Research Square

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Traditional Healers Usage among Cancer Survivors with Neuropsychiatric Conditions in the United States: An All of Us Study

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Abstract

Background: With the recent guidelines supporting the integration of traditional healer (TH) practices into cancer care, cancer survivors experiencing neuropsychiatric conditions may increasingly seek care from TH providers. This study aims to examine the current patterns of TH use among United States (US) cancer survivors suffering from at least one neuropsychiatric condition, and their barriers to accessing TH services.

Methods: This study is a secondary data analysis of a US nationwide prospective cohort study, the *All of Us (AoU)* Research Program. We identified our cohort using the *AoU* Research Program Controlled Tier Dataset version 8 (2018-2023). Eligible patients were diagnosed with cancer and reported at least one TH use-associated neuropsychiatric condition. Multivariate analyses were conducted examining the relationship between sociodemographic factors and reasons for delayed healthcare in separate independent models. Estimates were presented as adjusted odds ratios (aOR) and p-values.

Results: Among 24,389 cancer survivors, 2,350 (9.6%) reported seeking care from TH. TH users were predominantly non-males, highly educated, privately insured, and from households with higher income levels (all p<0.001). Perceived high out-of-pocket costs (aOR=1.37, 95%CI: 1.18-1.59, p<0.001), which result in delayed conventional medical care, were associated with higher TH use. Clinical conditions associated with TH use include: diagnosis of breast cancer (aOR=1.26; 95%CI: 1.12-1.43, p<0.001), reporting chronic fatigue (aOR=1.41, 95%CI: 1.21-1.64 p<0.001), neuropathy (aOR=1.25, 95%CI:1.11-1.40 p<0.001), traumatic brain injury (aOR=1.54, 95%CI: 1.20-1.95) p<0.001, muscular dystrophy (aOR= 2.69; 95%CI: 1.10-5.87 p<0.05), and post-traumatic stress disorder (aOR=1.55, 95%CI: 1.35-1.77 p<0.001).

Conclusion: Despite widespread advocacy for the safe and effective incorporation of integrative modalities into mainstream cancer care, significant barriers remain that limit their adoption to a relatively privileged subset of survivors.

Introduction

With the expected rise of cancer cases rising 20 million to 35.3 million from 2022 to 2050, the need to address the access to care barriers and the neuropsychiatric conditions that arise as the prevalence of cancer continue to increase.[1] In the general population, there is a high prevalence of complementary and alternative medicine (CAM) use due to neuropsychiatric conditions.[2] Similarly, many cancer patients turn to traditional medicine in addition to their conventional treatment as they are unable to get relief these conditions. The World Health Organization (WHO) defines traditional medicine as “the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness.”[3] In parallel with conventional treatment, many cancer survivors seek care from practitioners of traditional medicine to support their healing journey. These practices often align with patients’ cultural beliefs regarding the origins and management of mental

health symptoms. Traditional healers (TH), such as traditional oriental medicine practitioners[4], curanderos[5], and shamans[6], commonly employ traditional medicine therapies such as herbal remedies, spiritual interventions, acupuncture, and other manual techniques to address cancer-related neuropsychiatric conditions. Their approaches aim to improve quality of life and are frequently used alongside conventional medical treatments.

Over the past two decades, the role of traditional medicine in cancer care has significantly evolved, particularly with the emergence of integrative oncology (IO, i.e., the incorporation of traditional medicine with conventional cancer treatment) as a recognized approach.[7] This evolution is reflected in early real-world studies conducted in the United States (U.S.) during the early 2000s, which primarily utilized large databases to examine general patterns of TH use among cancer survivors.[8,9] At that time, IO was still considered a relatively novel concept, and formal guidelines for managing cancer-related symptoms using integrative modalities were not yet established.[10-12] Moreover, these cross-sectional studies conducted in the U.S. did not systematically assess the association of TH use against specific neuropsychiatric conditions among survey respondents, limiting the depth and interpretability of the findings.[13]

To better understand current patterns of TH use in contemporary cancer care, we designed a study aimed at exploring the utilization of TH services among cancer survivors experiencing at least one neuropsychiatric condition, as well as identifying barriers to accessing these services. We leveraged data from the **All of Us (*AoU*) Research Program,** a large, nationwide initiative led by the National Institutes of Health (NIH), which seeks to advance understanding of human health through data collected from a diverse population. Our findings will help illuminate gaps in the use of traditional medicine within contemporary cancer care and highlight areas where further advocacy for integrative oncology is needed.

