

Utilization of Chiropractic Care in US Children and Adolescents: A Cross-Sectional Study of the 2012 National Health Interview Survey



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ABSTRACT

Objective: The purpose of this study was to describe the prevalence of chiropractic utilization and examine sociodemographic characteristics associated with utilization in a representative sample of US children and adolescents aged 4 to 17 years.

Methods: Data are from 9734 respondents to the 2012 National Health Interview Survey. Age, sex, race/ethnicity, geography, family income, parental educational attainment, and other health care providers served as exposure variables. Chiropractic utilization in the past 12 months (yes/no) was the targeted outcome. Weighted crude and adjusted logistic regression models, controlling for relevant covariates, were performed.

Results: The 12-month prevalence of chiropractic utilization in US children was 3.0% (95% confidence interval: 2.6%-3.6%). The adjusted odds (95% confidence interval) of chiropractic utilization were higher among 11- to 17-year-olds (2.02 [1.41-2.90]) (vs 4- to 10-year-olds), Midwest residents (2.45 [1.36-4.44]) (vs Northeast), families with incomes $\geq$ \$100 000 (3.25 [1.87-5.66]) (vs $<$ \$35 000), and those that visited other Complementary and Integrative Health (also known as Complementary and Alternative Medicine) practitioners (11.26 [7.19-17.64]). Blacks and Asians had lower adjusted odds of chiropractic utilization compared with whites (0.17 [0.06-0.47] and 0.17 [0.07-0.43], respectively). Sex, parental education, and having an orthodox medical personal physician were not associated with utilization.

Conclusion: Although overall prevalence was low, sociodemographic characteristics of child and adolescent users of chiropractic care were identified. Age, race/ethnicity, region of residence, family income, and utilization of other Complementary and Integrative Health services were associated with chiropractic utilization, after adjusting for sociodemographic covariates. (J Manipulative Physiol Ther 2018;41:725-733)

Key Indexing Terms: Chiropractic; Child; Adolescent; Pediatrics; Complementary Therapies; Integrative Medicine

INTRODUCTION

Musculoskeletal pain complaints, such as neck and low back pain, are common but often underemphasized issues in

the pediatric population.^{1,2} Watson et al reported a 1-month prevalence of 23.9% for low back pain in schoolchildren aged 11-14 years.³ In a Danish study, the prevalence of spine pain among children aged 8-15 years was estimated to be 55.5% (95% confidence interval [CI]: 52.1%-59.0%) during the 3-year study period.⁴ The mean point and 1-year-period prevalence of low back pain were 12.0% (95% CI: 9.0%-15.9%) and 33.6% (95% CI: 26.9%-44.0%), respectively, in children and adolescents aged $<$ 18 years, based on a recent meta-analysis.⁵ In contrast, the 3-month-period prevalence of low back pain in US adults aged $\geq$ 18 years was 26.4% (standard error [SE]: 0.3%),⁶ illustrating how surprisingly commonly children experience musculoskeletal pain. Despite the perception that pediatric musculoskeletal complaints may be milder and self-limiting,⁷ approximately 8.3% of children (95% CI: 7.9%-8.7%) aged 3-17 years sought treatment from a primary care physician for musculoskeletal complaints over a 12-month period.⁸ In

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addition to discomfort and activity limitation, spine pain in adolescents has been shown to reduce reported quality of life.⁹ Another important consideration is that studies have shown that persistent low back pain in children and adolescents often progresses to chronic pain in adulthood.¹⁰⁻¹² Therefore, finding effective treatment options for musculoskeletal pain in the pediatric population is of high public health significance.

Chiropractic therapy is a clinically effective, conservative treatment approach for spine-related conditions in adults^{13,14} and adolescents.¹⁵ Children are 5 times as likely to use complementary and integrative health (CIH) (previously known as complementary and alternative medicine [CAM]) services if their parents also utilize CIH.¹⁶ We may expect a utilization similar to that of adults, which has been reported to be between 8.4% and 13.7%.^{17,18} However, chiropractic utilization in the pediatric population has been low.^{16,19,20} An explanation is required to understand the reason for the differences if utilization is to be recommended to increase, especially for children and adolescents with musculoskeletal conditions.

