Neuropsychiatric Symptoms and the Use of Mind-Body Therapies

Maulik P. Purohit, MD, MPH; Rebecca Erwin Wells, MD, MPH; Ross Zafonte, DO; Roger B. Davis, ScD; Gloria Y. Yeh, MD, MPH; and Russell S. Phillips, MD

ABSTRACT

Objective: Neuropsychiatric symptoms affect 37% of US adults and present in many important diagnoses including posttraumatic stress disorder, traumatic brain injury, and chronic pain. However, these symptoms are difficult to treat with standard treatments, and patients may seek alternative options. In this study, we examined the use of mind-body therapies by adults with neuropsychiatric symptoms.

Method: We compared mind-body therapy use (biofeedback, energy healing, meditation, guided imagery, yoga, deep-breathing exercises, hypnosis, progressive relaxation therapy, qigong, and tai chi) between adults with and without neuropsychiatric symptoms (anxiety, depression, insomnia, headaches, memory deficits, attention deficits, and excessive daytime sleepiness) in the 2007 National Health Interview Survey (N = 23,393). Use of ≥ 1 of these therapies in the prior 12 months was the primary outcome of interest. We also examined prevalence and reasons for mind-body therapy use in adults with neuropsychiatric symptoms. We performed logistic regression to examine the association between neuropsychiatric symptoms and mind-body therapy use to adjust for sociodemographic and clinical factors.

Results: Adults with ≥ 1 neuropsychiatric symptom used mind-body therapies more than adults without symptoms (25.3% vs 15.0%, $P < .001$). Prevalence increased with increasing number of symptoms (21.5% for 1 symptom, 32.4% for ≥ 3 symptoms, $P < .001$); differences persisted after adjustment for potential confounders (odds ratios, 1.39 [95% CI, 1.26–1.53] and 2.48 [95% CI, 2.18–2.82]). Reasons for mind-body therapy use among adults with ≥ 1 symptom included the ineffectiveness or expense of conventional medicine (30.2%). Most adults (nearly 70%) with ≥ 1 symptom did not discuss their mind-body therapy use with a conventional provider.

Conclusions: Adults with ≥ 1 neuropsychiatric symptom use mind-body therapies frequently; more symptoms are associated with increased use. Future research is needed to understand the efficacy of these therapies.

J Clin Psychiatry 2013;74(6):e520–e526

Submitted: *October 25, 2012; accepted December 27, 2012 (doi:10.4088/JCP.12m08246).*

Corresponding author: *Maulik P. Purohit, MD, MPH, Spaulding Rehabilitation Hospital Network, 125 Nashua St, #720, Boston, MA 02114 (mpurohit1@partners.org).*

Neuropsychiatric symptoms (memory loss, insomnia, regular headaches, anxiety, excessive sleepiness, attention deficits, and depression) are common in the general population, affecting nearly 82 million adults (37%) in the United States.[1] Furthermore, these symptoms are prevalent in many difficult-to-treat conditions such as traumatic brain injury (TBI), posttraumatic stress disorder (PTSD), chronic pain syndromes, and fibromyalgia.[2–5]

Neuropsychiatric symptoms are concerning because they are independent risk factors for many other health conditions. For example, insomnia, anxiety, and depression are independent risk factors for obesity, metabolic syndrome, and cardiovascular disease.[6,7] Furthermore, migraine headaches with aura are independent risk factors for cardiovascular disease, stroke, and increased mortality.[8,9]

We previously showed that patients with these symptoms were more likely to use complementary and alternative medicine (CAM) than those without these symptoms (44% vs 29%, $P < .001$), and the most common CAM therapies used by adults with neuropsychiatric symptoms are mind-body therapies.[1] However, we do not know which mind-body therapies are being used by adults with these symptoms.

Mind-body therapies are defined by the National Institutes of Health (NIH) as practices that "focus on the interactions among the brain, mind, body, and behavior, with the intent to use the mind to affect physical functioning and promote health."[10] The NIH considers mind-body therapies to include meditation, yoga, deep-breathing exercises, guided imagery, hypnotherapy, progressive relaxation, qigong, and tai chi.[10]

Unlike many CAM therapies, such as certain herbal treatments, these therapies are compatible with standard treatments such as pharmacologic interventions without interfering with these treatments. As largely lifestyle interventions, they may even help augment standard treatments. Furthermore, several trials using mind-body therapies such as meditation and yoga have shown the potential for beneficial neuroplasticity, which may indicate not only clinical efficacy, but also a potential mechanism for longer-term change.[11–13] Additionally, for many patient populations, particularly those in the military with TBI or PTSD, these therapies may carry less risk than conventional treatments, such as improper use of medications and overdosing on prescription medications.[14]

Given this context, in this study, we extended our research using the National Health Interview Survey (NHIS) to analyze specifically the prevalence of mind-body medicine use in adults with neuropsychiatric symptoms, and the variations in prevalence based on the number of symptoms. Furthermore, we analyze the specific types, reasons for, and correlates of mind-body medicine use in adults with neuropsychiatric symptoms.