Methods

Study Design and Setting

This study is a secondary data analysis of a U.S. nationwide prospective cohort study, the *AoU* Research Program. The program aims to recruit 1 million participants ≥18 years of age from various backgrounds across over 590 recruitment sites. Participants were asked to complete the core surveys (The Basics, Lifestyle, and Overall Health) and have the option to complete the Personal/Family Health History and Health Care Access & Utilization surveys.[14]

The study conducted in this research has undergone the exempt self-determination process at the University of California Irvine Institutional Review Board (IRB). Ethical approval was not required or sought as it falls under the Category 4 exemption of IRB review. The authors of the study did not directly communicate with the participants, and all potentially identifying information has been removed from the data available in the *AoU* Researcher Workbench. To gain access to the research data, the authors

completed necessary research ethics training administered by the *AoU* Research Program and must adhere to the *AoU* Data User Code of Conduct for upholding data privacy and confidentiality.

Informed consent was obtained from all individual participants included in the *All of Us* Research Program. The program itself, including its informed consent process, was approved by the *All of Us* Institutional Review Board (*AoU* IRB). This study was conducted using the *All of Us* Researcher Workbench, and all analyses were performed in accordance with the program's data use and privacy regulations.

Eligibility Criteria

We analyzed data from participants who have completed both the “Personal/Family Health History” and “Health Care Access & Utilization” surveys. When we built our study cohort, we identified eligible participants based on two criteria: (1) self-reported past diagnosis of cancer and (2) self-reported experiencing at least one of the 15 neuropsychiatric conditions that were associated with TH use (Table S1).

Definitions

In this study, a cancer survivor is defined as someone who has been diagnosed with cancer, from diagnosis through the balance of their life.

The use of TH was determined from the “Healthcare Access & Utilization” Survey. The question was stated as follows: “*During the past 12 months, have you seen or talked to any of the following doctors or healthcare providers about your health? Traditional healers such as, Shaman, acupuncturist, non-western medicine?”*.

Barriers to care were also identified through the “Healthcare Access & Utilization” Survey, in which participants indicated reasons for delaying medical care, including *nervous to see a provider, not being able to get time-off work, not being able to afford copay/deductible, and having to pay out of pocket.*

Self-reported diagnoses of cancer and neuropsychiatric conditions were obtained from the “Personal/Family Health History” survey, in which participants indicated whether a doctor or a health care provider had informed that they had these conditions.

We determined all sociodemographic covariates from “The Basics” Survey. All administered *AoU* surveys and codebooks are publicly available on the *AoU* Research Hub Survey Explorer page (https://www.researchallofus.org/data-tools/survey-explorer/).[14]

Outcomes

The primary outcome is the prevalence of TH use among eligible cancer survivors. The secondary outcomes are the odds of seeking TH users in relation to sociodemographic characteristics, neuropsychiatric conditions, cancer diagnoses, and reasons for delayed care.

Statistical Analysis

To identify the study cohort, we first extracted data of all patients with a diagnosis of cancer, we perform Chi-Square or Fisher's Exact tests to evaluate the association between each neuropsychiatric condition and TH usage. Conditions associated with the use of traditional healers in the univariate analysis after Bonferroni correction ($p < 0.002$, which is 0.05/29), with a total of 15 neuropsychiatric conditions (amongst 29 pre-defined neuropsychiatric conditions within the survey) being identified (Table S1).

A cohort was then built based on patients who have reported experiencing at least one of the abovementioned 15 neuropsychiatric conditions. Descriptive statistics were utilized to summarize the data, using counts and proportions to summarize all categorical variables. Bivariate analysis was conducted to compare the association of TH vs no TH use on a number of variables (demographics, neuropsychiatric conditions, cancer diagnosis, reasons of delayed care), and estimates were presented as crude (OR) and 95% confidence intervals (CI). Variables that are statistically significant ($p < 0.05$) from bivariate analysis were entered into a multiple logistic regression model, with adjusted odds ratios (aOR) and associated 95% CI being presented for each variable.