The sociodemographic characteristics of adults who utilize chiropractic therapy have been reported.^{17,18,21} However, the sociodemographic characteristics of children and adolescents that utilize chiropractic therapy are more limited.^{19,22,23} Further, these studies targeting children and adolescent populations are often not specific to chiropractic therapy. More specifically, chiropractic therapy utilization in children and adolescents has been reported with other CAM approaches, such as acupuncture and yoga.^{16,19,22} Previous studies in children and adolescents have also reported utilization based on the type of treatment, including spinal manipulation. Although spinal manipulation is the primary treatment offered by doctors of chiropractic, it is also used by osteopathic doctors, which may inflate overall utilization estimates. As a result, utilization percentages that are specific to chiropractic therapy are largely unknown in these age groups.^{19,22,23}

To address these important research gaps, the purpose of this study was to identify the prevalence of utilization of chiropractic therapy and sociodemographic factors related to chiropractic utilization in a nationally representative sample of US children and adolescents. Based on previous findings of CAM use among adults^{17,18,24,25} and children,^{16,26} we hypothesized that female sex, white race/ethnicity, Midwest residence, higher parental education/family income, and utilization of other health care services (orthodox medicine or CAM) would be associated with chiropractic utilization among US children and adolescents.

METHODS

Study Design and Participants

The 2012 National Health Interview Study (NHIS) was chosen because of its unique ability to isolate chiropractic

utilization from osteopathic manipulation, a feature not available in previous NHIS data sets. The NHIS is a cross-sectional survey of US households released by the Centers for Disease Control and Prevention (CDC). Details of the survey are readily accessible online.²⁷ The NHIS uses a complex, multistage, stratified sampling design that oversamples the minority population to obtain a nationally representative sample. Health-related questions were asked by trained personnel using computer-assisted, in-person interviews. Note that in the case of respondents younger than 18 years, the child did not report information. Rather, responses were provided by an adult (either a parent or a guardian) knowledgeable about the child's health condition. A new data set is released annually and contains mostly de-identified, publicly available data on the US general population. Every 5 years, NHIS collaborates with the National Center for Complementary and Integrative Health (NCCIH) and releases a special CIH section to ascertain CIH use, including chiropractic or osteopathic manipulation. The 2012 NHIS is the most recent data set that includes CAM data (release date: June 2013).²⁷ Data collected as part of the Family Core and Sample Child's Section of the 2012 NHIS survey were also included to address the primary study objective. In the 2012 NHIS, a total of 13,275 children and adolescents under the age of 18 completed the interview and were included in the analysis. The CIH/CAM and Sample Child Sections of the 2012 NHIS were not collected in children aged 0-3 years; therefore, the analytic sample is restricted to those aged 4-17 years ($n = 10,218$).

This study was reviewed by the Committee for the Protection of Human Subjects at the University of Texas Health Science Center (Houston, Texas) and received exempt status (Exempt No.: HSC-SPH-17-0653).

Exposure Variables: Sociodemographic Factors

Based on the literature, 4 child-level independent variables were selected: age, sex, race/ethnicity, and region of residence. In addition, the family-level variables, highest parental education and family income, were evaluated. Study participants were classified into 2 age groups to further characterize child and adolescent respondents: 4-11 or 12-17 years. Race and ethnicity information was collected using 2 questions. First, Hispanic origin was isolated by the query, "Do you consider yourself Hispanic/Latino (yes/no)?" If yes, the participant was classified as Hispanic/Latino. If no, a follow-up question was asked, "What race do you consider yourself to be?" The response options were "white only," "black/African American only," "American Indian and Alaskan Native (AIAN)," "Asian only," and "multiple races." Because of low sample sizes, the AIAN and multiple-race groups were collapsed into a single category that was operationalized as "other" for data analysis. Residence was categorized into the 4 major US Census regions: Northeast, South, Midwest, and West.

Highest parental education was determined by the highest level of education achieved by either parent and classified into 2 levels (less than a bachelor's degree and bachelor's degree or higher). Family income was classified into 4 categories: <\$35 000, \$35 000 to <\$75 000, \$75 000 to <\$100 000, and \$100 000 or higher.

