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Neuropsychiatric Symptoms and Expenditure on Complementary and Alternative Medicine

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Abstract

Objective—Neuropsychiatric symptoms affect 37% of US adults. These symptoms are often refractory to standard therapies, and patients may consequently opt for complementary and alternative medicine therapies (CAM). We sought to determine the demand for CAM by those with neuropsychiatric symptoms compared to those without neuropsychiatric symptoms as measured by out-of-pocket expenditure.

Method—We compared CAM expenditure between US adults with and without neuropsychiatric symptoms (n = 23,393) using the 2007 National Health Interview Survey. Symptoms included depression, anxiety, insomnia, attention deficits, headaches, excessive sleepiness, and memory loss. CAM was defined per guidelines from the National Institutes of Health as mind-body therapies, biological therapies, manipulation therapies, or alternative medical systems. Expenditure on CAM by those without neuropsychiatric symptoms was compared to those with neuropsychiatric symptoms.

Results—Of the adults surveyed, 37% had ≥ 1 neuropsychiatric symptom and spent $ 14.8 billion out-of-pocket on CAM. Those with ≥ 1 neuropsychiatric symptom were more likely than those without neuropsychiatric symptoms to spend on CAM (27.4% vs 20.3%, $P < .001$). Likelihood to spend on CAM increased with number of symptoms (27.2% with ≥ 3 symptoms, $P < .001$). After adjustment was made for confounders using logistic regression, those with ≥ 1

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neuropsychiatric symptom remained more likely to spend on CAM (odds ratio [OR] = 1.34; 95% Cl, 1.22–1.48), and the likelihood increased to 1.55 (95% Cl, 1.34–1.79) for ≥ 3 symptoms. Anxiety (OR = 1.40 [95% Cl, 1.22–1.60]) and excessive sleepiness (OR=1.36 [95% Cl, 1.21–1.54]) were the most closely associated with CAM expenditure.

Conclusions—Those with ≥ 1 neuropsychiatric symptom had disproportionately higher demand for CAM than those without symptoms. Research regarding safety, efficacy, and cost-effectiveness of CAM is limited; therefore, future research should evaluate these issues given the tremendous demand for these treatments.

Neuropsychiatric symptoms affect more than 1 in 3 adults in the United States.[1,2] This group of symptoms, including insomnia, anxiety, attention deficits, memory loss, regular headaches, excessive sleepiness, and depression, often occurs as a constellation rather than as individual symptoms.[1,2] While these symptoms can be present in otherwise healthy individuals, the constellation is frequently present in those suffering from neuropsychiatric conditions including posttraumatic stress disorder (PTSD), traumatic brain injury (TBI), mild cognitive impairment (MCI), dementia, and fibromyalgia.[3–5] Individual neuropsychiatric symptoms have also been shown to be independent risk factors for other chronic medical conditions such as insomnia and obesity, metabolic syndrome, cardiovascular disease, and stroke.[6–9] Furthermore, they are associated with risky behaviors (eg, substance abuse, drunk driving, dangerous sexual behaviors), and decreased work productivity.[10] Standard treatments for neuropsychiatric symptoms vary according to the associated disease entities, but these symptoms as a whole are often notoriously difficult to treat. Additionally, despite conventional options, including pharmacologic intervention and mental health visits, patients continue to seek other options for relief of these symptoms.[1]

Complementary and alternative medicine (CAM) encompasses a wide range of therapies including acupuncture, meditation, yoga, biofeedback, massage therapy, and herbal medications.[11] Prior studies have estimated that Americans spend $34 billion out-of-pocket annually for CAM treatments.[12] Several of these CAM treatments, with varying degrees of underlying evidence, may offer additional options to those suffering from neuropsychiatric symptoms.

In our prior work,[1] we reported higher prevalence of CAM use among adults with neuropsychiatric symptoms compared to those without neuropsychiatric symptoms (44% vs 30%, $P < .001$). The 3 modalities most likely to be used include herbal medications, deep-breathing exercises, and meditation. Mind-body therapies were the most popular subcategory.[1,2] In addition, there was a positive association between the number of neuropsychiatric symptoms and CAM use, with those having more symptoms more likely to use CAM, particularly mind-body medicine.[1,2] Preliminary studies[13–15] with these mind-body interventions have suggested improvements in sleep dysfunction, anxiety, and attention deficits. For example, mindfulness-based stress reduction, an 8-week group yoga and meditation course, has shown improvement in anxiety, depression, insomnia, and quality of life.[13–17] Studies[18] with acupuncture have suggested potential benefit for cognition and sleep quality. Several studies[19,20] suggest the beneficial effects of meditation for attention and memory processes. Some studies[19,21–24] of meditation and yoga have also

suggested beneficial changes both neurostructurally and neurophysiologically, with changes in cortical gray matter, as well as changes with γ-aminobutyric acid (GABA) and glutamate production providing a potential neural mechanistic pathway for the improvements observed. However, several studies[25,26] investigating nutriceuticals or herbal therapies for individual neuropsyehiatric symptoms, such as St. John's wort for anxiety and depression and ginkgo for memory have had equivocal results at best. Also, while many types of CAM are generally regarded as relatively safe, questions of safety and herb-drug interactions exist with supplements.[27–29]