METHOD

Data Source

To allow comparison with previous studies, we analyzed data from the 2007 NHIS Adult Core and Alternative Medicine Supplement, conducted by the Centers for Disease Control and Prevention, which employs a complex, multistage, stratified sampling design. One adult, 18 years

or older, was randomly selected from each household to answer the adult questionnaire.[15] In 2007, the NHIS used a supplement questionnaire, sponsored by the NIH, to obtain information regarding national prevalence and reasons for CAM therapy use. The final adult survey included 23,393 respondents, with an overall response rate of 67.8%.[15]

Data Collection

Neuropsychiatric symptoms. We analyzed the neuropsychiatric symptoms of memory loss, insomnia, regular headaches, anxiety, excessive sleepiness, attention deficits, and depression because of their relationship to many important diagnoses such as TBI, PTSD, chronic pain syndromes, and fibromyalgia.[4,16]

Outcomes of interest. Our primary outcome was the use of at least 1 mind-body therapy (biofeedback, energy healing, hypnosis, tai chi, yoga, qigong, meditation, guided imagery, progressive relaxation, deep-breathing exercises) in the prior 12 months. We were also interested in the correlation between increasing number of neuropsychiatric symptoms and prevalence of mind-body therapy use. Sampled adults were asked, "Have you used [specific therapy] in the past 12 months?"[15]

Additionally, we were interested in reasons for mind-body therapy use and disclosure of mind-body therapy use to conventional providers. Respondents were asked their reasons for mind-body therapy use and answered yes/no to each of 7 items: (1) to improve or enhance energy, (2) for general wellness/general disease prevention, (3) to improve/enhance immune function, (4) because conventional medical treatments did not help, (5) because conventional medical treatments were too expensive, (6) because it was recommended by a health care provider, and (7) because it was recommended by family, friends, or coworkers.[15] For each therapy used in the previous year, respondents were asked whether they disclosed their use to a conventional provider.

Correlates of mind-body therapy use. Data were also collected on sociodemographic characteristics (ie, gender, age, race/ethnicity, region of residence, birthplace, educational attainment, and marital status), indicators of illness burden (ie, perceived health status, presence of functional limitations, and self-reported history of medical conditions), indicators of access to care (ie, insurance status and imputed family income provided by the NHIS), and measures of health habits (ie, smoking status, physical activity level, and alcohol intake). We also analyzed other diagnoses including pain syndromes and rheumatic diseases such as fibromyalgia, arthritis, low back pain, and joint pain. Covariates were included if either previously reported as significant or considered important and relevant to our topic.[17–21]

Statistical Analyses

Using bivariable analyses, we compared prevalence of mind-body therapy use, reasons for mind-body therapy use, and disclosure of mind-body therapy use to conventional providers between adults with and without neuropsychiatric symptoms. We also examined the correlation between increasing number of neuropsychiatric symptoms and prevalence of mind-body therapy use with χ^2 analysis. These methods are similar to methods from previous work to allow a consistent comparison with previous studies.

We fit multiple multivariable logistic regression models to determine (1) whether the association in mind-body therapy use persisted between adults with and without common neuropsychiatric symptoms after adjusting for sociodemographic characteristics, illness burden, access to care, health habits, and other diagnoses; (2) whether the number of symptoms was associated with change in the likelihood of mind-body therapy use after adjusting for covariates; and (3) the specific symptoms that were more closely associated with mind-body therapy use.

All models used the same covariates including adjustments for sociodemographic characteristics, illness burden, access to care, health habits, and other diagnoses as described above. To ensure a robust analysis, we did not eliminate any of the covariates after initial inclusion.

We excluded missing data from prevalence estimates; no individual variable had more than 5.8% missing data. We included only respondents with complete data on all covariates for the regression models. No regression model had more than 9.1% missing data.

SAS (version 9.3, Research Triangle Park, North Carolina) was used to account for the complex sample design using NHIS parameters so that the results reflect national estimates.[15] Imputed incomes were provided by the NHIS. The study was approved for exemption by the Spaulding Rehabilitation Hospital Institutional Review Board because we used deidentified data.

Clinical Points

- Neuropsychiatric symptoms are common in the general population, and these symptoms can be difficult to treat with standard treatments.
- Patients in significant numbers are seeking treatment elsewhere, most commonly using mind-body therapies. However, many patients do not discuss these treatments with conventional providers.
- It might be necessary for providers to initiate discussion of any alternative treatments patients may be using in addition to standard treatments.