Results

Cohort characteristics

We utilized AoU Research Program Controlled Tier Dataset version 8 (2018-2023), which comprised data from 633,547 participants, with 277,965 participants completing both the Personal/Family Health History and the Health Care Access & Utilization surveys. Of these, 24,389 eligible cancer survivors were identified, with 2,350 (9.6%) seeking care from TH while 22,039 (90.4%) did not. Cancer survivors with missing TH use information were excluded from the analysis (N = 6,084, 20%) (Figure 1). While several characteristics are significantly associated with missing TH data, this significance is largely driven by the cohort's large sample size. Most observed differences are less than 10 percentage points, except for age (Table S2).

Majority of eligible participants were female (67.8%), non-Hispanic White (84.4%), and had private insurance (57.0%) (Table 1). The most observed neurological symptoms were migraine headaches (33.1%), neuropathy (22.0%), and insomnia (19.6%), whereas the most observed psychiatric symptoms were anxiety (32.8%), depression (50.6%), and post-traumatic stress disorder (PTSD) (15.5%) (Table 2). The most common cancers observed were skin cancer (42.9%), breast cancer (20.0%), and prostate cancer (7.9%) (Table 3).

Bivariate association between sociodemographic characteristics and traditional healer use

In bivariate analyses, TH users were more likely to be under 65 years old, non-male, non-Hispanic White or Asian, employed, have higher income and education, and hold military or government insurance (excluding Medicaid and/or Medicare, i.e. "Other health plans" category) ($p < 0.05$) (Table 1).

Bivariate association between neuropsychiatric conditions and traditional healer use

In bivariate analyses, cancer survivors with neurological symptoms including chronic fatigue, concussion/loss of consciousness, insomnia, memory loss, migraine headaches, multiple sclerosis, narcolepsy, neuropathy, and traumatic brain injuries are more likely to seek treatment from traditional healers ($p < 0.05$). Cancer survivors with psychiatric symptoms such as anxiety, attention-deficit/ hyperactivity disorder, depression, eating disorder and post-traumatic stress disorder are also more likely to find help from traditional healers ($p < 0.05$) (Table 2).

Bivariate association between cancer diagnoses and traditional healer use

Without adjusting for confounders, participants with breast cancer, ovarian cancer and pancreatic cancer are more likely to receive care from traditional healers, while those diagnosed with prostate cancer, skin cancer patients, and bladder cancer were less likely to receive care from traditional healers ($p < 0.05$) (Table 3).

Bivariate association between access to care barriers and TH use

Survivors have indicated reasons that they would delay care, and we have investigated the association of these reasons with TH use. Survivors who delayed healthcare due to being nervous to see a provider (OR 1.23; 95% CI 1.02-1.48), having work commitments (OR 1.35; 95% CI 1.2-1.52), engaging childcare (OR 1.42; 95% CI 1.06-1.86), having work commitments (OR 1.39, 95%CI 1.19-1.62), lack of transportation (OR 1.18, 95% CI 1.01-1.37), having high copay (OR 1.35; 95% CI 1.16-1.57), having high deductible (OR 1.29; 95% CI 1.11-1.49) and having high out of pocket expenditure (OR 1.57; 95% CI 1.41-1.75) were more likely to be associated with TH use (Table 4).

Multivariate model in predicting variables associated with TH use

Variables that are statistically significant ($p < 0.05$) within the bivariate analyses were entered into a multivariate model, to evaluate the factors associated with TH use. In the final model, a number of variables are associated with TH use. Patient characteristics, such as being female and non-binary genders, having private insurance as well as military-, state-, and non-Medicare or Medicaid federal-sponsored health plans, having a higher education level than high school, and having a higher household income. Survivors who have a partner, but living alone, are more likely to be users of TH. On the other hand, NH-Black survivors were less likely to be associated with TH use.