In addition to common sociodemographic variables, 2 additional independent variables were created to assess the association between visits to other health care providers and chiropractic utilization. The first variable quantified whether a medical doctor was considered as the primary health care provider (yes or no). The second variable assessed whether a child participant had ever seen a CIH provider other than a chiropractor (yes or no) and included a list of 17 different CIH specialties: acupuncture, massage therapy, energy healing, naturopathy, hypnosis, biofeedback, ayurveda, chelation therapy, craniosacral therapy, traditional healer, herbal (nonvitamin) consult, special diets, homeopathy, Feldenkrais, Alexander technique, Pilates, and Trager psychosocial integration. If a parent or guardian responded that his or her child sought treatment from any one of these CIH specialists, he or she was classified as a yes.

Outcome Variable: Chiropractic Utilization

The primary outcome variable in this study involves chiropractic utilization in the past 12 months, with a dichotomous (yes/no) response. Responses from 2 questions were used to determine the 12-month prevalence of chiropractic utilization. First, the respondent was asked: "During the past 12 months, did [insert child's name] use chiropractic or osteopathic manipulation?" If the response was yes, a follow-up question was asked: "Which did [insert he or she] see, a chiropractor or an osteopathic physician?" Those who answered "chiropractor" were considered to have utilized chiropractic in the past 12 months. Respondents with missing data for these questions were classified as no chiropractic utilization given an underlying assumption that missing data likely meant general unfamiliarity with this therapy option.

Statistical Analysis

Relevant data from the Family Core (ie, family income, parental education), Sample Child (ie, age, sex, race/ethnicity, region of residence), and Child CAM (ie, chiropractic utilization, medical utilization, other CAM specialties) sections of the 2012 NHIS were merged into the analytic data set. This study adopted a complete case analysis. Yet, differences between the analytic sample and excluded participants were evaluated, using the χ^2 or Student *t* test, to assess the extent of possible selection bias.

To ensure accurate representation of the targeted US civilian and non-institutionalized population, sampling

weights supplied by NHIS were applied before analysis. Weighted frequencies and proportions were estimated for each categorical variable in the analytic sample. Weighted, univariate logistic regressions were performed with each sociodemographic factor against the outcome variable (chiropractic utilization) to calculate crude odds ratios (ORs) and 95% CIs. Then, a weighted, multivariate logistic regression was modeled with the sociodemographic variables against the outcome. Dummy variables were created for race/ethnicity (5 categories), region of residence (4 categories), and family income (4 categories) for the multivariate analysis. Goodness-of-fit was assessed for the univariate and multivariate models using an *F*-adjusted mean residual test, as outlined in Heeringa and West.²⁸

Statistical analysis was performed with STATA software, version 13.0 (Stata Corp LLC, College Station, Texas). A 2-sided type I error level of .05 was used.

RESULTS

Participants

The initial child sample contained 10,218 participants between the ages of 4 and 17 years. An additional 484 participants were excluded because of missing parental education and family income data. The final analytic sample included 9,734 children and adolescents (Fig 1). Although there were no statistically significant differences by age or sex between those included and excluded, the analytic sample had a larger proportion of whites than the excluded sample.

Sociodemographic Characteristics of the Analytic Sample

The weighted frequency and proportion estimates of the sociodemographic characteristics are listed in Table 1. In summary, the overall rate of utilization of chiropractic or osteopathic manipulation was 3.2% (95% CI: 2.7%-3.7%). The overall rate of utilization of chiropractic care alone was 3.0% (95% CI: 2.6%-3.6%). Chiropractic users were older (12-17 years, 60.5% [95% CI: 51.8%-61.5%]), predominantly female (55.1% [95% CI: 47.8%-62.2%]), and white (79.5% [95% CI: 72.8%-84.9%]). The largest proportion of chiropractic users lived in the Midwest (37.2% [95% CI: 29.7%-45.5%]). Most chiropractic users had 1 or more parents with at least a bachelor's degree (52.1% [95% CI: 44.2%-59.9%]) and family income exceeding \$100 000 USD (41.7% [95% CI: 34.0%-49.8%]).