RESULTS

Sample Characteristics

Overall, 8,696 adults reported experiencing at least 1 neuropsychiatric symptom, representing the 36.6% of the US adult population who have 1 or more of these symptoms (estimated 81.6 million adults nationwide).[1] Of the total sample surveyed, 62.8% (n = 14,697) reported zero neuropsychiatric symptoms, 18.2% (n = 4,261) reported 1 symptom, 8.5% (n = 1,992) reported 2 symptoms, and 10.4% (n = 2,443) reported ≥ 3 symptoms. Mind-body therapies

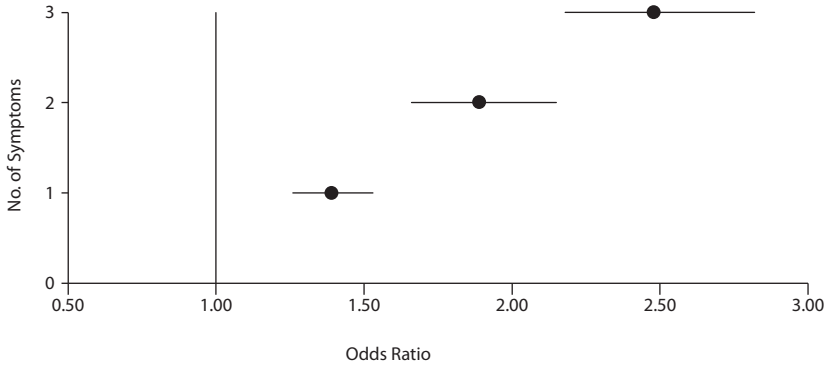
Table 1. Sample Characteristics[a]

Characteristics	% Mind-Body Therapy Use in Those With Symptoms (n = 8,696)	% Mind-Body Therapy Use in Those Without Symptoms (n = 14,697)	*P* Value (χ^2 test)
Sociodemographic characteristics			
Gender			
Male	8.2	6.0	< .001
Female	17.1	9.0	
Age, y			
18–24	3.4	1.9	< .001
25–44	9.6	5.8	
45–64	9.5	5.7	
65–74	1.8	1.1	
75+	1.1	0.5	
Race			
Non-Hispanic white	19.4	11.3	< .001
Non-Hispanic black	2.2	1.4	
Hispanic	1.9	1.0	
Asian	1.0	1.1	
Other	0.8	0.3	
Education			
High school or less	8.0	2.9	< .001
> High school	17.5	12.3	
Imputed family income,[b] $			
0–19,999	4.7	1.8	< .001
20,000–34,999	4.3	1.8	
35,000–64,999	6.7	3.6	
> 65,000	9.6	7.8	
Region			
Northeast	4.2	3.1	< .001
Midwest	6.5	3.9	
South	7.8	4.0	
West	6.8	4.0	
Marital status			
Married/living with partner	14.4	9.4	< .03
Widowed	1.5	0.7	
Divorced/separated	3.8	1.5	
Never married	5.7	3.4	
US born	22.9	13.0	< .001
Foreign born	2.5	2.1	
Insurance status			
Uninsured	4.1	1.7	< .001
Medicare	4.1	1.5	
Medicaid	1.7	0.3	
Private	13.3	10.3	
Other	1.9	1.2	
Health characteristics			
Needs help with ADLs[c]	10.1	2.8	< .04
Does not need help with ADLs	15.2	12.2	
Body mass index, kg/m^2			
< 25	10.1	7.0	< .07
25 to < 30	7.9	5.7	
30 to < 35	4.7	2.0	
≥ 35	3.3	0.9	
Perceived health[d]			
Excellent/very good/good	20.0	14.5	< .001
Fair or poor	5.3	0.5	
Physical activity[e]			
Low	13.3	10.0	< .001
Moderate	5.1	2.8	
High	7.3	2.5	
Smoking			
Current/former	13.6	5.9	< .06
Never	12.0	9.4	
Alcohol use[f]			
None	1.7	1.0	< .12
Light/moderate/heavy	24.2	14.5	
History of chronic medical conditions[g]	20.4	7.7	< .001
No history of chronic medical conditions	4.9	7.3	
History of pain syndromes[h]	16.3	5.1	< .001
No history of pain syndromes	9.0	9.9	