Among all cancer types examined, breast cancer was the only one associated with higher odds of TH use. Regarding clinical characteristics, several neuropsychiatric symptoms including chronic fatigue, muscular dystrophy, neuropathy, traumatic brain injury, and post-traumatic stress disorder were significantly associated with increased TH use. Additionally, higher out-of-pocket costs that resulted in delayed conventional medical care were also linked to greater TH use in the model (all $p < 0.05$) (Table 5).

Discussion

In this study, we utilized data from the *AoU* Research Program to examine contemporary patterns of TH utilization among cancer survivors in the U.S. Our analysis included over 24,000 self-reported cancer survivors, revealing that approximately one in ten American cancer survivors had sought care from a TH. We further investigated sociodemographic factors associated with TH use and found that our results closely align with trends reported over the past two decades.[8,9,15] Specifically, TH users were predominantly non-male, highly educated, privately insured, and from households with higher income levels. These findings are concerning, as they highlight persistent disparities in access to IO services in the U.S. Despite widespread advocacy for the safe and effective incorporation of integrative modalities into mainstream cancer care, significant barriers remain that restrict their adoption to a relatively privileged subset of survivors.

Our analysis is also unique because we have investigated the association of specific neuropsychiatric conditions with TH use among cancer survivors. Cancer patients often experience neuropathy, also known as chemotherapy-induced peripheral neuropathy (CIPN), when exposed to commonly prescribed neurotoxic chemotherapy such as taxanes, platinum agents, and vinca alkaloids.[16] CIPN is debilitating and can greatly affect quality of life in cancer survivors.[17] Despite its high prevalence (over 30%), there remains a lack of reliable evidence-based pharmacotherapy except duloxetine for treating neuropathic pain, with much less evidence for its effectiveness on other more common symptoms of CIPN such as numbness, tingling, and muscle weakness.[18-20] Cognizant of this clinical gap, traditional Chinese medicine (TCM) therapies, especially acupuncture, are emerging as potential treatments of CIPN. Multiple trials investigating acupuncture for CIPN treatment have been conducted; however, none were conclusive due to limitations such as small sample sizes, conflicting findings, and the difficulty of designing a robust trial that successfully blinds patients while minimizing placebo effects.[21,22] Nevertheless, as our findings reflect, the high clinical need for CIPN treatment and the relative safety of acupuncture have encouraged guidelines and clinicians to consider its use for managing CIPN.[19,23]

Our analysis also revealed that cancer survivors with cancer-related fatigue (CRF) and diagnosed with breast cancer are more likely to seek support from TH. Fatigue is especially common among breast cancer survivors undergoing multiple lines of chemotherapy. Currently published guidelines recommend incorporating exercises like Tai Chi and Qigong to alleviate CRF during treatment.[10] Other evidence-based interventions include mindfulness programs, cognitive behavioral therapy, and psychoeducation. Herbal supplements, often suggested by TH for managing CRF, may be beneficial. American Ginseng, for instance, is guideline-recommended for managing fatigue while patients are undergoing treatment. Emerging data have evaluated the use of a 16-herb concoction (including *Radix Astragali*, *Radix Ginseng*, and *Atractylodis lanceae rhizome*) in a mixed cancer population showed that it can improve emotional fatigue, cognitive function, and related biomarkers.[24] Notably, many of the more rigorous clinical trials on CRF management have been conducted in most women and breast cancer populations[25], forming the foundation of current guidelines. There is also a growing body of literature addressing CRF in other

cancer types, such as those with gastrointestinal cancers.[26] However, more robust clinical trials are needed in order to further promote the use of appropriate TH use in cancer survivors beyond those diagnosed with breast cancer.

