

## HEALTH SERVICES RESEARCH

## The Prevalence, Patterns, and Predictors of Chiropractic Use Among US Adults

*Results From the 2012 National Health Interview Survey*Jon Adams, PhD,\* Wenbo Peng, PhD,\* Holger Cramer, PhD,\*<sup>†</sup> Tobias Sundberg, PhD,\*<sup>‡</sup>  
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David Sibbritt, PhD,\* and Romy Lauche, PhD\***Study Design.** Secondary analysis of a national survey.**Objective.** The aim of this study was to investigate the prevalence, patterns, and predictors of chiropractic utilization in the US general population.**Summary of Background Data.** Chiropractic is one of the largest manual therapy professions in the United States and internationally. Very few details have been reported about the use of chiropractic care in the United States in recent years.**Methods.** Cross-sectional data from the 2012 National Health Interview Survey (n=34,525) were analyzed to examine the lifetime and 12-month prevalence and utilization patterns of chiropractic use, profile of chiropractic users, and health-related predictors of chiropractic consultations.**Results.** Lifetime and 12-month prevalence of chiropractic use were 24.0% and 8.4%, respectively. There is a growing trend of chiropractic use among US adults from 2002 to 2012. Back pain (63.0%) and neck pain (30.2%) were the most prevalent health problems for chiropractic consultations and the majority of users reported chiropractic helping a great deal with their health problem and improving overall health or well-being. A substantial number of chiropractic users had received prescription

(23.0%) and/or over-the-counter medications (35.0%) for the same health problem for which chiropractic was sought and 63.8% reported chiropractic care combined with medical treatment as helpful. Both adults older than 30 years (compared to younger adults), and those diagnosed with spinal pain (compared to those without spinal pain) were more likely to have consulted a chiropractor in the past 12 months.

**Conclusion.** A substantial proportion of US adults utilized chiropractic services during the past 12 months and reported associated positive outcomes for overall well-being and/or specific health problems for which concurrent conventional care was common. Studies on the current patient integration of chiropractic and conventional health services are warranted.**Key words:** adults, back pain, chiropractic, health services research, national survey, pain, patterns, predictors, prevalence, USA.**Level of Evidence:** 3**Spine 2017;42:1810–1816**From the \*Australian Research Centre in Complementary and Integrative Medicine (ARCCIM), Faculty of Health, University of Technology Sydney, Sydney, New South Wales, Australia; <sup>†</sup>Department of Internal and Integrative Medicine, Kliniken Essen-Mitte, Faculty of Medicine, University of Duisburg-Essen, Essen, Germany; <sup>‡</sup>Department of Neurobiology, Care Sciences and Society (NVS/OMV), Karolinska Institutet, Stockholm, Sweden; and <sup>§</sup>School of Health Professions, Murdoch University, Murdoch, Western Australia, Australia.

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Chiropractic is one of the commonly used complementary health approaches in the United States and internationally.<sup>1,2</sup> It is characterized by manual therapy techniques usually delivered to treat musculoskeletal and neurological disorders.<sup>3,4</sup> Certain chiropractic services such as spine manipulation are covered by Medicare and Medicaid for all adults in the United States.<sup>5</sup> Also, chiropractic care is one of the health benefits included in the workers' compensation systems in most US States.<sup>6</sup> It is worth noting that there is growing utilization of chiropractic care in the United States for near recent years<sup>7</sup> with >70,000 chiropractors practicing in the United States<sup>6</sup> and the total expense of visits to chiropractors in the United States estimated to be more than 10 billion in 2013.<sup>8</sup>

Previous work in a number of countries has shown inconsistent findings regarding the characteristics of chiropractic users and predictors of chiropractic utilization. For example, a large cohort study conducted in one State of Australia in 2005 revealed that adults who experienced back problems and/or had a pension as the main source of income

were more likely to visit a chiropractor, whereas those who were older than 55 years and/or consumed medication for certain health problems such as hypertension and high cholesterol were less likely to use chiropractic services.<sup>9</sup> A large-scale US survey focusing upon the use of health care and health insurance coverage in 2008 reported that participants who were female, white, with higher family income, and/or with arthritis were more likely to use chiropractic.<sup>10</sup> Meanwhile, a survey undertaken in Switzerland in 2009 found patients aged 31 to 50 years, those who experienced low back pain, and/or experienced pelvic pain or injury without leg pain were more likely to seek help from chiropractors.<sup>11</sup>