Irrespective of the evidence base, with significant CAM use by the general population, significant out-of-pocket costs are assumed. However, to our knowledge, no studies have been published evaluating CAM expenditure in patients with neuropsyehiatric symptoms. Out-of-pocket expenditure represents a significant interest by the consumer, indicating a willingness to invest a finite resource beyond regular expenditures on health insurance and standard treatments. In order to inform future clinical and cost-effectiveness research, facilitate discussion among various stakeholders, and inform eventual public policy regarding CAM treatments, it is imperative to understand consumer use and expenditure of CAM, particularly in a population in which neuropsyehiatric symptoms are pervasive and span multiple important medical conditions. Thus, understanding costs associated with CAM therapies is an important indicator of consumer interest and demand.

In this context, utilizing a nationally representative survey, we aimed to further analyze patterns of consumer cost and expenditure for CAM specifically in those with neuropsyehiatric symptoms.

METHOD

Data Source

We analyzed data from the 2007 National Health Interview Survey (NHIS) Adult Core and Alternative Medicine Supplement. The NHIS is conducted by the Centers for Disease Control and Prevention and uses a complex sampling design to select a nationally representative sample of households for face-to-face interviews. One adult, aged 18 years or older, was randomly selected from each household to answer the adult questionnaire.[30] In 2007, the NHIS used a supplement questionnaire, sponsored by the National Institutes of Health, to obtain information regarding national out-of-pocket expenditures for CAM therapy use.[30] Details of the survey description including specific questions and response options are publicly available on the NHIS website.[30,31] The final adult survey included 23,393 respondents, with an overall response rate of 67.8%.[30] Of these respondents, 8,696 individuals had neuropsyehiatric symptoms; this study will focus on comparing these individuals to those without neuropsyehiatric symptoms.

Data Collection

Neuropsychiatric symptoms—Of the information surveyed, the most common neuropsyehiatric symptoms include memory loss, insomnia, regular headaches, anxiety,

excessive sleepiness, attention deficits, and depression.[31] Presence of symptoms was based on self-report.

Outcomes of interest—Our primary outcome was the total expenditure for CAM by those with ≥ 1 neuropsyehiatric symptom compared to those without any symptoms in the prior 12 months. We were also interested in the correlation between increasing number of neuropsyehiatric symptoms and expenditure on CAM.

Complementary and alternative medicine therapies were grouped into 4 categories: alternative medical systems (Ayurveda, acupuncture, homeopathy, naturopathy, and traditional healers), manipulation/bodywork therapies (massage, chiropractic care, Feldenkrais, Alexander technique, pilates, Trager Psychophysical Integration), biologically based therapies (herbal therapies, chelation therapy, special diets), and mind-body therapies (biofeedback, energy healing, hypnosis, tai chi, yoga, qi gong, meditation, guided imagery, progressive relaxation, deep breathing exercises). Each of these therapies is additionally classified in NHIS as a practitioner-based or self-care therapy. To maintain consistency with previous studies, we included the therapies as listed above and excluded prayer, vitamin use, support group meetings, and stress-management classes.

Correlates of CAM use—Data were collected on sociodemographic and clinical characteristics such as gender, age, race/ethnicity, region of residence, birthplace, educational attainment, and marital status. Potential indicators of illness burden included perceived health status, presence of functional limitations, self-reported history of medical conditions, insurance status, imputed family income provided by the NHIS, smoking status, physical activity level, alcohol intake, and presence of chronic medical and neurologic diagnoses such as cardiovascular disease, stroke, and chronic pain syndromes. Covariates were included if either previously reported as significant or considered important and relevant to our topic.[32–36]

Calculation of expenditures—To maintain consistency and allow for a fair comparison with previous studies, we used the published methods described by Barnes et al[12] for the calculation of expenditures. In brief, we used recodes provided by the NHIS for the number of times the respondent saw a CAM practitioner, the amount paid out-of-pocket for each CAM practitioner visit or therapy used, the number of times these visits or purchases occurred, and the amount paid out-of-pocket for a self-care therapy. Details of these methods are available in the study conducted by Barnes et al.[12] Persons with unknown CAM information were excluded from the analysis.