Univariate and Multivariate Analyses

Unadjusted and adjusted associations between each sociodemographic variable and chiropractic utilization are reported in Table 2. Briefly, statistically significant associations were observed between the following

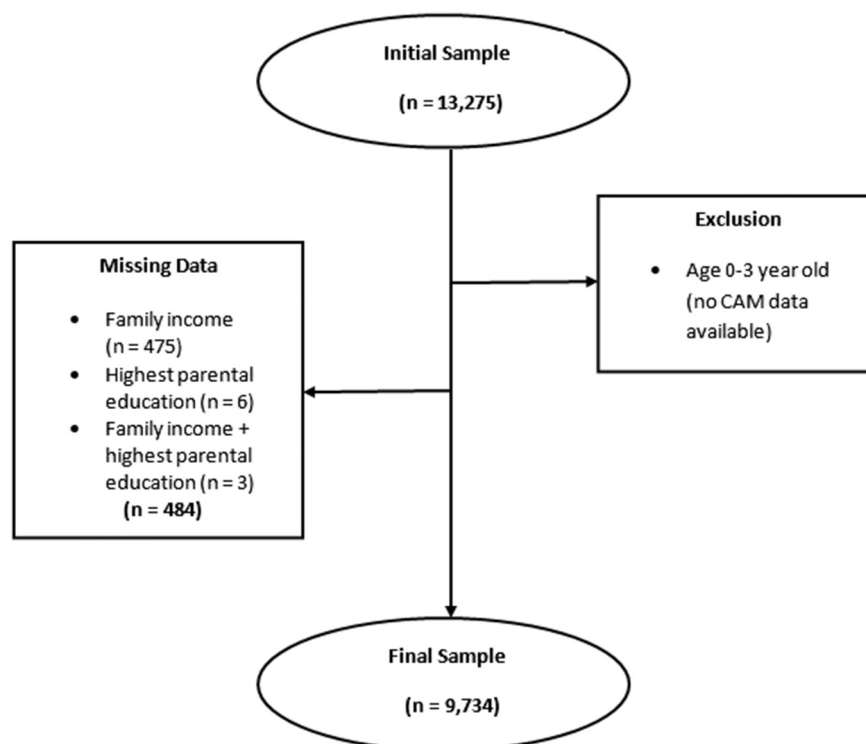


Fig 1. Number of exclusions by reason, National Health Interview Study, 2012. CAM, Complementary and Alternative Medicine.

sociodemographic characteristics and chiropractic utilization: age, certain racial and ethnic groups, Midwest region, higher parental education, higher family income, and reported utilization of other CIH specialties; all other relations were statistically null.

The adjusted ORs for the sociodemographic variables against chiropractic utilization were similar to the crude ORs, with slight increases or attenuation in the magnitude of association. Specifically, the adjusted odds ratio (aOR [95% CI]) of chiropractic utilization in participants 12-17 years old was higher (aOR: 2.02 [1.41, 2.90]) compared with that of participants 4-11 years old. Relative to white participants, black, Hispanic, and Asian participants had 83%, 58%, and 83% (0.17 [0.06-0.47], 0.42 [0.25-0.68], and 0.17 [0.07-0.43]) lower adjusted odds of chiropractic utilization, respectively. West and Midwest residents had 2.31 (1.28-4.16) and 2.45 (1.36-4.44) times the adjusted odds of chiropractic utilization, respectively, than those residing in the Northeast. Compared with participants in the lowest income bracket (\$0-\$34,999), those in the 3 higher income brackets (\$35,000-\$74,999, \$75,000-\$99,999, >\$100,000) all demonstrated statistically significantly higher odds of chiropractic utilization (2.07 [1.22-3.50], 2.95 [1.70-5.14], and 3.25 [1.87-5.66], respectively). Finally, pediatric participants who saw another CIH specialist had 11.26 (7.19-17.64) times the adjusted odds of chiropractic utilization of those who never visited a CIH

provider. Goodness-of-fit tests using methods indicated earlier were performed on the multivariate logistic regression models, and the results indicated good model fit with sociodemographic variables ($F = 1.63$, $P = .11$) and with the addition of variables related to orthodox medicine or other CIH utilization ($F = 0.89$, $P = .54$).