The National Health Interview Survey (NHIS) is the principal and reliable source of comprehensive health care information in the United States, utilizing a nationally representative sample of the civilian noninstitutionalized population of the United States.<sup>12</sup> An overview of chiropractic practice among US adults has been previously undertaken by analyzing the data collected in the 2002 and 2007 NHIS surveys. The focus of this previous work has been predominantly upon the broad use of a range of complementary health care approaches,<sup>13,14</sup> whereas only a few specific details have been revealed regarding chiropractic such as prevalence rates of chiropractic use and examination of the chronic conditions treated by chiropractic.<sup>15–17</sup> The 2012 NHIS survey is the most recent source providing data on the use of complementary health care approaches by adults in the United States. The objective of this present article is to update the examination of the lifetime and 12-month prevalence of chiropractic use among US adults and advance our understanding of the patterns and predictors of chiropractic care by drawing upon the 2012 NHIS survey dataset.

## MATERIALS AND METHODS

### Design and Setting

This paper reports on secondary analysis of the 2012 NHIS nationally representative survey which monitored the health of the US population.

### Data and Measures

For this analysis, data from the Family Core, the Sample Adult Core, and the Adult Complementary and Alternative Medicine questionnaire were used. The Family Core and the Sample Adult Core collected data regarding participants' sociodemographic characteristics including age, sex, ethnicity, region, marital status, education, annual household income, and self-perceived general health status. The Adult Complementary and Alternative Medicine questionnaire collected data on the use of a number of modalities including the use of chiropractic. Lifetime prevalence of chiropractic use was determined with the following question: *Have you ever seen a provider or practitioner for chiropractic or osteopathic manipulation for yourself?* Those who answered "Yes" were presented with an additional question asking whether they also had consulted a *chiropractic or*

*osteopathic manipulation* practitioner during the past 12 months. They were further queried which of the practitioners they had consulted most (with the options of chiropractor, osteopathic physician, refused, and do not know), and which of those they had consulted most often.

Those participants who had consulted a chiropractor in the past 12 months were asked to provide more details, such as the number of consultations, the costs per each consultation, insurance coverage, and the purchase of self-help books or other materials to learn about chiropractic. These respondents were questioned about the reasons for their use of chiropractic (including general reasons and specific medical conditions—a total of 88 possible conditions) as well as their disclosure/nondisclosure of chiropractic care to their personal health care provider and reasons for non-disclosure (where relevant), their perceived benefits of chiropractic use, and their use of information sources about chiropractic.

### Statistical Analyses

A total of 42,366 households were eligible and 34,525 adults provided data (response rate: 79.7%).<sup>18</sup> Population-based estimates were calculated using weights calibrated to the 2010 census-based population estimates for age, sex, and ethnicity of the US civilian noninstitutionalized population.

Lifetime and 12-month prevalence of chiropractic use were analyzed descriptively, as were details on chiropractic care and reasons for use. Results were reported as means and standard deviations, medians and ranges, weighted frequencies, and distributions as reasonable.

Sociodemographic characteristics were compared between those who had consulted a chiropractor ever in their life or within the previous 12 months and those nonchiropractic users via  $\chi^2$  tests. Independent predictors of chiropractic utilization (ever used, used in previous 12 months) were identified using multiple logistic regression analysis. The following sociodemographic predictors were considered: age (18–29; 30–39; 40–49; 50–64, 65 or older), sex (female; male), ethnicity (non-Hispanic white; Hispanic; African-American; Asian; Other), region (West; Northeast; Midwest; South), marital status (not in relationship; in relationship), education (less than college; some college or more), and annual household income (<\$20,000; \$20,000–\$34,999; \$35,000–\$64,999;  $\geq$ \$65,000). Additionally, health-related factors such as general health status (excellent or very good; good; fair or poor), body mass index (BMI) (<18.5; 18.5–25; 25–30;  $\geq$ 30), smoking (nonsmoker, smoker), alcohol consumption (alcohol abstainer; light drinker; regular or heavy drinker), exercise behavior (low-level exerciser; moderate-level exerciser; high-level exerciser), and medical conditions or diseases (chronic pain conditions; rheumatologic disorders; mental health disorders) were also used as potential predictors.

A backward stepwise procedure with a likelihood-ratio-statistic  $P$  value of  $\leq 0.005$  was chosen, and adjusted odds ratios with 95% confidence intervals were calculated. Only those associated with chiropractic use at a  $P$  value of  $\leq 0.10$  ( $\chi^2$  test) were included in the regression analyses. Statistical

analysis was performed using the Statistical Package for Social Sciences software (IBM SPSS Statistics for Windows, release 22.0; IBM Corp., Armonk, NY).