On the basis of prior testing results of the Complementary and Alternative Medicine Supplement of the 2007 NHIS,[12] few respondents reported purchasing supplements as often as daily. Responses indicating purchases more than 365 times per year were therefore excluded from the analysis as presumed errors.

Statistical Analyses

We used bivariable analyses to compare out-of-pocket expenditure on CAM between adults with and without neurologic and psychiatric symptoms. We also examined the correlation

between increasing number of neuropsychiatric symptoms and prevalence and category of CAM use with χ^2 analysis.

We fit multiple multivariable logistic regression models to determine (1) whether differences in likelihood of out-of-pocket expenditure on CAM persisted between adults with and without common neuropsychiatric symptoms after adjusting for sociodemographic and clinical factors, as described above; (2) whether an increase in the number of these symptoms was associated with an increased likelihood of out-of-pocket expenditure on CAM after adjusting for covariates; and (3) which specific symptoms were more closely associated with a higher likelihood of higher out-of-pocket expenditure on CAM.

All models used the same covariates as described in detail above. To ensure a robust analysis, we did not eliminate any of the covariates after initial inclusion.

Estimates excluded missing data; no individual variable had more than 5.8% missing data. Regression models included respondents with complete data on all covariates.

We used SAS (version 9.3; Research Triangle Park, North Carolina) to account for the complex sample design and used NHIS parameters so that the results reflect national estimates.[30] Imputed incomes were provided by the NHIS. The study was approved for exemption by the Spaulding Rehabilitation Hospital Institutional Review Board.

RESULTS

Sample Characteristics

General characteristics of the sample have been previously reported.[1,2] In brief, 8,696 adults reported experiencing at least 1 neuropsychiatric symptom, representing 37% of the US adult population (estimated 81.6 million adults nationwide).[1,2] For individual neuropsychiatric symptoms, 18% reported insomnia (estimated 40 million adults), 15% reported regular headaches (estimated 34 million adults), 11% reported anxiety (estimated 24 million adults), 11% reported depression (estimated 24 million adults), 10% reported excessive sleepiness (estimated 23 million adults), 6% reported memory loss (estimated 12 million adults), and 3% reported attention deficit (estimated 6 million adults).[1,2] Of the total population surveyed, 63% (n= 14,697) reported no 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. Those reporting ≥ 1 neuropsychiatric symptoms differed in many ways from those without such symptoms (Table 1).[1,2] In the descriptive analyses, of those adults with ≥1 neuropsychiatric symptom, females, middle age brackets, non-Hispanic white respondents, lower income brackets, US born, those needing assistance with ADLs, alcohol consumers, and those with chronic medical conditions were more likely to have a neuropsychiatric symptom.

CAM Expenditures

Of the adults surveyed, 37% had ≥ 1 neuropsychiatric symptom and spent $14.8 billion out of pocket on CAM. Overall, 23.4% of US adults had ≥ 1 expenditure on a CAM therapy in the prior 12 months. Of those with ≥ 1 neuropsychiatric symptom, 28.5% made an

expenditure in the prior 12 months compared to 14.8% of those without any symptoms ($P < .001$), with the percentage of the population making an expenditure increasing with the number of symptoms to over 27.2% in those with ≥ 3 neuropsychiatric symptoms (Figure 1; $P < .001$). Expenditure by those with ≥1 neuropsychiatric symptom (36.6% of the population) represents 44.7% of the total out-of-pocket expenditure of the overall population. By CAM category, those with and without symptoms spent the most on biological therapies, followed by manipulation/body work therapies, mind-body therapies, and alternative medical systems (Figure 2). However, per capita expenditure is disproportionately higher in those with neuropsychiatric symptoms for all categories.

Even after we adjusted for covariates, those with ≥ 1 neuropsychiatric symptom were more likely to have an expenditure on CAM (OR=1.34 [95% CI, 1.22-1.48]). This likelihood increased with an increasing number of symptoms (1 symptom: OR=1.24 [95% CI, 1.10-1.40]; 2 symptoms: OR=1.45 [95% CI, 1.24-1.70]; ≥3 symptoms: OR=1.55 [95% CI, 1.34-1.79]). Female gender, higher level of education, higher income, those needing help with ADLs, those that perceived their health as good or better, those with higher levels of physical activity, and history of chronic medical conditions were all associated with higher likelihood of CAM expenditure (Table 2). In evaluating specific symptoms, anxiety, excessive sleepiness, depression, and insomnia were associated with an increased likelihood of CAM expenditure, with memory loss showing a trend toward significance (Figure 3).

DISCUSSION

We found that US adults with ≥1 neuropsychiatric symptom spent disproportionately more on CAM compared to adults without neuropsychiatric symptoms. Furthermore, more neuropsychiatric symptoms correlated with higher likelihood of CAM expenditure. Respondents with anxiety, depression, and sleep dysfunction had the highest likelihood of CAM expenditure.