We have also uncovered some important trends related to TH users among different racial and ethnic groups. Compared to non-Hispanic White individuals, Asian and other ethnic minority groups are more likely to seek care from TH. Interesting, there is a trend that African American cancer survivors are less likely to seek care from TH. This finding aligns with a recent study using data from the National Health Interview Survey involving 3,118 cancer survivors[27], which reported higher CAM use among White, female, and non-Hispanic individuals. Cultural attitudes may influence TH use; for example, one study found that 30% of African Americans used spiritual healing, 22% of Chinese Americans used herbal remedies, and 30% of Latino Americans used dietary interventions.[28] In a large study[29] of racial minorities and medically underserved populations—43% of whom were African American—prayer, relaxation, and dietary practices were the most commonly used alternative therapies, suggesting a preference for spiritual and psychological approaches over herbal or physical modalities that are offered by TH. More importantly, with the limited number of studies focused on minority populations may contribute to the underrepresentation of TH use in cancer care among these groups in the United States.

To understand the impact of health disparities on TH use, we examined whether delays in accessing healthcare were associated with increased utilization of TH among cancer survivors. While several factors underlying delayed healthcare—such as nervousness about seeing healthcare providers, work-related constraints, and high out-of-pocket costs (e.g., copayments or deductibles)—were initially correlated with TH use, these variables did not remain significant in our multivariate analysis. The only factor that remained positive in our model is the perceived high out-of-pocket expenditure for conventional medical care. Interestingly, we also observed that TH users are more likely to have higher household income and the presence of supplemental insurance coverage. These findings suggest that TH use may be less driven by barriers to conventional care and more influenced by resource availability and personal choice among certain demographic groups. Previous studies have identified cost, limited access to TH centers, and insufficient information—particularly regarding therapies such as acupuncture and herbal medicine—as major barriers to TH use, contributing to health disparities.[30,31] Cancer survivors with household incomes exceeding $100,000 have been shown to face fewer barriers to CAM utilization.[32] Moreover, TH use is often driven by dissatisfaction with conventional treatments and the perceived benefits of TH, rather than access-related factors such as insurance coverage. Motivations frequently stem from unmet psychological needs and a desire for greater control over one's healthcare.[15] Future research should be conducted to understand how cancer survivors make health decisions to seek TH help, particularly in scenarios where financial resources are limited.

Our findings provide a broad overview of TH use for symptom management among U.S. cancer survivors. Despite growing support for integrating TH modalities into clinical practice, TH use remains concentrated among specific subgroups—namely, women, non-Hispanic White individuals, breast cancer

patients, and those with higher household incomes. Leading international oncology organizations, including the American Society of Clinical Oncology (ASCO), the Multinational Association of Supportive Care in Cancer (MASCC), and the Society for Integrative Oncology (SIO), should continue to develop and disseminate clinical practice guidelines to integrate CAM modalities across diverse cancer types. Simultaneously, there is a pressing need for more robust symptom management trials to evaluate the effectiveness of IO interventions incorporated into mainstream practices. IO trials should adhere to the same rigorous standards applied in trials of pharmacological therapies. Purposeful trial designs incorporating both objectively measured outcomes and mechanistic biomarkers, alongside patient-reported outcomes, will better isolate true effects from placebo when investigating TH's role in managing neuropsychiatric symptoms.[24,33] Value assessment methodologies such as cost effectiveness analyses[34] and claims-based studies[35] evaluating TH's impact on healthcare utilization, will better assist decision-makers and healthcare payers in structuring value-based reimbursement of TH therapies. Expanding the evidence base will support the integration of CAM into mainstream care, particularly for neuropsychiatric conditions where these modalities may offer significant benefit.

A key strength of this study is the use of a large cohort of cancer patients with a breadth of data collected describing social determinants of health, clinical characteristics, as well as utilization patterns of traditional medicine. The database utilized for this study, the *AoU* Research Program, is highly accessible to researchers, facilitating transparency and reproducibility of study findings. However, the cross-sectional study design and the limited number of TH users due to the secondary data source made it challenging to investigate causal relationships for significant predictors. Furthermore, this analysis draws on self-reported questionnaires to obtain critical information such as cancer diagnoses and neuropsychiatric conditions. It also incorporates a self-reported questionnaire on Health Care Access & Utilization to gather information on TH use and barriers to accessing care. These two questionnaires are optional among *AoU* participants; hence, missing data is substantial which may potentially introduce biases to our data. Finally, TH was defined in this survey as Shaman, acupuncturist, and non-western medicine. Individual's definition of non-Western medicine may vary, which may introduce information bias by respondents to the survey. Future studies should collect fit-for-purpose primary data in a prospective and longitudinal manner to resolve the conflicting findings of high TH use prevalence among patients with high socioeconomic status and high rates of delayed healthcare to further evaluate causality of these relationships.