**RESULTS**

A total of 54.6 million adults in the United States had ever consulted a chiropractor (lifetime prevalence 24.0%), and 19.1 million adults had consulted a chiropractor within the previous 12 months (12-month prevalence 8.4%).

Predictors for lifetime and 12-month prevalence of chiropractic utilization are presented in Table 1. For lifetime prevalence of chiropractic utilization, the following statistically significant factors were identified. Adults older than 30 years were more likely to have ever used chiropractic (30–39: odds ratio [OR] = 1.53, 95% confidence interval [CI]: 1.33–1.77; 40–49: OR = 2.00, 95% CI: 1.74–2.29; 50–64: OR = 2.06, 95% CI: 1.79–2.36; 65 or older: OR = 2.23, 95% CI: 1.80–2.78) compared to adults younger than 30 years, as were those with a college or more education (OR = 1.31, 95% CI: 1.17–1.45) compared to those being less than college-educated, those living in a relationship (OR = 1.12, 95% CI: 1.02–1.24) compared to those not in a relationship, those with light (OR = 1.32, 95% CI: 1.17–1.48) or moderate to heavy (OR = 1.17, 95% CI: 1.02–1.33) alcohol consumption compared to abstainers, and those who were diagnosed with spinal pain (OR = 2.18, 95% CI: 2.00–2.43), headache or migraine (OR = 1.21, 95% CI: 1.08–1.37), or arthritis (OR = 1.26, 95% CI: 1.11–1.43) compared to those without those diagnoses. However, those of Hispanic (OR = 0.48, 95% CI: 0.41–0.56), Black (OR = 0.46, 95% CI: 0.38–0.55), or Asian (OR = 0.27, 95% CI: 0.21–0.34) ethnic origin were less likely to have ever used chiropractic compared to non-Hispanic whites, as were those living in the Northeast (OR = 0.79, 95% CI: 0.69–0.91) or South (OR = 0.69, 95% CI: 0.61–0.78) compared to those living in the West, those who smoked (OR = 0.75, 95% CI: 0.66–0.85) compared to non-smokers, and/or those respondents who were diagnosed with phobia (OR = 0.74, 95% CI: 0.61–0.90), depression (OR = 0.78, 95% CI: 0.68–0.88), coronary heart disease (OR = 0.68, 95% CI: 0.48–0.96), or asthma (OR = 0.74, 95% CI: 0.65–0.84) compared to those without these diagnoses.

Table 1 shows that those older than 30 years were more likely to have used chiropractic in the past 12 months (30–39: OR = 1.44, 95% CI: 1.22–1.71; 40–49: OR = 1.63, 95% CI: 1.38–1.92; 50–64: OR = 1.51, 95% CI: 1.29–1.78; 65 or older: OR = 1.72, 95% CI: 1.34–2.20) compared to younger adults, as were those living in the Midwest (OR = 1.28, 95% CI: 1.11–1.48) compared to those living in the West, and those diagnosed with spinal pain (OR = 2.64, 95% CI: 2.36–2.94) compared to those without. However, those living in the South (OR = 0.84, 95% CI: 0.73–0.98) were less likely to have used chiropractic in the past 12 months compared to those living in the West, as were those of Hispanic (OR = 0.59, 95% CI: 0.49–0.72),