[a]Percentages are weighted to reflect national estimates.
[b]Incomes are imputed values provided by the National Health Interview Survey.
[c]ADLs were defined as needing help with personal care, bathing/showering, dressing, eating, getting in/out of a chair/bed, toileting, getting around the home, routine needs, difficulty walking ¼ mile without special equipment, difficulty climbing 10 steps without special equipment, difficulty standing for 2 hours without special equipment, difficulty sitting for 2 hours without special equipment, difficulty stooping/bending without special equipment, difficulty reaching overhead, difficulty grasping small objects without special equipment, difficulty lifting/carrying ≥ 10 lb without special equipment, difficulty pushing large objects without special equipment, or difficulty going out or participating in social events without special equipment.
[d]Perceived health is a subjective response based on respondent's perception of one's own health.
[e]Physical activity categories were defined as follows: high = vigorous activity 2 times per week or moderate activity 4 times per week, moderate = vigorous activity 1 time per week or moderate activity 1–3 times per week, and low = no vigorous or moderate activity per week.
[f]Alcohol use is defined as none if the respondent answered "lifetime abstainer, former infrequent, former regular, former frequency unknown." All other respondents were included in the light/moderate/heavy category.
[g]History of chronic medical conditions includes self-reported history of heart attack, coronary artery disease, angina in the past 12 months, poor circulation, history of urinary problems or weak/failing kidneys in the past 12 months, acid reflux/heartburn, bowel problems, ulcer, or liver condition in the past 12 months, history of emphysema or asthma, gout, lupus, fibromyalgia, rheumatoid arthritis, and/or arthritis.
[h]History of chronic pain syndromes includes self-reported history of dental pain in the past 12 months or jaw/face pain, neck pain, and/or low back pain in the past 3 months.
Abbreviation: ADL = activity of daily living.

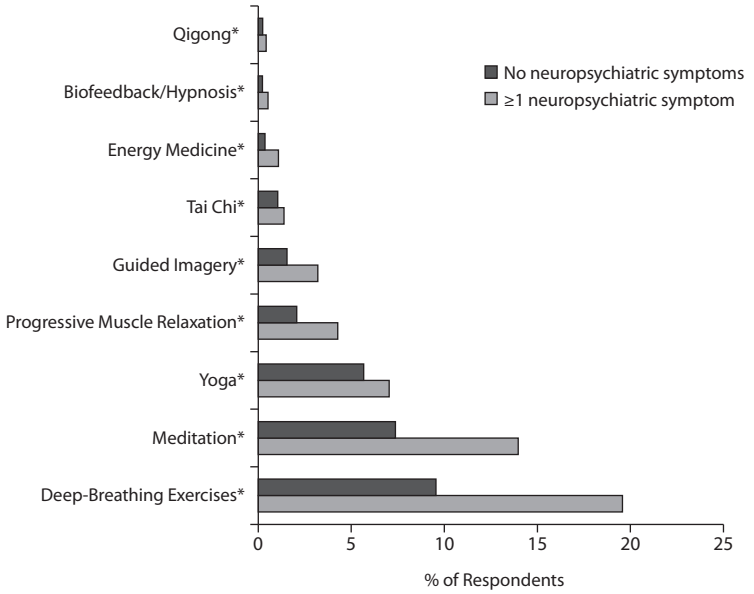
were used more among those with neuropsychiatric symptoms across all sociodemographic and clinical factors except for body mass index, alcohol consumption, and smoking status (Table 1). Furthermore, female subjects with neuropsychiatric symptoms were nearly twice as likely to use mind-body therapies compared to those without symptoms, and subjects between 25–64 years of age were the most likely to use mind-body therapies (Table 1). Also, although in general those in higher income and education categories had a higher prevalence of mind-body therapy use, of subjects with less income and education, those with neuropsychiatric symptoms had double the prevalence of mind-body therapy

Figure 1. Likelihood of Mind-Body Therapy Use by Number of Neuropsychiatric Symptoms: A Multivariable Model[a,b]



[a]Adults without neuropsychiatric symptoms served as the reference group.
[b]Bars represent 95% confidence intervals.

Figure 2. Mind-Body Therapy Use by Modality



*$P < .05$.

use compared to those without symptoms in the same income and education categories (Table 1).

Prevalence of Mind-Body Therapy Use

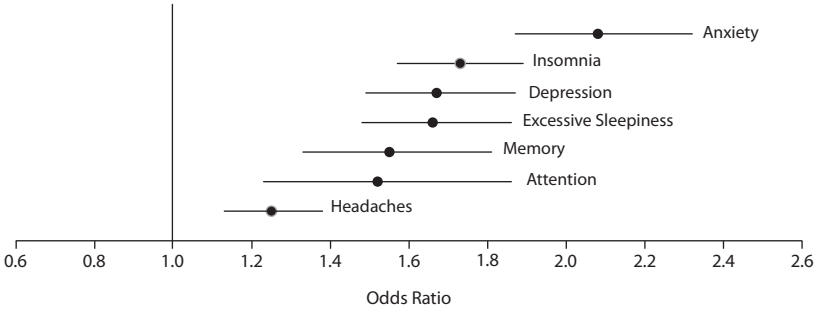
Overall, 25.3% of US adults in this survey with ≥1 neuropsychiatric symptom reported using at least 1 mind-body therapy in the previous 12 months compared to 15.0% of those adults not reporting any neuropsychiatric symptoms ($P < .001$), and those with more neuropsychiatric symptoms had a higher prevalence of use (21.5% for those with 1 symptom, 25.2% with 2 symptoms, and 32.4% with ≥3 symptoms; $P < .001$). Even after adjusting for covariates, those with ≥1 neuropsychiatric symptom were more likely to use mind-body medicine (odds ratio [OR] = 1.68 [95% CI, 1.55–1.82]; see Supplementary eTable 1), and this likelihood increased with an increasing number of symptoms (OR = 1.39 [95% CI, 1.26–1.53] for 1 symptom vs OR = 2.48 [95% CI, 2.18–2.82] for ≥3 symptoms; Figure 1).