DISCUSSION

In this study, we examined the association of sociodemographic characteristics with chiropractic utilization in children and adolescents. To summarize, the overall rate of utilization of chiropractic was 3.0% (95% CI: 2.6%-3.6%) among U.S. children 4-17 years of age. After adjustment for covariates, characteristics that were associated with chiropractic utilization include older age (12-17 years), race/ethnicity (lowest odds in blacks and Asians, compared with whites), Midwest or West residence (relative to Northeast), higher family income, and propensity for utilizing other CIH services. Our results are similar to the findings reported by Adams et al,¹⁷ who utilized the adult CIH section of the 2012 NHIS. In that particular study, older age (≥ 30 years vs 18-29 years), white race, higher educational status, and living in the Midwest region were all statistically significantly associated with chiropractic or osteopathic manipulation. These similarities are perhaps unsurprising as

Table 1. *Weighted Sociodemographic Characteristics by Chiropractic Utilization (Past 12 Months), National Health Interview Study, 2012*

Characteristic	Unweighted Frequency	Weighted Frequency ^a	Weighted % in Sample Population (95% CI)	Weighted % Chiropractic Utilization, Past 12 mo (95% CI)
Total population of children	9734	55 011 625	100	3.0 (2.6-3.6)
Age group				
4-11	5331	31 508 570	57.3 (56.0-58.5)	39.5 (31.5-48.2)
12-17	4403	23 503 055	42.7 (41.5-44.0)	60.5 (51.8-68.5)
Sex				
Male	4953	28 154 240	51.2 (50.0-52.4)	44.9 (37.8-52.2)
Female	4781	26 857 385	48.8 (47.6-50.0)	55.1 (47.8-62.2)
Race/ethnicity				
White	4334	29 422 104	53.5 (52.0-55.0)	79.5 (72.8-84.9)
Black	1487	7 376 931	13.4 (12.5-14.3)	2.0 (0.7-5.4)
Hispanic	2839	13 120 241	23.9 (22.6-25.1)	10.9 (7.4-15.7)
Asian	550	2 376 053	4.3 (3.9-4.9)	1.2 (0.5-3.0)
Others	524	2 716 296	4.9 (4.4-5.6)	6.5 (3.2-12.5)
Region				
Northeast	1563	9 037 900	16.4 (15.3-17.7)	11.2 (6.9-17.9)
Midwest	1921	12 567 021	22.8 (21.7-24.0)	37.2 (29.7-45.5)
South	3514	20 448 493	37.2 (35.7-38.7)	23.2 (17.1-30.5)
West	2736	12 958 211	23.6 (22.2-25.0)	28.4 (22.1-35.5)
Highest parental education				
< Bachelor's degree	6561	35 264 013	64.1 (62.6-65.6)	47.9 (40.1-55.8)
≥ Bachelor's degree	3173	19 747 612	35.9 (34.5-37.4)	52.1 (44.2-59.9)
Family income				
\$0-\$34 999	3517	17 532 363	31.8 (30.5-33.3)	11.1 (7.5-16.1)
\$35 000-\$74 999	2924	16 487 092	30.0 (28.7-31.3)	27.4 (20.8-35.2)
\$75 000-\$99 999	1226	7 354 746	13.4 (12.5-14.3)	19.8 (14.5-26.5)
\$100 000+	2067	13 637 424	24.8 (23.4-26.2)	41.7 (34.0-49.8)

CI confidence interval.

^a Equation for weighted frequency: $\overline{X}_g = \sum_{i=1}^n (X_{ig} * W_i) / \sum_{i=1}^n W_i$, where $\overline{X}_g$ = weighted frequency of group g, W_i = weight, X_{ig} = dummy variable for level g of variable X_i .

children cannot independently determine the health care they receive; rather, their parents or guardians make the health care decisions.