**TABLE 1. Regression Output Including All Significant Predictors for the Use of Chiropractic**

	Ever Used Chiropractic, OR (95% CI)	Used Chiropractic in the Past 12 months, OR (95% CI)
<b>Age, y</b>		
18–29	Reference	Reference
30–39	1.53 (1.33–1.77)	1.44 (1.22–1.71)
40–49	2.00 (1.74–2.29)	1.63 (1.38–1.92)
50–64	2.06 (1.79–2.36)	1.51 (1.29–1.78)
≥65	2.23 (1.80–2.78)	1.72 (1.34–2.20)
<b>Ethnicity</b>		
Non-Hispanic white	Reference	Reference
Hispanic	0.48 (0.41–0.56)	0.59 (0.49–0.72)
Black	0.46 (0.38–0.55)	0.37 (0.28–0.48)
Asian	0.27 (0.21–0.34)	0.32 (0.23–0.45)
Other	0.80 (0.47–1.36)	1.01 (0.55–1.87)
<b>Region</b>		
West	Reference	Reference
Northeast	0.79 (0.69–0.91)	0.94 (0.79–1.11)
Midwest	0.94 (0.83–1.06)	1.28 (1.11–1.48)
South	0.69 (0.61–0.78)	0.84 (0.73–0.98)
<b>Education</b>		
Less than college	Reference	
Some college or more	1.31 (1.17–1.45)	
<b>Marital status</b>		
Not in relationship	Reference	
In relationship	1.12 (1.02–1.24)	
<b>BMI</b>		
18.5–25		Reference
up to 18.5		0.54 (0.32–0.93)
25–30		0.91 (0.80–1.03)
≥30		0.83 (0.72–0.95)
<b>Smoking</b>		
Nonsmoking	Reference	Reference
Smoking	0.75 (0.66–0.85)	0.63 (0.54–0.73)
<b>Alcohol consumption</b>		
Abstainers	Reference	
Light	1.32 (1.17–1.48)	
Moderate to heavy	1.17 (1.02–1.33)	
<b>Health status</b>		
Excellent/very good		Reference
Good		0.78 (0.69–0.89)
Fair/Poor		0.92 (0.74–1.14)
<b>Diagnosed conditions</b>		
Spinal pain	2.18 (2.00–2.43)	2.64 (2.36–2.94)
Headache/migraine	1.21 (1.08–1.37)	
Phobia	0.74 (0.61–0.90)	0.65 (0.51–0.84)
Depression	0.78 (0.68–0.88)	0.65 (0.55–0.77)
Coronary heart disease	0.68 (0.48–0.96)	0.50 (0.31–0.81)
Arthritis	1.26 (1.11–1.43)	
Asthma	0.74 (0.65–0.84)	0.68 (0.58–0.80)

*Note: empty cells represent non-significant associations. Analysis of cross-sectional data from the 2012 National Health Interview Survey for adults (n = 34,525). CI indicates confidence interval; OR, odds ratio.*

Black (OR = 0.37, 95% CI: 0.28–0.48) or Asian (OR = 0.32, 95% CI: 0.23–0.45) ethnic origin compared to non-Hispanic whites, those who had a BMI <18.5 (OR = 0.54, 95% CI: 0.32–0.93) or >30 (OR = 0.83, 95% CI: 0.72–0.95) compared to adults with a normal BMI, those who smoked (OR = 0.63, 95% CI: 0.54–0.73)

compared to nonsmokers, those who reported a good self-reported health status (OR = 0.78, 95% CI: 0.69–0.89) compared to those with excellent/very good health status, and/or those diagnosed with phobia (OR = 0.65, 95% CI: 0.51–0.84), depression (OR = 0.65, 95% CI: 0.55–0.77), coronary heart disease (OR = 0.50, 95% CI: 0.31–0.81) or asthma (OR = 0.68, 95% CI: 0.58–0.80) compared to those without these diagnoses.

The majority of those who had consulted a chiropractor within the past 12 months (83.3%) were able to recall the number of times they consulted a chiropractor; the average number of consultations being 9.8 ± 11.3 times (median: 6; 25th percentile: 3; 75th percentile: 12). Insurance covered some costs of consultations in 60.2% of respondents, and in 31.7% of those with coverage they were reimbursed 100% of the costs. The average of cost per chiropractic consultation visit as reported by 60.9% of the participants was US\$42.2 ± US\$51.8 (median: 30; 25th percentile: 20; 75th percentile: 46). The average total amount of expense for those who only paid out-of-pocket costs for chiropractic per year (approximately 5.9/19.1 million users) is estimated at US\$2.2 billion and the average total amount of expense for those who have partial reimbursement from health insurance for chiropractic per year (5.7/19.1 million users) is estimated at US\$1.4 billion. Only 1.3% of respondents reported purchasing a self-help book or other materials to learn about chiropractic, spending a total of US\$36.0 ± US\$41.3 on average for such items (median: 25; 25th percentile: 15; 75th percentile: 50).

Table 2 shows, in the past 12 months, that only a small percentage of chiropractic users reported the use of information sources for the utilization of chiropractic, including the internet (8.1%), books, magazines or newspapers (4.1%), and scientific articles (3.7%). Most respondents reported consulting a chiropractor for general wellness or disease prevention (43.3%), to improve their energy (16.3%), or to improve athletic or sports performance (15.4%). Many respondents reported positive outcomes of chiropractic utilization agreeing that such care had helped them to improve overall health and make them feel better (66.9%), to sleep better (41.9%), and to reduce stress or to relax (40.2%).