Conclusion

This study provides a comprehensive overview of TH utilization among cancer survivors in the U.S., highlighting persistent disparities in access to integrative oncology services. With one in ten cancer survivors seeking TH care in the U.S., TH use remains concentrated among specific subgroups—particularly non-male, non-Hispanic White individuals, breast cancer patients, and those with higher socioeconomic status. Our findings underscore the clinical need for symptom management strategies, especially for conditions like CIPN and CRF. Despite growing support for CAM, broader integration into

mainstream oncology care requires more inclusive research, culturally sensitive approaches, and robust clinical trials to ensure equitable access and evidence-based practice.

Declarations

Human Participant Protection:

This study was exempt from institutional review board approval because the data were publicly available and deidentified.

Financial Disclosure: All authors have nothing to disclose.

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Data Availability: The data that support the findings of this study are openly available at https://allofus.nih.gov/

Author Contribution

D.Q.N and A.C. provided substantial contributions to the conception or design of the study, acquisition, analysis, and interpretation of data. M.D., S.R., and B.V. have provided analysis and interpretation of the study. All authors reviewed the manuscript.

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Tables

Table 1: Comparison of sociodemographic characteristics by traditional healer use among cancer survivors

Variables	All participants[c]	TH use[c]	No TH use[c]	Crude OR (95% CI)
N (%)	24389 (100%)	2350 (9.6%)	22039 (90.4%)	
Age in years, n (%)				
18-39	1729 (7.1%)	213 (9.1%)	1516 (6.9%)	Reference
40-64	10767 (44.1%)	1201 (51.1%)	9566 (43.4%)	0.89 (0.77-1.05)
65+	11893 (48.8%)	936 (39.8%)	10957 (49.7%)	0.61*** (0.52-0.71)
Gender, n (%)				
Male	7539 (30.9%)	449 (19.1%)	7090 (29.1%)	Reference
Female	16542 (67.8%)	1851 (78.8%)	14691 (60.2%)	1.99*** (1.79-2.22)
Non-binary	128 (0.5%)	27 (1.2%)	101 (0.41%)	4.22*** (2.68-6.43)
Race/Ethnicity, n (%)				
NH-White	20588 (84.4%)	1933 (82.3%)	18655 (84.6%)	Reference
NH-Black	866 (3.7%)	95 (4%)	803 (3.6%)	0.76* (0.58-0.97)
Hispanic	821 (3.4%)	71 (3%)	750 (3.4%)	0.91 (0.71-1.16)
NH-Asian	182 (0.7%)	35 (1.5%)	147 (0.7%)	2.3** (1.56-3.29)
Others	1519 (6.2%)	207 (8.8%)	1312 (6%)	1.68*** (1.45-1.93)
Health Insurance, n (%)				
Private	13908 (57%)	1401 (59.6%)	12507 (56.7%)	Reference
Medicare[a]	7052 (28.9%)	592 (25.2%)	6460 (29.3%)	0.82*** (0.74-0.9)
Medicaid	1886 (7.7%)	183 (7.8%)	1703 (7.7%)	0.96 (0.81-1.13)
Other health plans[b]	1036 (4.2%)	133 (5.7%)	903 (4.1%)	1.31* (1.08-1.58)
Uninsured	309 (1.3%)	26 (1.1%)	283 (1.3%)	0.82 (0.53-1.21)
Education, n (%)				