In a similar study, Ndetan et al²³ investigated utilization of chiropractic or osteopathic manipulation in children <18 years, using the 2007 Child CAM section of the NHIS. The

Table 2. *Weighted Crude and Adjusted Odds Ratios of Chiropractic Utilization (Past 12 Months) by Sociodemographic Exposure Variables, National Health Interview Study, 2012*

Variable	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) ^a
Age group		
4-11	Reference	Reference
12-17	2.10 (1.46-3.01)	2.02 (1.41-2.90)
Sex		
Male	Reference	Reference
Female	1.30 (0.96-1.75)	1.34 (0.99-1.83)
Race/ethnicity		
White	Reference	Reference
Black	0.10 (0.03-0.27)	0.17 (0.06-0.47)
Hispanic	0.30 (0.19-0.46)	0.42 (0.26-0.68)
Asian	0.18 (0.07-0.46)	0.17 (0.07-0.43)
Other (AIAN, multiple)	0.87 (0.42-1.84)	0.96 (0.43-2.11)
Region		
Northeast	Reference	Reference
South	0.91 (0.49-1.68)	1.16 (0.62-2.17)
West	1.79 (1.00-3.18)	2.31 (1.28-4.16)
Midwest	2.45 (1.36-4.43)	2.45 (1.36-4.44)
Family income		
\$0-\$34 999	Reference	Reference
\$35 000-\$74 999	2.66 (1.59-4.46)	2.07 (1.22-3.50)
\$75 000-\$99 999	4.40 (2.61-7.42)	2.95 (1.70-5.14)
\$100 000+	5.02 (3.17-7.95)	3.25 (1.87-5.66)
Highest parental education		
< Bachelor's degree	Reference	Reference
≥ Bachelor's degree	1.98 (1.44-2.73)	1.17 (0.78-1.77)
MD/DO as personal health provider		
No	Reference	Reference
Yes	0.86 (0.61-1.21)	0.73 (0.50-1.07)

Table 2. *(continued)*

Variable	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) ^a
Saw another CIH provider, ever ^b		
No	Reference	Reference
Yes	13.93 (9.37, 20.71)	11.26 (7.19, 17.64)

AIAN, American Indians and Alaskan natives; CI, confidence interval; CIH, Complementary and Integrative Health; DO, doctor of osteopathy; MD, doctor of medicine.

^a Adjusted for age, sex, race/ethnicity, region of residence, family income, and highest parental education.

^b CIH specialties included in the 2012 Complementary and Alternative Medicine section of the National Health Interview Study: acupuncture, massage therapy, energy healing, naturopathy, hypnosis, biofeedback, ayurveda, chelation therapy, craniosacral therapy, traditional healer, herbal (nonvitamin) consult, special diets, homeopathy, Feldenkrais, Alexander technique, Pilates, and Trager psychosocial integration.

overall 12-month-period prevalence for chiropractic or osteopathic manipulation rate was 2.8% (SE: 0.3%), slightly lower but similar to our updated prevalence estimate of 3.0% (95% CI: 2.6%-3.6%) collected 5 years later. Other similar findings include higher odds of chiropractic or osteopathic manipulation with older children (≥10 years vs <10 years) and lower odds of chiropractic or osteopathic manipulation in minorities (vs whites). Sex, parental education, and region of residence were not statistically significantly associated with chiropractic or osteopathic manipulation. Although some findings were similar in these studies, direct comparison of results may not be appropriate because of differences in research methodology, weighting, and operationalization of the primary outcome (chiropractic manipulation vs chiropractic or osteopathic manipulation).

One consistent observation among all the chiropractic utilization studies is that white US children had higher odds of utilizing chiropractic care compared with children of other race/ethnic groups. The reason for this racial disparity in chiropractic utilization may involve reduced access and exposure to chiropractic in minority population because of socioeconomic factors (ie, limited or lack of insurance coverage),²⁹ resulting in less utilization. Previous studies have implicated a tendency for black and Hispanic patients to seek care from physicians of the same race/ethnicity (termed *patient-provider concordance*) because these minority groups report better patient-provider communications with racial-concordant providers.³⁰⁻³³ In the Practice Analysis of Chiropractic 2015, a report summarizing the US chiropractic profession, the proportions of white, black, Hispanic, and Asian doctors of chiropractic in 2014 were 89.4%, 1.2%, 2.0%, and 2.8%, respectively.³⁴ On the basis of these statistics, black, Hispanic, and Asian doctors of chiropractic were all underrepresented compared with the

racial makeup of the general US population.³⁵ These findings suggest a lack of racial diversity in the chiropractic profession, which may contribute to reduced exposure and utilization of this therapy option by minority groups.