Back pain or back problems (63.2%) and neck pain or neck problems (30.2%) were by far the top specific health problems for which people consulted a chiropractor in the past 12 months, followed by joint pain/stiffness (13.6%) and other pain conditions. Around two in three users (64.5%) reported that chiropractic had helped a great deal to address these health problems. Chiropractic was used mainly because of respondents believing it would help when combined with their medical treatment (64.8%), owing to a perception that it treated the cause and not just the symptoms of their health problem (61.9%), and owing to it being considered natural (37.5%). A large proportion of chiropractic users also received over-the-counter (OTC) medication (35.2%) and/or prescription medication (23.2%) for the same health problem for which chiropractic was sought

**TABLE 2. Reasons for Using Chiropractic, Changes Owing to Chiropractic and Disclosure to Personal Health Care Provider**

	% of Respondents (95% CI)
<b>Reasons to use chiropractic</b>	
For general wellness or general disease prevention	43.3 (41.4–45.2)
To improve energy	16.3 (14.9–17.7)
To improve athletic or sports performance	15.4 (14.0–16.8)
To improve immune function	11.4 (10.2–12.6)
To improve memory or concentration	5.3 (4.5–6.2)
Did chiropractic motivate to	
Eat healthier	10.7 (9.5–11.8)
Exercise more regularly	21.6 (20.0–23.1)
Cut back or stop drinking alcohol	2.6 (1.9–3.3)
Cut back or stop smoking cigarettes	5.9 (3.5–8.4)
Eat more organic food	5.8 (4.9–6.7)
Did chiropractic lead to	
Give a sense of control over health	32.5 (30.7–34.3)
Help to reduce stress level or to relax	40.2 (38.4–42.1)
Help to sleep better	41.9 (40.0–43.8)
Helps to feel better emotionally	27.4 (25.7–29.1)
Make it easier to cope with health problems	38.5 (36.6–40.4)
Improve overall health and make you feel better	66.9 (65.1–68.7)
Improve your relationships with others	13.3 (12.0–14.6)
Improve attendance at job or school	17.0 (15.4–18.6)
How important was chiropractic for maintaining health and well-being	
Very important	47.9 (45.9–49.8)
Somewhat important	29.6 (27.8–31.3)
Slightly important	13.9 (12.6–15.2)
Not at all important	8.7 (7.6–9.8)
Used chiropractic for a specific health problem (top health problem)	66.9 (65.1–68.7)
Specific health problem	
Back pain or back problems	63.2 (60.9–65.4)
Neck pain or neck problems	30.2 (28.1–32.3)
Joint pain or stiffness	13.6 (12.0–15.1)
Muscle or bone pain	9.0 (7.6–10.3)
Severe headache/migraine	4.7 (3.7–5.7)
Arthritis	4.7 (3.7–5.7)
Chronic pain	3.9 (3.0–4.8)
Chiropractic helped for specific health problem	
A great deal	64.5 (62.3–66.8)
Some	25.8 (23.8–27.9)
Only a little	6.1 (5.0–7.2)
Not at all	3.5 (2.7–4.4)
Has received the following for the specific health problem (for which chiropractic care was sought)	
Prescription medication	23.2 (21.2–25.1)
OTC medication	35.2 (32.9–37.4)
Surgery	4.7 (3.7–5.7)
Physical therapy	22.9 (20.9–24.9)
Mental health counseling	2.1 (1.4–2.7)
Chiropractic practitioner was seen because	
Medical treatments were too expensive	6.3 (4.7–7.9)
Therapy combined with medical treatment would help	64.8 (61.7–67.9)
Medical treatments do not work for your specific health problem	33.8 (30.7–36.9)
Medications cause side effects	18.1 (15.4–20.7)
It is natural	37.5 (35.6–39.3)
It focuses on the whole person, mind, body, and spirit	24.9 (23.2–26.5)
It treats the cause and not just the symptoms	61.9 (60.1–63.8)
It was part of your upbringing	10.6 (9.4–11.8)

TABLE 2 (Continued)

	% of Respondents (95% CI)
Chiropractic was recommended by	
A medical doctor	17.7 (16.2–19.2)
A family member	32.2 (30.4–34.0)
A friend	25.9 (24.2–27.6)
A coworker	11.0 (9.8–12.2)
Chiropractic disclosed to personal health care provider	59.8 (57.7–61.9)
Not disclosed because	
Not used at the time	29.1 (26.0–32.2)
They discouraged use of it in the past	5.0 (3.5–6.5)
Being worried they would discourage it	4.8 (3.3–6.2)
Being concerned about a negative reaction	5.4 (3.9–7.0)
Did not think they needed to know	44.2 (40.8–47.6)
They did not ask	56.3 (52.9–59.7)
Do not think they know as much about it as you do	7.8 (6.0–9.7)
They did not give enough time to tell them	3.0 (1.8–4.2)
Information sources on chiropractic	
Internet	8.1 (7.1–9.2)
Books, magazines, or newspapers	4.1 (3.3–4.9)
DVDs, videos, or CDs	0.9 (0.6–1.3)
Television or radio	2.0 (1.4–2.5)
Scientific articles	3.7 (2.9–4.4)
Health food stores	1.3 (0.9–1.7)
<i>Analysis of cross-sectional data from the 2012 National Health Interview Survey for adults (n = 34,525).</i>	
<i>CI indicates confidence interval.</i>	

and 33.8% of respondents used chiropractic because they considered medical treatments to not be working for their condition (Table 2).