Given the tremendous prevalence of neuropsychiatric symptoms and the difficulties in treating these symptoms with standard treatments, identifying patterns of consumer use and expenditure of alternative treatments is important for this population. To our knowledge, this is the first evaluation of the expenditure on CAM by this population of patients on a national scale. This population was studied because nearly 37% of the general population reports at least 1 neuropsychiatric symptom as well as the relevance of these neuropsychiatric symptoms to many conditions, including PTSD, TBI, MCI, dementia, and fibromyalgia.[1,3–5] Our previous studies have shown that there is a prevalence of CAM usage by those with neuropsychiatric symptoms. This study expands on previous work by investigating actual out-of-pocket expenditure in addition to prevalence.

Consistent with previous studies estimating prevalence, we found that having at least 1 neuropsychiatric symptom is significantly associated with CAM expenditure. Those with neuropsychiatric symptoms had disproportionately higher out-of-pocket expenditure on CAM than those without these symptoms. Interestingly, our prior study[1,2] found the prevalence of CAM use to be 44% by those with neuropsychiatric symptoms, while the

percentage of respondents with symptoms having a CAM expenditure in this analysis was relatively less, 28.5%.

One potential reason for the difference in prevalence compared to expenditure is that many types of CAM may not always require a purchase including lifestyle or self-care interventions, (eg, yoga, meditation, and tai chi). Mind-body therapies were, in fact, the most frequently used modality. However, they were much lower on the list in terms of expenditure. Furthermore, other modalities such as herbal medications and manipulation therapies (eg, massage) require repeated expenditure for use, whereas mind-body therapies, once learned, can potentially be adopted without further expense.

The high overall prevalence and expenditure on CAM argues that these treatments are increasingly becoming mainstream. For example, in 2007, total out-of-pocket expenditure on CAM was $34.2 billion.[12] This number starts to approach other out-of-pocket health care expenses such as $49.6 billion for conventional physician visits and $52.5 billion for prescription medications in the same year.[37] In fact, the $34.2 billion spent on CAM represents 11.2% of total out-of-pocket health care expenditures for 2007.[37] As such, this consumer demand places an imperative on research evaluating the safety, efficacy, and cost of these therapies, including comparative cost-effectiveness analysis between CAM and conventional treatments.

CAM treatments, particularly those related to lifestyle such as mind-body therapies (eg, yoga, meditation, tai chi), may have relatively lower cost, have fewer side effects, and allow for active patient participation and personal responsibility. There is also some evidence to suggest benefit of mind-body therapies for a range of neuropsychiatric and chronic medical conditions as previously discussed.

Some have suggested that the use of CAM may affect health care expenditures in a positive way, although this area is still understudied.[38] Limited or no data exist on how the use of CAM impacts conventional provider visits, prescription medication usage, procedures, or even health insurance coverage. For example, one may postulate that CAM can serve as adjuvant treatment helping to lower the cost and demand of more expensive treatments (eg, lifestyle changes compared to gastric bypass surgery) or decrease the dose of medications with high side effect profiles (eg, lessen the dose of pain medications for patients with chronic pain). At the same time, it is possible that use of herbal medications in conjunction with standard medications may cause more interaction risks and thus increase emergency room visits. Further study is thus needed to make these determinations.

We also identified clear differences between adults that do spend on CAM versus those that do not in terms of race and gender, among other factors. It is unclear whether these differences represent disparities in care or different preferences based on culture and background, particularly given different perceptions of disease and healing care in various cultures.

We acknowledge that the NHIS survey we utilized has some inherent limitations. First, recall bias by the respondents may have been present. Second, the total costs per person for nonvitamin, nonmineral natural products and homeopathy were estimates (calculated by

multiplying the amount spent at the most recent purchase by the number of purchases per year). As the most recent purchase may not have been typical of the respondent's usual purchase of CAM products, the estimates may contain errors. Third, the sample size in the subgroups does not allow for evaluation of whether CAM therapies were used specifically for the neuropsychiatric symptoms. Finally, the conditions were self-reported. These limitations are common to survey-based studies and are unavoidable for this analysis, as no claims data on CAM exists.

Despite these limitations, this nationally representative survey provides tremendous insight into the consumer demand for a comprehensive and detailed list of CAM therapies. Additionally, to our knowledge, this is the first evaluation of CAM expenditure by this important population of patients on a national scale.

CONCLUSION

US adults with neuropsychiatric symptoms comprised a significant percentage of total CAM expenditure in 2007. Increasing numbers of neuropsychiatric symptoms were associated with increased expenditure. Anxiety, depression, and sleep dysfunction were most associated with CAM expenditure. Given the demand for CAM therapies, this study highlights the importance of research evaluating the efficacy, safety, and cost-effectiveness of these treatments.