Both groups used deep-breathing exercises, meditation, and yoga the most (Figure 2); however, those with neuropsychiatric symptoms used them more than those without neuropsychiatric symptoms (19.6% vs 9.6%, 14.0% vs 7.4%, and 7.0% vs 5.7%, respectively; $P < .001$ for all comparisons). Each neuropsychiatric symptom was independently associated with an increased likelihood of mind-body therapy use (Figure 3). Those with anxiety were the most likely to use mind-body therapies, whereas those with headaches were least likely.

Reason for Use and Disclosure of Mind-Body Therapy Use

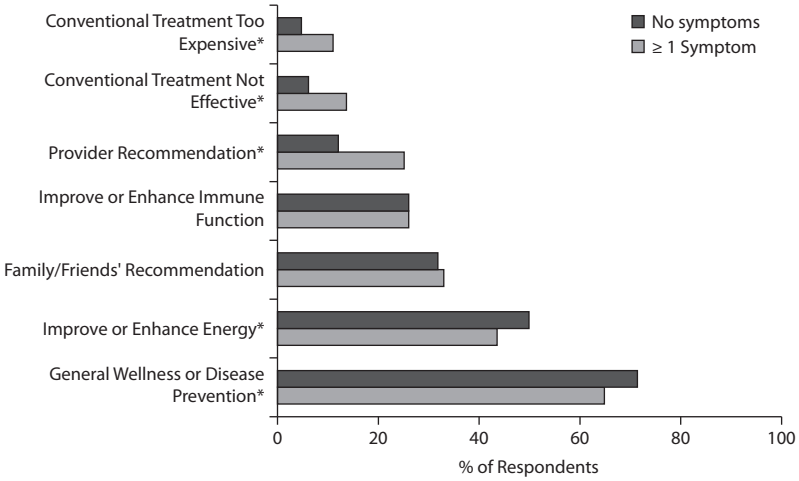
Both adults with neuropsychiatric symptoms and those without symptoms used mind-body therapies primarily for

Figure 3. Likelihood of Mind-Body Therapy Use by Type of Neuropsychiatric Symptom: Multivariable Models[a,b]



[a]Adults without the specific symptom served as the reference group.
[b]Bars represent 95% confidence intervals.

Figure 4. Reasons for Mind-Body Therapy Use in Adults With and Without Neuropsychiatric Symptoms



*$P < .05$.

general wellness and disease prevention (Figure 4). Adults with neuropsychiatric symptoms used mind-body therapies more often than those without symptoms because their provider recommended it (25.1% vs 12.0%), conventional treatment was not effective (13.2% vs 6.1%), or conventional treatment was too expensive (11.0% vs 4.7%, $P < .05$ for all comparisons, Figure 4), but less than those without symptoms for general wellness or disease prevention (64.9% vs 71.4%) or to improve or enhance energy (43.6% vs 49.9%, $P < .05$ for all comparisons, Figure 4).

Although nearly 70% of adults with neuropsychiatric symptoms did not report their mind-body therapy use to a conventional provider, those with at least 1 neuropsychiatric symptom were more likely to disclose their use to a conventional provider compared to those without neuropsychiatric symptoms (30.9% vs 20.8%, $P < .001$).

DISCUSSION

Prevalence of mind-body therapy use was higher in US adults with neuropsychiatric symptoms compared to those without neuropsychiatric symptoms. The total number of symptoms and each specific symptom were also associated with a higher likelihood of mind-body therapy use. Those with neuropsychiatric symptoms had a higher prevalence of mind-body therapy use because the therapy was recommended by a conventional provider or a conventional treatment was considered either ineffective or too expensive. Most users of mind-body therapies did not disclose their use of these therapies to a conventional provider.