High school or less	2330 (9.6%)	121 (5.1%)	2209 (10%)	Reference
Some college	6401 (26.2%)	533 (22.7%)	5868 (26.6%)	1.66** (1.36-2.04)
Bachelor	6780 (27.8%)	737 (31.4%)	6043 (27.4%)	2.23*** (1.83-2.73)
Masters or more	8629 (35.4%)	941 (40 %)	7688 (34.9%)	2.23*** (1.85-2.73)
Household Income, n (%)				
<25k	3259 (13.4%)	283 (12%)	2976 (13.5%)	Reference
25k to <50k	3933 (16.1%)	318 (13.5%)	3615 (16.4%)	0.93 (0.78-1.09)
50k to <100k	6711 (27.5%)	673 (28.6%)	6038 (27.4%)	1.17* (1.01-1.36)
100k to <200k	5910 (24.2%)	571 (24.3%)	5339 (24.2%)	1.12 (0.97-1.31)
200k and above	2380 (9.8%)	295 (12.6%)	2085 (9.5%)	1.49*** (1.25-1.77)
Missing	2196 (9%)	210 (8.9%)	1986 (9%)	1.11 (0.92-1.34)
Employment Status, n (%)				
Unemployed	14474 (59.3%)	1256 (53.4%)	13218 (54.2%)	Reference
Employed	9696 (39.7%)	1076 (45.8%)	8620 (35.3%)	1.31*** (1.21-1.43)
Marital Status, n (%)				
Married	14125 (57.9%)	1264 (53.8%)	12861 (58.4%)	Reference
Divorced/ Separated/ Widowed	8980 (36.8%)	927 (39.4%)	8053 (36.5%)	1.14* (1.03-1.35)
Non-married	2646 (10.8%)	291 (12.4%)	2355 (10.7%)	1.26* (1.1-1.44)
With a partner	1071 (4.4%)	133 (5.7%)	938 (4.3%)	1.44** (1.19-1.74)
House Ownership, n (%)				
Owner	17644 (72.3%)	1658 (70.6%)	15986 (72.5%)	Reference
Renter	5091 (20.9%)	521 (22.2%)	4570 (20.7%)	1.1 (0.99-1.22)
Other	1367 (5.6%)	138 (5.9%)	1229 (5.6%)	1.08 (0.9-1.3)
Birth Country, n (%)				

Foreign Born	1400 (5.7%)	144 (6.1%)	1256 (5.7%)	Reference
U.S. Born	22878 (93.8%)	2203 (93.7%)	20675 (93.8%)	0.93 (0.78-1.11)
Living Arrangements, n (%)				
Living with others	18916 (77.6%)	1752 (74.6%)	17164 (77.9%)	Reference
Alone	5178 (21.2%)	575 (24.5%)	4603 (20.9%)	1.22** (1.11-1.35)

Abbreviations: CI, confidence interval; N/n, counts; OR, odds ratio.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[a] Include participants who have Medicare and Medicaid dual eligibility.

[b] Other health plans included military, State Children's Health Insurance Program (SCHIP), and other state or federal-sponsored health plans.

[c] Results reported in compliance with the All of Us Data and Statistics Dissemination Policy prohibiting the display of participant counts ranging 1-20.

Table 2: Comparison of neuropsychiatric conditions by traditional healer use among cancer survivors

Variables	All participants[a]	TH use[a]	No TH use[a]	Crude OR (95% CI)[b]
N (%)	24389 (100%)	2350 (9.6%)	22039 (90.4%)	
Neurological Conditions, n (%)				
Cerebral palsy	£20	£20	£20	2.01 (0.46-6.17)
Chronic fatigue	2594 (10.6%)	375 (16%)	2219 (10.1%)	1.7*** (1.5-1.91)
Concussion/ loss of consciousness	4227 (17.5%)	485 (20.6%)	3792 (17.2%)	1.25** (1.12-1.39)
Dementia	>20	£20	>20	0.57 (0.28-1.02)
Epilepsy	967 (4%)	106 (4.5%)	861 (3.9%)	1.16 (0.94-1.42)
Insomnia	4781 (19.6%)	581 (24.7%)	4200 (19.1%)	1.39*** (1.26-1.54)
Lou Gehrig's Disease	£20	£20	£20	3.52 (0.77-12.18)
Memory loss	1868 (7.7%)	225 (9.6%)	1634 (7.5%)	1.31** (1.13-1.52)
Migraine headaches	8065 (33.1%)	893 (38%)	7172 (32.5%)	1.27** (1.16-1.39)
Multiple Sclerosis	293 (1.2%)	39 (1.7%)	254 (1.2%)	1.45* (1.02-2.01)
Muscular dystrophy	>20	£20	>20	2.69 (1.26-5.23)
Narcolepsy	237 (1%)	36 (1.5%)	201 (1%)	1.69* (1.16-2.38)
Neuropathy	5360 (22%)	598 (25.5%)	4762 (21.6%)	1.24* (1.12-1.37)
Parkinson's Disease	>20	£20	>20	0.56 (0.28-1.01)
Restless Leg Syndrome	3685 (15%)	352 (15%)	3313 (15%)	1 (0.88-1.12)
Spinal cord injury or impairment	1482 (6.1%)	152 (6.5%)	1330 (6%)	1.08 (0.9-1.28)
Traumatic brain injury	776 (3.2%)	137 (5.8%)	639 (2.9%)	2.07*** (1.71-2.5)

