005
Black	0.83 (0.72–0.95)	0.018
Asian	0.94 (0.78–1.14)	0.636
Other	0.76 (0.51–1.13)	0.171
Region		<0.001
West	Reference	
Northeast	0.78 (0.69–0.88)	<0.001
Midwest	0.76 (0.68–0.85)	<0.001
South	0.66 (0.59–0.73)	<0.001
Education		<0.001
Less than college	Reference	
Some college or more	2.49 (2.27–2.73)	<0.001
Heart disease		0.028
No	Reference	
Yes	1.14 (1.02–1.29)	0.028

in the conventional health sector [1]. While Pearson et al., found by researching the 2002 NHIS that most people stated “to combine conventional and MBM treatments”, followed by “finding them interesting to try” and “finding conventional treatments not helpful” [27], Bertisch et al., found in an analysis of the 2007 NHIS most individuals stating “general wellness/disease prevention”, followed by “treating a specific medical condition” and “because a friend/family/co-worker recommended it” [28] as the most common reasons. Therefore no conclusive statement about motivation could be made, but individuals seem to be increasingly aware of the usefulness or potential usefulness of preventing and treating medical conditions with MBM. Unfortunately the most recent NHIS did not collect data on the motivation of individuals to use complementary health.

In line with the literature we found that younger and higher educated individuals with sleep problems were more likely to use MBM [27,8]. Furthermore Hispanics and Blacks were less likely to use MBM than non-Hispanic Whites in our sample, which was shown before for general CIM use [8,29]. The literature suggests that overall non-Hispanic Whites are more likely to use complementary health approaches, while certain ethnicities more often use culturally specific treatments such as herbal medicine among Mexican Americans and acupuncture among Chinese Americans [30]. Overall the literature suggests that users of complementary health approaches tend to be female, of young or middle age and have higher education [31].

Several studies support the effectiveness of MBM as a treatment for sleep problems and insomnia [12–18,32]. In addition the

literature suggests acupressure, tai chi and yoga have the best evidence-base of all MBM treatments for chronic insomnia [33]. Especially in the older population, which is especially prone to insomnia and often have more severe sleep problems [1,23], the use of tai chi was shown to be effective in improving sleep quality, sleep efficiency, sleep duration, and sleep disturbance [17]. We found that while other complementary health approaches were used more widely, tai chi was only used by 1.8% among the individuals with sleeping problems by the US population. The more prevalent use of yoga (16.3%) by individuals with insomnia shown by our paper is most likely associated with the generally high popularity of yoga: 31 million US adults report having used yoga in their lifetime [34]. Tai chi on the other hand seems to be an underrepresented MBM treatment for sleep problems in the wider population.

Although this study contributes to tackling the important health care issue of insomnia there are some limitations. First, this is a secondary analysis of existing data. Furthermore the NHIS surveyed sleep problems, operationalized as troubles falling asleep and troubles staying asleep in the past week; therefore no established diagnosis of insomnia was determined. Consequently no distinction between a manifest disorder and only symptoms of insomnia could be made for our analysis. Therefore, further studies should discriminate between sub-disorder levels of insomnia and clinically diagnosed insomnia to make differentiated statements about this issue. Furthermore, we could not research reasons for MBM use because unlike former NHIS, in 2017 the reasons were not accessed. In addition, it should be taken into account that the NHIS did not differentiate if MBM use was especially targeted at sleeping problems. Moreover, it would be of great interest to include direct assessments of sleep disorders as well as reasons for MBM use in future NHIS. The NHIS relies on self-report data of the participants therefore especially while reporting sleep problems the individuals could be subjected to misclassification- and recall bias. Further studies could include physiological measurements of insomnia to prevent these biases. In addition, it would be interesting to gather further evidence on the effectiveness of MBM treatments for sleep problems and insomnia.

4.1. Conclusions

Despite these limitations this study enables us to research a large representative sample of the general adult population of the United States and therefore allowed for population-based estimates. Important implications can be drawn from this study. First of all evidence-based information about effective MBM treatments for sleep problems and insomnia should be made available to the public especially for older non-White individuals, because they rarely use MBM while on the other hand being a group prone to insomnia [24]. Second, MBM-practices, specifically like tai chi which are evidently supported by research findings but rarely used in the population should be brought to attention to a wider public. Our analyses suggests the need to further study reasons for ethnical differences in MBM use, why some effective MBM approaches are not commonly used and what the motivations for MBM use are.

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Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: https://doi.org/10.1016/j.sleep.2019.01.008.

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