To our knowledge, this is the first study evaluating the use of mind-body therapies in patients with this constellation of neuropsychiatric symptoms. A similar study[19] using the NHIS evaluated the prevalence of mind-body therapies in adults with neurologic disorders and found a similar prevalence as our study (25%). Another study[22] examined the prevalence of mind-body therapy use in adults specifically with severe headaches/migraines and found a prevalence of 30%. We did not specifically look at the prevalence of mind-body therapy use in adults with headaches. However, we did find that the odds ratio for mind-body therapy use in adults with headaches compared to those without these headaches was 1.25, and this was less than the odds ratios associated with the other neuropsychiatric symptoms in our study.

Because of the potential impact of neuropsychiatric symptoms on overall health, it is important to treat them effectively and safely. However, these symptoms may often be difficult to treat in many patients using standard treatments alone. This study suggests that patients with neuropsychiatric symptoms are using mind-body therapies frequently, although we do not know if individuals are using mind-body therapies specifically for treatment of their neuropsychiatric symptoms. Furthermore, approximately 1 in 4 adults with at least 1 neuropsychiatric symptom used a mind-body therapy because a conventional provider recommended it, suggesting that many providers may be recommending these therapies. This may suggest that providers are also open to or looking for additional, nonconventional treatment options for their patients with neuropsychiatric symptoms.

Mind-body therapies have shown benefits for neuropsychiatric symptoms. For example, studies[23–25] using mindfulness-based stress reduction, a standardized 8-week class teaching meditation and yoga, have shown improvement for specific symptoms such an anxiety, insomnia, depression, and memory. Additionally, a systematic review and meta-analysis[26] of tai chi for psychological well-being found that it is associated with improvements in anxiety, depression, and mood disturbance and decreased stress.

Although these studies are promising, they had small sample sizes or limited control groups and may not generalize to all populations. More research is needed to evaluate the safety and efficacy of mind-body therapies in adults with neuropsychiatric symptoms before they are routinely recommended, because adverse consequences are possible. For example, for patients with a TBI or PTSD, some of the therapies may elicit unpleasant emotions or memories. This may require modifying the therapy, using another therapeutic option altogether, or being prepared to address the resulting emotions. Thus, although many patients with neuropsychiatric symptoms are using mind-body therapies, given our limited knowledge about the benefits and risks of mind-body therapy use among patients with these symptoms, future research is needed to determine if these therapies are safe and effective.

Our study has several limitations. The NHIS is conducted on US adults, and the results may not generalize to other populations. The NHIS, like many surveys, is cross-sectional, relies on self-reporting, and is subject to recall bias and misclassification of information. The survey does not address the intensity or frequency of the neuropsychiatric symptoms, and the symptoms are based on self-report. The NHIS also does not provide sufficient information regarding whether the mind-body therapies were used specifically for the neuropsychiatric symptoms. Most importantly, the cross-sectional design does not allow any conclusions regarding causation; on the basis of this study, we do not know if individuals used mind-body therapies as a consequence of their neuropsychiatric symptoms or if the symptoms were a consequence of the therapy use. Despite these limitations, this study includes a large national sample size and provides valuable information about mind-body therapy use in the general population.

CONCLUSION

In conclusion, our study showed that adults with neuropsychiatric symptoms used mind-body therapies more than did those without these symptoms, with an increasing number of symptoms associated with increased use. Our results highlight the importance of clinicians' discussing the role of and reasons for mind-body therapies with patients with neuropsychiatric symptoms. Furthermore, more research is needed to better understand the efficacy of these treatments for patients with neuropsychiatric symptoms.

Author affiliations: Massachusetts General Hospital and Spaulding Rehabilitation Hospital, Harvard Medical School (Drs Purohit and Zafonte); Beth Israel Deaconess Medical Center, Harvard Medical School (Drs Purohit, Davis, Yeh, and Phillips); Brigham and Women's Hospital and Faulkner Hospital, Harvard Medical School (Dr Wells); and Center for Primary Care, Harvard Medical School (Dr Phillips), Boston, Massachusetts. Dr Wells is now affiliated with the Department of Neurology, Wake Forest Baptist Health, Winston-Salem, North Carolina.

Potential conflicts of interests: None reported.

Funding/support: Drs Purohit and Wells were supported by an institutional National Research Service Award Number T32AT000051 from the National Center for Complementary and Alternative Medicine (NCCAM), National Institutes of Health. Dr Wells was supported by a headache fellowship from the American Headache Society. Dr Zafonte was supported by National Institute of Child Health and Human Development Investigator Award 5R24HD065688-02; Spaulding-Harvard Spinal Cord Injury Model System, US Department of Education, National Institute on Disability and Rehabilitation Research, Traumatic Brain Injury Model Systems grant H133N110010; Department of Defense Insight; and Harvard Clinical Consortium PTSD/TBI study site (INTRuST), Department of Defense, US Army Medical Research and Materiel Command grant W81XWH-08-2-0159. Drs Phillips and Davis were supported by Mid-Career Investigator Award K24AT000589 from NCCAM, National Institutes of Health.

Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Previous presentation: Preliminary idea and data were presented as a poster at the International Research Congress on Integrative Medicine and Health, a meeting of the Consortium of Academic Health Centers for Integrative Medicine, May 15–18, 2012, in Portland, Oregon, but the poster did not contain refined data.

Additional information: The survey and all relevant information including actual survey questions and data are available from the Centers for Disease Control and Prevention at http://www.cdc.gov/nchs/nhis/nhis_2007_data_release.htm.

Supplementary material: See accompanying pages.

REFERENCES

1. Purohit MP, Wells RE, Zafonte RD, et al. Neuropsychiatric symptoms and the use of complementary and alternative medicine. *PM R*. 2013;5(1):24–31.
2. Hetrick SE, Purcell R, Garner B, Et Al. Combined pharmacotherapy and psychological therapies for post traumatic stress disorder (PTSD). *Cochrane Database Syst Rev*. 2010(7):CD007316.
3. Roth RS, Geisser ME, Theisen-Goodvich M, et al. Cognitive complaints are associated with depression, fatigue, female sex, and pain catastrophizing in patients with chronic pain. *Arch Phys Med Rehabil*. 2005;86(6):1147–1154.
4. Vaishnavi S, Rao V, Fann JR. Neuropsychiatric problems after traumatic brain injury: unraveling the silent epidemic. *Psychosomatics*. 2009;50(3):198–205.
5. Geoffroy PA, Amad A, Gangloff C, et al. Fibromyalgia and psychiatry: 35 years later…what's new? [in French] *Presse Med*. 2012;41(5):455–465.
6. Grandner MA, Jackson NJ, Pak VM, et al. Sleep disturbance is associated with cardiovascular and metabolic disorders. *J Sleep Res*. 2012;21(4):427–433.
7. Plantinga L, Rao MN, Schillinger D. Prevalence of self-reported sleep problems among people with diabetes in the United States, 2005–2008. *Prev Chronic Dis*. 2012;9:E76.
8. Kurth T, Chabriat H, Bousser MG. Migraine and stroke: a complex association with clinical implications. *Lancet Neurol*. 2012;11(1):92–100.
9. Schürks M, Rist PM, Shapiro RE, et al. Migraine and mortality: a systematic

review and meta-analysis. *Cephalalgia*. 2011;31(12):1301–1314.
10. What is complementary and alternative medicine? National Institutes of Health Web site. http://nccam.nih.gov/health/whatiscam. Accessed June 2011.
11. Lazar SW, Kerr CE, Wasserman RH, et al. Meditation experience is associated with increased cortical thickness. *Neuroreport*. 2005;16(17):1893–1897.
12. Hölzel BK, Carmody J, Evans KC, et al. Stress reduction correlates with structural changes in the amygdala. *Soc Cogn Affect Neurosci*. 2010;5(1): 11–17.
13. Hölzel BK, Carmody J, Vangel M, et al. Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Res*. 2011;191(1):36–43.
14. Seal KH, Shi Y, Cohen G, et al. Association of mental health disorders with prescription opioids and high-risk opioid use in US veterans of Iraq and Afghanistan. *JAMA*. 2012;307(9):940–947.
15. NHIS 2007 Survey Description. Centers for Disease Control and Prevention Web site. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_ Documentation/NHIS/2007/srvydesc.pdf. Published June 2008. Accessed May 2011.
16. Halbauer JD, Ashford JW, Zeitzer JM, et al. Neuropsychiatric diagnosis and management of chronic sequelae of war-related mild to moderate traumatic brain injury. *J Rehabil Res Dev*. 2009;46(6):757–796.
17. Bertisch SM, Wee CC, McCarthy EP. Use of complementary and alternative therapies by overweight and obese adults. *Obesity (Silver Spring)*. 2008;16(7):1610–1615.
18. Bertisch SM, Wee CC, Phillips RS, et al. Alternative mind-body therapies used by adults with medical conditions. *J Psychosom Res*. 2009;66(6):511–519.
19. Erwin Wells R, Phillips RS, McCarthy EP. Patterns of mind-body therapies in adults with common neurological conditions. *Neuroepidemiology*. 2011;36(1):46–51.
20. Wells RE, Phillips RS, Schachter SC, et al. Complementary and alternative medicine use among US adults with common neurological conditions. *J Neurol*. 2010;257(11):1822–1831.
21. Carlson MJ, Krahn G. Use of complementary and alternative medicine practitioners by people with physical disabilities: estimates from a national US survey. *Disabil Rehabil*. 2006;28(8):505–513.
22. Wells RE, Bertisch SM, Buettner C, et al. Complementary and alternative medicine use among adults with migraines/severe headaches. *Headache*. 2011;51(7):1087–1097.
23. Gross CR, Kreitzer MJ, Reilly-Spong M, et al. Mindfulness-based stress reduction versus pharmacotherapy for chronic primary insomnia: a randomized controlled clinical trial. *Explore (NY)*. 2011;7(2):76–87.
24. Joo HM, Lee SJ, Chung YG, et al. Effects of mindfulness based stress reduction program on depression, anxiety and stress in patients with aneurysmal subarachnoid hemorrhage. *J Korean Neurosurg Soc*. 2010;47(5):345–351.
25. Vøllestad J, Sivertsen B, Nielsen GH. Mindfulness-based stress reduction for patients with anxiety disorders: evaluation in a randomized controlled trial. *Behav Res Ther*. 2011;49(4):281–288.
26. Wang C, Bannuru R, Ramel J, et al. Tai Chi on psychological well-being: systematic review and meta-analysis. *BMC Complement Altern Med*. 2010;10(1):23.