Chiropractic was mainly recommended by family (32.2%), friends (25.9%), and medical doctors (17.7%) in the past 12 months. The use of chiropractic was disclosed to their conventional health care provider by 59.8% of respondents, and the main reasons for not disclosing their use of chiropractic included that the provider did not ask (56.3%), the respondent thought the provider did not need to know (44.2%), or conventional health care was not used at the time (29.1%). Less than 5% of respondents were worried that their conventional health care provider would discourage their chiropractic use (Table 2).

## DISCUSSION

To the best of our knowledge, this article is the first to analyze the details of the prevalence, patterns, and predictors of chiropractic care in a large-scale nationally representative sample based on the complementary health care approaches statistics in the 2012 NHIS survey. The 12-month prevalence rate of chiropractic care among US adults (8.4%) shown in our study is higher than that reported from the 2002 NHIS survey (7.5%).<sup>13</sup> Owing to the lack of reporting of an exclusive prevalence rate for chiropractic use in the 2007 NHIS survey (8.6% of US adults sought chiropractic or osteopathic care),<sup>3</sup> we are unable to directly compare the rate of chiropractic use in 2007 to our relevant finding (8.4%). However, in light of the small difference between the exclusive prevalence of

chiropractic care in 2012 and that of chiropractic or osteopathic care in 2007, our analysis suggests the use of chiropractic practice in the US population has increased from the period 2002 to 2012. The growing trend of chiropractic use in US adults over these years is consistent with findings from the US Medical Expenditure Panel Survey<sup>7</sup> as well as the US Medicare Current Beneficiary Survey.<sup>19</sup> However, the motivations behind this growing trend in chiropractic use and the feedback of such individuals about their experience of chiropractic care remain unclear and is deserving of further research focus.

Our analyses show that, among the US adult population, spinal pain and problems - specifically for back pain and neck pain - have positive associations with the use of chiropractic. This finding is in agreement with that identified in a number of previous studies conducted in the US and elsewhere showing the most common complaints encountered by a chiropractor are back pain and neck pain<sup>11,20–22</sup> and is in line with systematic reviews identifying emerging evidence on the efficacy of chiropractic for back pain and neck pain.<sup>23,24</sup> Our analysis also shows that having mental health problems, coronary heart disease, and asthma are negatively associated with seeking chiropractic care. Indeed, no convincing rationale or evidence exists for the use of chiropractic for mental health disorders or cardiovascular conditions and systematic reviews have failed to identify sufficient evidence to support the efficacy of chiropractic treatment for asthma.<sup>25–27</sup>

Our analyses indicate that a substantial proportion of chiropractic users also consume prescription medications and/or OTC medications for the same health problem for which they seek chiropractic care. Notably, in our analyses >60% of those in the United States who consulted a chiropractor did so because of a belief that chiropractic would be helpful *in combination* with their medical treatment. Such concurrent use of chiropractic care and conventional medications and health provision is in line with previous studies.<sup>28–30</sup> Furthermore, previous randomized controlled trials have suggested the comanagement of chiropractic and medical care is likely to show more improvement in pain relief than medical care alone.<sup>31–33</sup>

Our study found that a recommendation for an adult to consult a chiropractor is rarely initiated by a conventional health care provider, and many respondents reported that their conventional health care provider failed to enquire about their possible chiropractic use. These results are similar to those identified in some previous studies, which have specifically investigated the referral patterns of chiropractors in the United States.<sup>34–36</sup> However, a recent national workforce survey of Australian chiropractic showed approximately half of the chiropractors initiate and/or receive referrals to/from general practitioners and one-third initiate and/or receive referrals to/from physiotherapists.<sup>37</sup> As such, further research examining the interface between chiropractors and conventional health providers is warranted to help tease out possible opportunities and challenges to safe, effective coordinated patient care.