Region of residence was another factor associated with chiropractic utilization, with the Midwest and West regions of the United States being more likely to use chiropractic than the Northeast (reference group). One explanation for this geographic variation may relate to the availability of doctors of chiropractic in the United States. Whedon et al³⁶ analyzed Medicare claims and examined the supply of doctors of chiropractic per Medicare beneficiary and chiropractic utilization among older US adults. On the basis of these data, chiropractic utilization was correlated with supply of doctors of chiropractic, and the highest density of both chiropractic utilization and supply of doctors of chiropractic occurred in the Midwest (ie, Iowa). This study provides some evidence that utilization of chiropractic may be dependent on available doctors of chiropractic in the area, and considerations should be made for placing doctors of chiropractic in underserved areas.

One of the novel features of this analysis was examination of the association of utilization of other CIH services (ie, acupuncture, naturopathy) with chiropractic utilization. Our findings suggest that the pediatric participants who utilized other CIH services had higher odds of chiropractic utilization. The same association was not found between having a medical doctor as personal health provider and chiropractic utilization. This may be facilitated in part by the increasing popularity of multidisciplinary, group CIH practices. In a survey of doctors of chiropractic, massage therapists, and acupuncturists, 25.7%-53.0% reported working in a group practice, and most practiced with other CIH providers.³⁷ Therefore, doctors of chiropractic should consider incorporating other CIH services into their practices or foster referral relationships with other CIH practitioners. Moreover, based on the overall findings, doctors of chiropractic should explore ways to engage those who normally do not seek CIH therapies (ie, through referrals from orthodox medical physicians), to improve chiropractic utilization on a larger scale.

Strengths and Limitations

We used data from a nationally representative data set, which optimizes generalizability of findings to a broader US population of children and adolescents. Second, findings were adjusted for covariates that were shown to influence the measures of association. Finally, the NHIS database has a large sample size, which ensures adequate statistical power to detect the strength of association.

There are several limitations to this study. First, the cross-sectional design allows us to determine association but not infer causality. However, findings from this study help provide a basis for future work exploring predictors of

chiropractic utilization using a prospective cohort design. Second, because of survey design, chiropractic utilization of participants aged 0-3 years could not be examined. Although the utilization is expected to be small in this age group, information on utilization may still be of interest to doctors of chiropractic specializing in infant care. Third, missing data for some variables may result in selection bias; there were statistically significant differences in racial makeup between those excluded and the analytic sample. Finally, those with missing data for chiropractic utilization were considered as providing a "no" response, and this assumption might be subject to misclassification bias. Yet, the risk for misclassification was potentially minimized as the primary reason for omitting the response would likely be unfamiliarity with chiropractic therapy. Future research should investigate reasons to seek chiropractic care, referral source for chiropractic therapy, and source of information about chiropractic.

CONCLUSION

In a nationally representative sample of 9724 US children and adolescents 4-17 years old, the 12-month prevalence of chiropractic utilization was 3.0%. Age, race/ethnicity, region of residence, family income, and utilization of other CIH services were associated with chiropractic utilization, after adjusting for sociodemographic covariates. On the basis of these preliminary findings, considerations should be made to explore the reasons for underutilization in the minority groups, increase supply of chiropractic services in underserved areas, and bolster interprofessional relationships and referrals among CIH providers, to increase chiropractic utilization in the pediatric population.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): T.P., K.P.G.

Design (planned the methods to generate the results): T.P., B.C., K.P.G.

Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): K.P.G.

Data collection/processing (responsible for experiments, patient management, organization, or reporting data): T.P.

Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): T.P., B.C., K.P.G.

Literature search (performed the literature search): T.P.
Writing (responsible for writing a substantive part of the manuscript): T.P.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): B.C., K.P.G.

Practical Applications

- Our analysis revealed the following factors associated with chiropractic utilization: age, race/ethnicity, region of residence, family income, and utilization of other CAM services.
- Regional differences implicate supplying doctors of chiropractic in underserved areas.
- Racial/ethnic differences suggest increased communication and promotion to minority groups.
- CAM utilization was associated with chiropractic utilization; inter-professional communications and referrals among CAM and medical providers are recommended to improve chiropractic utilization.

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