Supplementary material follows this article.

THE JOURNAL OF CLINICAL PSYCHIATRY

Supplementary Material

Article Title: Neuropsychiatric Symptoms and the Use of Mind-Body Therapies

Author(s): Maulik P. Purohit, MD, MPH; Rebecca Erwin Wells, MD, MPH; Ross Zafonte, DO; Roger B. Davis, ScD; Gloria Y. Yeh, MD, MPH; and Russell S. Phillips, MD

DOI Number: 10.4088/JCP.12m08246

List of Supplementary Material for the article

1. eTable 1 — Independent Association of the Presence of ≥1 Neuropsychiatric Symptom With Mind-Body Therapy Use: Results From a Single Multivariable Model

Disclaimer

This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

Supplemental Table: Independent association of the presence of ≥1 neuropsychiatric symptom with mind-body therapy use: results from a single multivariable model

Primary Factor	**Odds Ratio (95% CI)**
≥ 1 Neuropsychiatric Symptom	**1.68 (1.55, 1.82)**
Adjustment Factors	
Gender	
Male	0.55 (0.51, 0.60)
Female	1.00 (ref)
Age	
18–24	1.05 (0.92, 1.21)
25-44	1.00 (ref)
45-64	0.40 (0.31, 0.51)
65-74	0.96 (0.88, 1.05)
75+	0.63 (0.50, 0.79)
Race	
Non-hispanic White	1.00 (ref)
Non-hispanic Black	0.83 (0.73, 0.93)
Hispanic	0.68 (0.60, 0.78)
Asian	1.41 (1.18, 1.69)
Other	1.15 (0.90, 1.46)
Education	
High School or less	0.42 (0.39, 0.46)
>High School	1.00 (ref)

Imputed Family Income ($)	
0-19,999	0.92 (0.80, 1.05)
20-34,999	0.90 (0.80, 1.02)
35-64,999	0.92 (0.83, 1.02)
>65,000	1.00 (ref)
Region	
Northeast	0.89 (0.80, 1.00)
Midwest	0.82 (0.73, 0.91)
South	0.66 (0.60, 0.73)
West	1.00 (ref)
Marital Status	
Married/Living with Partner	1.00 (ref)
Widowed	1.20 (1.01, 1.41)
Divorced/Separated	1.25 (1.12, 1.39)
Never married	1.30 (1.17, 1.45)
US Born	1.07 (0.94, 1.22)
Foreign Born	1.00 (ref)
Insurance Status	
Uninsured	1.04 (0.92, 1.17)
Medicare	1.21 (0.99, 1.48)
Medicaid	0.88 (0.73, 1.06)
Private	1.00 (ref)
Other	1.09 (0.94, 1.26)
Needs help with ADLs	1.29 (1.18, 1.42)

Does Not Need Help with ADLs	1.00(ref)
Health Characteristics:	
Body Mass Index	
<25	1.00 (ref)
25 to <30	0.97 (0.89, 1.06)
30 to <35	0.93 (0.83, 1.04)
≥35	0.83 (0.73, 0.96)
Perceived Health	
Excellent/very good/good	1.00 (ref)
Fair or Poor	0.92 (0.82, 1.04)
Physical Activity	
Low	1.00 (ref)
Moderate	1.98 (1.77, 2.21)
High	2.73 (2.49, 2.99)
Smoking	
Current/Former	1.23 (1.14, 1.33)
Never	1.00 (ref)
Alcohol	
None	1.00 (ref)
Light/Moderate/Heavy	1.02 (0.87, 1.19)
History of Chronic Medical Conditions[#]	1.47 (1.34, 1.60)
Without History of Chronic Medical Conditions	1.00 (ref)
History of Pain Syndromes[##]	1.43 (1.32, 1.55)
No History of Pain Syndromes	1.00 (ref)