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Clinical Points

- This study shows the high demand for complementary and alternative medicine therapies, particularly for biological or herbal products.
- Since many people in this population may be using standard medications as well, it is important that the clinical provider discuss these therapies along with standard treatments, as interactions between herbal products and prescription medications are possible.

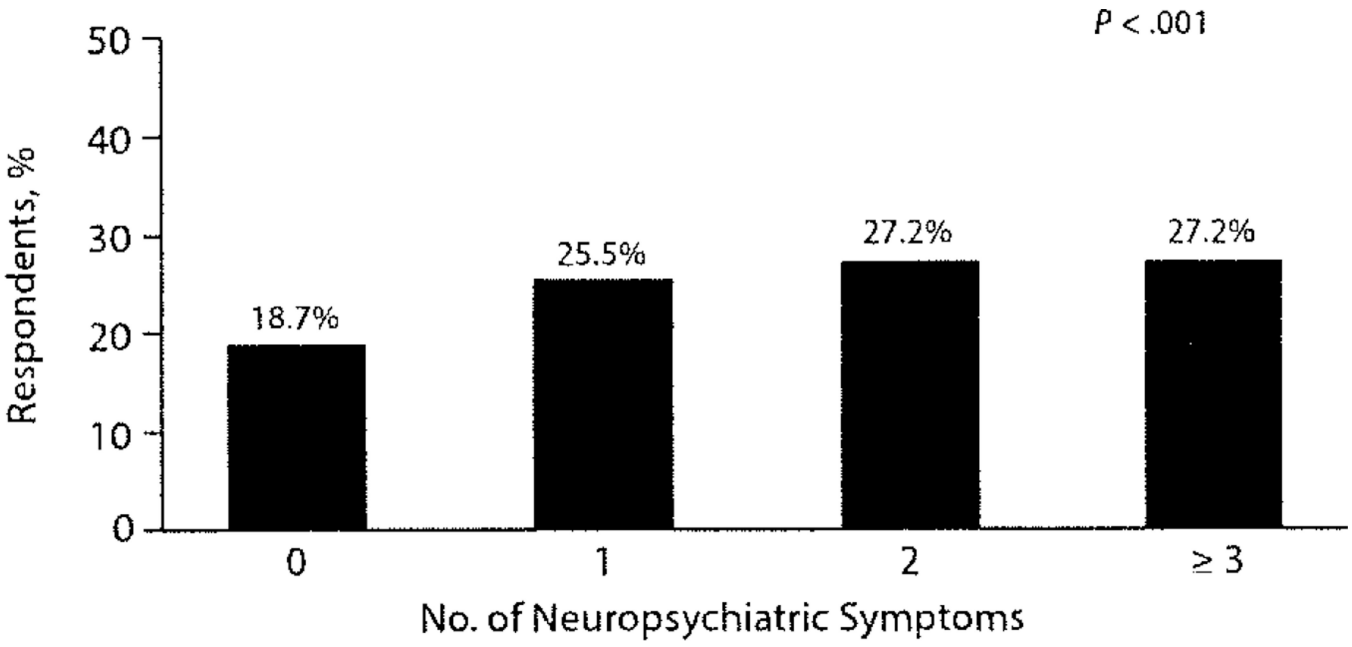

Figure 1.
Number of Neuropsychiatric Symptoms and Prevalence of Out-of-Pocket Expenditure on Complementary and Alternative Medicine