The findings of our analyses need to be considered in light of a number of limitations. The NHIS survey relies on self-reported responses and this may lead to potential recall bias and measurement error. Moreover, the statistics of the 2012 NHIS regarding use of complementary health care including chiropractic were drawn from a cross-sectional survey, and our results can only suggest associations in the data. Nevertheless, the NHIS dataset drawn upon in our study provides a large-scale nationally representative sample regarding chiropractic use and the results of our analyses provide important insights regarding the recent prevalence rate, patterns, and predictors of chiropractic utilization among US adults.

Chiropractic services are an important component of the healthcare provision for patients affected by musculoskeletal disorders (especially for back pain and neck pain) and/or for maintaining their overall well-being. Despite the substantive findings concerning the prevalence, patterns, and predictors of chiropractic use in the US general population as reported in this manuscript, there nevertheless remains a wide research gap in chiropractic care. Further studies on the details in chiropractic care and the relationship between chiropractic and conventional/allied health providers and services in patient management in the United States are warranted.

### ➤ Key Points

- ❑ There is a growing trend of chiropractic use in US adults from 2002 to 2012.
- ❑ Spinal pain, in particular back pain and neck pain, is positively associated with the use of chiropractic, whereas mental health problems, coronary heart disease, and asthma have negative associations with seeking chiropractic care.
- ❑ A proportion of chiropractic users also take prescription medications (23.2%) and/or OTC medications (35.2%) for the same health problem for which they seek chiropractic care.
- ❑ Chiropractic use is primarily recommended by family members or friends, and many chiropractic users do not disclose such use to their medical doctors because of the provider not asking or because of their perceptions that the provider did not need to know about such health care use.

### References

1. Ndetan HT, Bae S, Evans MW, et al. Characterization of health status and modifiable risk behavior among United States adults using chiropractic care as compared with general medical care. *J Manipulative Physiol Ther* 2009;32:414–22.
2. Xue CC, Zhang AL, Lin V, et al. Acupuncture, chiropractic and osteopathy use in Australia: a national population survey. *BMC Public Health* 2008;8:105.
3. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. *Natl Health Stat Report* 2008;12:1–23.
4. National Center for Complementary and Integrative Health. Chiropractic: in depth. Available at: <https://nccih.nih.gov/health/chiropractic/introduction.htm>. Published 2016. Accessed February 2012.
5. American Chiropractic Association. Insurance coverage of chiropractic: quick facts. Available at: <http://www.acatoday.org/Patients/Access-Coverage/Insurance-Coverage>. Published 2016. Accessed November 2016.
6. National Board of Chiropractic Examiners. Practice analysis of chiropractic 2015 - Chapter 1: the chiropractic profession. Available at: <http://www.nbce.org/practiceanalysis/>. Published 2015. Accessed November 2016.
7. Davis MA, Sirovich BE, Weeks WB. Utilization and expenditures on chiropractic care in the United States from 1997 to 2006. *Health Serv Res* 2010;45:748–61.
8. Agency for Healthcare Research and Quality. Office-based medical provider services-Median and Mean expenses per person-with expense and distribution of expenses by source of payment: United States, 2013-visits to chiropractors only. Medical Expenditure Panel Survey Household Component Data. Available at: [https://meps.ahrq.gov/mepsweb/data\\_stats/tables\\_compendia\\_hh\\_interactive.jsp](https://meps.ahrq.gov/mepsweb/data_stats/tables_compendia_hh_interactive.jsp)? Published 2015. Accessed July 25, 2016.
9. French SD, Densley K, Charity MJ, et al. Who uses Australian chiropractic services? *Chiropr Man Therap* 2013;21:31.
10. Zodet MW, Stevans JM. The 2008 prevalence of chiropractic use in the US adult population. *J Manipulative Physiol Ther* 2012;35:580–8.
11. Humphreys BK, Peterson CK, Muehlemann D, et al. Are Swiss chiropractors different than other chiropractors? Results of the job analysis survey 2009. *J Manipulative Physiol Ther* 2010;33:519–535.
12. Centers for Disease Control and Prevention. About the National Health Interview Survey. Available at: [http://www.cdc.gov/nchs/nhis/about\\_nhis.htm](http://www.cdc.gov/nchs/nhis/about_nhis.htm). Published 2015. Accessed October 8, 2015.
13. Tindle HA, Davis RB, Phillips RS, et al. Trends in use of complementary and alternative medicine by US adults: 1997–2002. *Altern Ther Health Med* 2005;11:42–9.
14. Upchurch DM, Dye CE, Chyu L, et al. Demographic, behavioral, and health correlates of complementary and alternative medicine and prayer use among midlife women: 2002. *J Womens Health* 2010;19:23–30.
15. Ndetan H, Hawk C, Sekhon VK, et al. The role of chiropractic care in the treatment of dizziness or balance disorders: analysis of National Health Interview Survey Data. *J Evid Based Complement Altern Med* 2016;21:138–42.
16. Ndetan H, Evans MW, Felini M, et al. Chiropractic and medical use of health promotion in the management of arthritis: analysis of the 2006 National Health Interview Survey. *J Manipulative Physiol Ther* 2010;33:419–24.
17. Blackwell DL, Lucas JW, Clarke TC. Summary health statistics for US adults: National Health Interview Survey, 2012. Series 10, Data from the National Health Survey [serial online]. 2014; 260:1–161. Available from: National Center for Health Statistics, Centers for Disease Control and Prevention, US. Accessed November 6, 2015.
18. Weigel PA, Hockenberry JM, Wolinsky FD. Chiropractic use in the Medicare population: prevalence, patterns, and associations with 1-year changes in health and satisfaction with care. *J Manipulative Physiol Ther* 2014;37:542–51.
19. Coulter ID, Hurwitz EL, Adams AH, et al. Patients using chiropractors in North America: who are they, and why are they in chiropractic care? *Spine (Phila Pa 1976)* 2002;27:291–6.
20. Parkinson L, Sibbritt D, Bolton P, et al. Well-being outcomes of chiropractic intervention for lower back pain: a systematic review. *Clin Rheumatol* 2013;32:167–80.
21. Amarin-Woods LG, Parkin-Smith GF, Nedkoff L, et al. Outcomes of a pilot study in chiropractic practices in Western Australia. *Chiropr Man Therap* 2016;24:34.
22. Bronfort G, Haas M, Evans RL, et al. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis. *Spine J* 2004;4:335–56.
23. Koes BW, Assendelft WJ, van der Heijden GJ, et al. Spinal manipulation for low back pain: an updated systematic review of randomized clinical trials. *Spine (Phila Pa 1976)* 1996;21:2860–71.