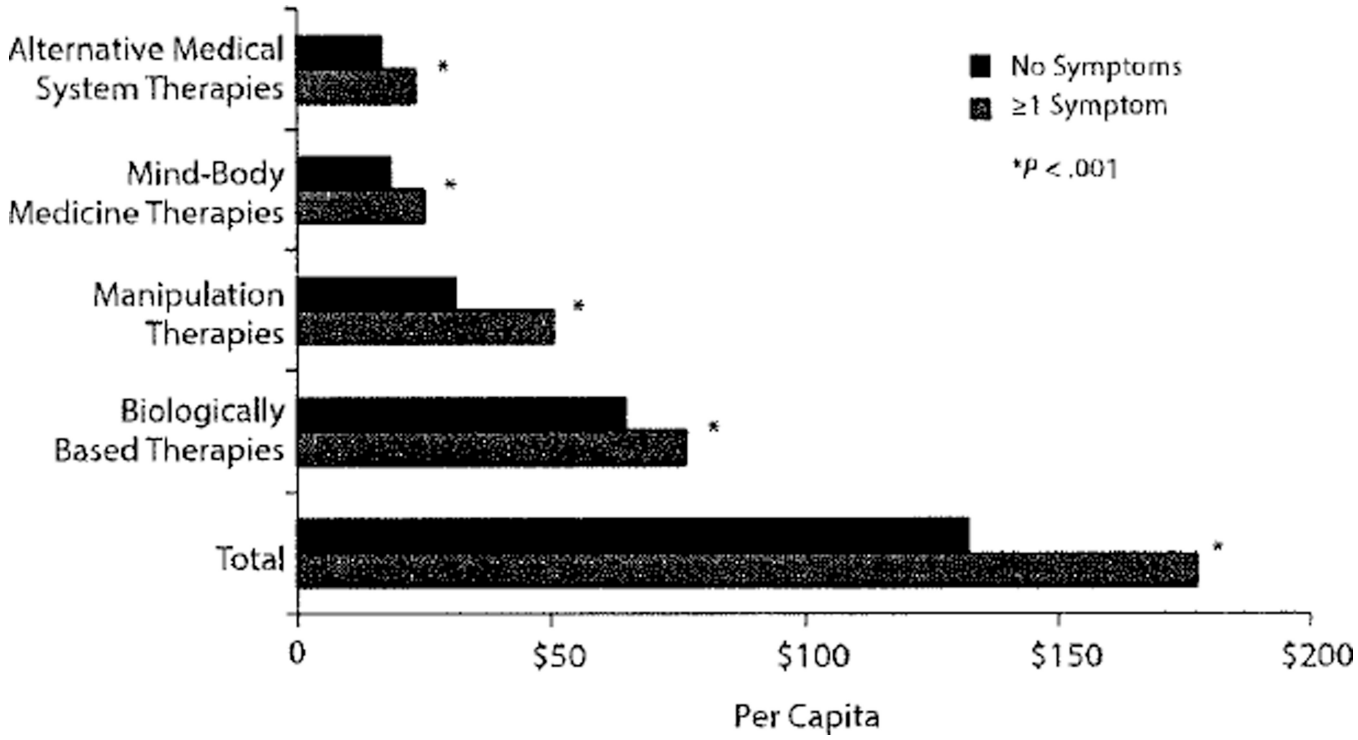

Figure 2.
Complementary and Alternative Medicine Expenditure Per Capita by Therapy Category

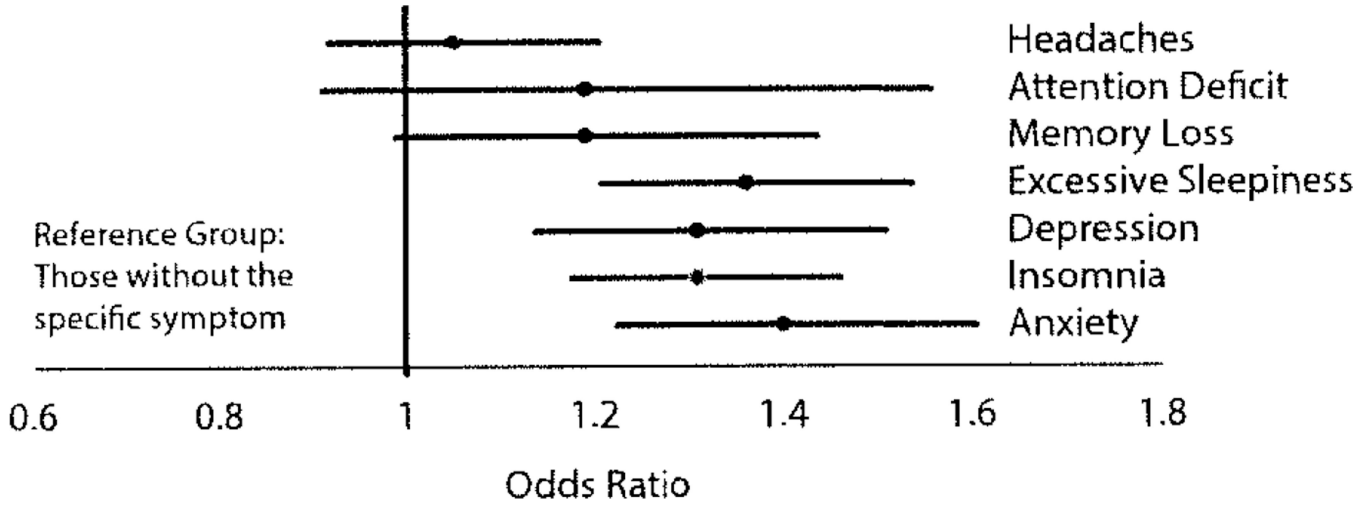

Figure 3.

The Likelihood of Out-of-Pocket Expenditure on Complementary and Alternative Medicine by Type of Neuropsychiatric Symptom: Multivariable Models

Table 1

Sample Characteristics[a]

Sociodemographic Characteristic	Individuals With Neuropsychiatric Symptoms, n (weighted %)	Individuals Without Neuropsychiatric Symptoms, n (weighted %)
Total	8,696	14,692
Gender		
Male	3,271 (37.6)	7,102 (48.3)
Female	5,425 (62.4)	7,590 (51.7)
Age, y		
18–24	856 (9.8)	1,638 (11.2)
25–44	2,992 (34.4)	5,548 (37.8)
45–64	2,973 (34.2)	4,801 (32.7)
65–74	900 (10.4)	1,515 (10.3)
≥75	975 (11.2)	1,190 (8.1)
Race		
Hispanic	1,477 (17.0)	2,719 (18.5)
Non-Hispanic white	5,393 (62.0)	8,656 (58.9)
Non-Hispanic black	1,371 (15.8)	2,334 (15.9)
Non-Hispanic Asian	352 (4.1)	882 (6.0)
Non-Hispanic other	103 (1.2)	101 (0.7)
Education		
High school or less	4,336 (49.9)	6,407 (43.6)
> High school	4,296 (49.4)	8,089 (55.1)
Imputed family income[b]		
0–$ 19,999	2,714 (31.2)	3,016 (20.5)
$20,000–$34,999	1,843 (21.2)	2,667 (18.2)
$35,000–$64,999	2,085 (24.0)	4,079 (27.8)
≥ $65,000	2,054 (23.6)	4,930 (33.6)
Region		
Northeast	1,389 (16.0)	2,531 (17.2)
Midwest	1,918 (22.1)	3,302 (22.5)
South	3,316 (38.1)	5,399 (36.8)
West	2,073 (23.8)	3,460 (23.6)
Marital status		
Married/living with partner	4,059 (46.7)	7,936 (54.0)
Widowed/divorced/separated	2,731 (31.4)	3,316 (22.6)
Never married	1,881 (21.6)	3,334 (22.7)
US born	7,251 (83.4)	11,559 (78.7)
Foreign born	1,442 (16.6)	3,118 (21.2)
Insurance status		
Private	4,757 (54.7)	9,837 (67.0)

Sociodemographic Characteristic	Individuals With Neuropsychiatric Symptoms, n (weighted %)	Individuals Without Neuropsychiatric Symptoms, n (weighted %)
Public	2,346 (27.0)	2,326 (15.8)
Uninsured	1,572 (18.1)	2,473 (16.8)
Needs help with activities of daily living[c]	909 (10.5)	316 (2.2)
Does not need help with activities of daily living[c]	7,786 (89.5)	14,374 (97.8)
Health characteristics		
Body mass index[d]		
Underweight	156 (1.8)	243 (1.7)
Healthy weight	2,790 (32.1)	5,262 (35,8)
Overweight	2,645 (30.4)	5,156 (35.1)
Obese	2,675 (30.8)	3,189 (21.7)
Perceived health[e]		
Excellent/very good/good	6,370 (73.3)	13,567 (92.3)
Fair or poor	2,321 (26.7)	1,115 (7.6)
Physical activity[f]		
Inactive	3,887 (44.7)	5,640 (38.4)
Insufficiently active	1,693 (19.5)	2,595 (17.7)
Sufficiently active	2,876 (33.1)	6,001 (40.9)
Smoking		
Current/former	4,176 (48.0)	5,123 (34.9)
Never	4,397 (50.6)	9,290 (63.2)
Alcohol		
Abstainer/former	3,477 (40.0)	5,755 (39.2)
Current light/moderate/heavy	5,001 (57.5)	8,334 (56.7)
History of chronic medical conditions[g]	6,543 (75.2)	6,024 (41.0)
Without history of chronic medical conditions[g]	2,153 (24.8)	8,668 (59.0)
History of pain syndromes[h]	5,061 (58.2)	3,452 (23.5)
No history of pain syndromes[h]	3,635 (41.8)	11,235 (76.5)

[a] Total number in sample is 23,393. Total number with symptoms is 8,696. Total number without symptoms is 14,692. Total number with missing data for symptoms is 5. The *n*'s in the table represent the unweighted number of persons with and without symptoms.

[b] Incomes are imputed values provided by the National Health Interview Survey.

[c] Activities of daily living is based on the variables PLAADL (Because of a physical, mental, or emotional problem, [do you/does anyone in the family] need the help of other persons with *personal care needs*, such as eating, bathing, dressing, or getting around inside this home?) and PLAIADL (Because of a physical, mental, or emotional problem, do [you/ any of these family members] need the help of other persons in handling *routine needs*, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?).

[d] Body mass index (kg/m^2) is based on respondent reported height and weight. Categories of BMI are underweight (BMI < 18.5), healthy weight (18.5 < BMI < 25.0), overweight (25.0 < BMI < 30.0), and obese (BMI > 30.0).