24. Ernst E. Chiropractic treatment for asthma? *J Asthma* 2009; 46:211.
25. Kaminskyj A, Frazier M, Johnstone K, et al. Chiropractic care for patients with asthma: a systematic review of the literature. *J Can Chiropr Assoc* 2010;54:24–32.
26. Hondras MA, Linde K, Jones AP. Manual therapy for asthma. *Cochrane Database Syst Rev* (2)2005; CD001002.
27. Hurwitz EL, Chiang LM. A comparative analysis of chiropractic and general practitioner patients in North America: findings from the joint Canada/United States Survey of Health, 2002-03. *BMC Health Serv Res* 2006;6:49.
28. Mior S, Gamble B, Barnsley J, et al. Changes in primary care physician's management of low back pain in a model of inter-professional collaborative care: an uncontrolled before-after study. *Chiropr Man Therap* 2013;21:6.
29. Sibbritt D, Adams J, Young A. A profile of mid-age women who consult a chiropractor or osteopath: findings from a survey of 11,143 Australian women. *J Manipulative Physiol Ther* 2006; 29:349–53.
30. Goertz CM, Long CR, Hondras MA, et al. Adding chiropractic manipulative therapy to standard medical care for patients with acute low back pain: results of a pragmatic randomized comparative effectiveness study. *Spine (Phila Pa 1976)* 2013; 38:627–34.
31. Vernon H, Jansz G, Goldsmith CH, et al. A randomized, placebo-controlled clinical trial of chiropractic and medical prophylactic treatment of adults with tension-type headache: results from a stopped trial. *J Manipulative Physiol Ther* 2009;32:344–51.
32. Amarin-Woods LG, Parkin-Smith GF, Cascioli V, et al. Manual care of residents with spinal pain within a therapeutic community. *Therap Commun* 2016;37:159–68.
33. Stevens GL. Demographic and referral analysis of a free chiropractic clinic servicing ethnic minorities in the Buffalo, NY area. *J Manipulative Physiol Ther* 2007;30:573–7.
34. Smith M, Greene BR, Haas M, et al. Intra-professional and inter-professional referral patterns of chiropractors. *Chiropr Osteopat* 2006;14:12.
35. Busse JW, Jacobs C, Ngo T, et al. Attitudes toward chiropractic: a survey of North American orthopedic surgeons. *Spine (Phila Pa 1976)* 2009;34:2818–25.
36. Adams J, Lauche R, Peng W, et al. A workforce survey of Australian chiropractic: the profile and practice features of a nationally representative sample of 2,005 chiropractors. *BMC Complement Altern Med* 2017;17:14.