[e] Based on the question, "Would you say (person's) health in general is excellent, very good, good, fair, or poor?"

[f] Inactive is participating in no leisure-time aerobic activity that lasted at least 10 minutes. Insufficiently active is participating in aerobic activities for 10 minutes or more but less than 150 minutes per week. Sufficiently active is participating in moderate-intensity leisure-time physical activity

150 minutes or more per week, or in vigorous-intensity leisure-time physical activity 75 minutes or more per week, or an equivalent combination. Categories are mutually exclusive.

[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, or arthritis.

[h]History of chronic pain syndromes includes self-reported history of dental pain past 12 months, jaw/face pain past 3 months, neck pain past 3 months, or low back pain in the past 3 months.

Table 2

Likelihood of Out-of-Pocket Complementary and Alternative Medicine Expenditure: A Multivariable Model

Sododemographic Characteristic	Odds Ratio (point estimate)	95% Wald CI
≥ 1 Neuropsychiatric symptom	1.34	1.22–1.48
Without symptoms	1.00 (reference)	
Adjustment factors		
Gender		
Male	0.65	0.60–0.71
Female	1.00 (reference)	
Age, y		
18–24	0.61	0.51–0.74
25–44	1.00 (reference)	
45–64	1.20	1.07–1.35
65–74	1.40	1.20–1.64
≥75	0.92	0.75–1.14
Race		
Hispanic	0.66	0.55–0.79
Non-Hispanic white	1.00 (reference)	
Non-Hispanic black	0.47	0.40–0.55
Non-Hispanic Asian	0.92	0.74–1.13
Non-Hispanic other	1.14	0.74–1.76
Education		
High school or less	0.57	0.52–0.64
> High school	1.00 (reference)	
Imputed family income[a]		
0–$ 19,999	0.62	0.53–0.72
$20,000–$34,999	0.71	0.62–0.82
$35,000–$64,999	0.83	0.74–0.93
≥ $65,000	1.00 (reference)	
Region		
Northeast	0.94	0.82–1.07
Midwest	1.12	0.97–1.28
South	1.00 (reference)	
West	1.36	1.20–1.56
Marital status		
Married/living with partner	1.00 (reference)	
Widowed/divorced/separated	1.05	0.93–1.18
Never married	1.00	0.88–1.13
US born		
Yes	1.00 (reference)	
No	0.77	0.67–0.90

Sododemographic Characteristic	Odds Ratio (point estimate)	95% Wald CI
Insurance status		
Private	1.00 (reference)	
Public	0.78	0.68–0.89
Uninsured	0.94	0.81–1.09
Needs help with activities of daily living[b]		
Yes	0.91	0.70–1.17
No	1.00 (reference)	
Health characteristics		
Body mass index		
Underweight	0.66	0.44–0.98
Healthy weight	1.00 (reference)	
Overweight	0.88	0.79–0.98
Obese	0.91	0.82–1.01
Perceived health		
Excellent/very good/good	1.00 (reference)	
Fair or poor	0.91	0.82–1.02
Physical activity		
Inactive	0.44	0.39–0.49
Insufficiently active	0.75	0.68–0.83
Sufficiently active	1.00 (reference)	
Smoking		
Current/former	1.03	0.93–1.13
Never	1.00 (reference)	
Alcohol		
Abstainer/former	0.70	0.64–0.77
Current light/moderate/heavy	1.00 (reference)	
History of chronic medical conditions[c]		
Yes	1.00 (reference)	
No	0.71	0.64–0.79
History of pain syndromes[d]		
Yes	1.97	1.81–2.15
No	1.00 (reference)	

[a] Incomes are imputed values provided by the National Health Interview Survey.

[b] Activities of daily living is based on the variables PLAADL (Because of a physical, mental, or emotional problem, [do you/does anyone in the family] need the help of other persons with *personal care needs*, such as eating, bathing, dressing, or getting around inside this home?) and PLAIADL (Because of a physical, mental, or emotional problem, do [you/ any of these family members] need the help of other persons in handling *routine needs*, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?).

[c] History of chronic medical conditions includes self-reported history of heart attack, coronary artery disease, or angina in the past 12 months; poor circulation, history of urinary problems, or weak/failing kidneys in the past 12 months; acid reflux/heart burn, bowel problems, ulcer, or liver condition in the past 12 months; or history of emphysema or asthma, gout, lupus, fibromyalgia, rheumatoid arthritis, and/or arthritis.

[d] History of chronic pain syndromes includes self-reported history of dental pain past 12 months, jaw/face pain in past 3 months, neck pain in past 3 months, and/or low back pain in the past 3 months.