Psychiatric Conditions, n (%)				
Alcohol use disorder	1550 (6.4%)	156 (6.6%)	1394 (6.3%)	1.05 (0.88-1.25)
Anxiety reaction/ panic disorder	8010 (32.8%)	865 (36.8%)	7145 (32.4%)	1.21*** (1.11-1.33)
Attention-deficit/ hyperactivity disorder	2336 (9.6%)	292 (12.4%)	2044 (9.3%)	1.39*** (1.22-1.58)
Autism spectrum disorder	204 (0.8%)	24 (1%)	180 (0.8%)	1.25 (0.8-1.88)
Bipolar disorder	1306 (5.4%)	122 (5.2%)	1184 (5.4%)	0.96 (0.79-1.16)
Depression	12346 (50.6%)	1247 (53.1%)	11099 (50.4%)	1.11* (1.02-1.21)
Drug use disorder	732 (3%)	68 (2.9%)	664 (3%)	0.96 (0.74-1.23)
Eating Disorder	1362 (5.6%)	184 (7.8%)	1178 (5.4%)	1.5*** (1.28-1.76)
Personality Disorder	488 (2%)	57 (2.4%)	341 (2%)	1.25 (0.93-1.63)
Post-traumatic stress disorder	3776 (15.5%)	547 (23.3%)	3229 (14.7%)	1.77*** (1.59-1.96)
Schizophrenia	>20	£20	>20	0.91 (0.47-1.57)
Social Phobia	826 (3.4%)	87 (3.7%)	739 (3.4%)	1.11 (0.88-1.38)

Abbreviations: CI, confidence interval; N/n, counts; OR, odds ratio.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[a] Results reported in compliance with the All of Us Data and Statistics Dissemination Policy prohibiting the display of participant counts ranging 1-20.

[b] Reference group = those without the neuropsychiatric condition of interest.

Table 3: Comparison of cancer diagnoses by traditional healer use among cancer survivors

Variables	All participants[a]	TH use[a]	No TH use[a]	Crude OR (95% CI)[b]
N (%)	24389 (100%)	2350 (9.6%)	22039 (90.4%)	
Cancer diagnoses, n (%)				
Breast Cancer	4888 (20%)	615 (26.2%)	4273 (19.4%)	1.47*** (1.34-1.62)
Cervical Cancer	1839 (7.5%)	174 (7.4%)	1665 (7.6%)	0.98 (0.83-1.15)
Colorectal Cancer	911 (3.7%)	89 (3.8%)	822 (3.7%)	1.02 (0.81-1.26)
Endocrine Cancer	204 (0.8%)	23 (1%)	181 (0.8%)	1.19 (0.75-1.81)
Endometrial Cancer	651 (2.7%)	76 (3.2%)	575 (2.6%)	1.25 (0.96-1.58)
Esophageal Cancer	>20	£20	>20	0.74 (0.36-1.33)
Eye Cancer	>20	£20	>20	1.27 (0.64-2.29)
Head & Neck	474 (1.9%)	46 (2%)	428 (1.9%)	1.01 (0.73-1.35)
Kidney Cancer	619 (2.5%)	50 (2.1%)	569 (2.6%)	0.82 (0.61-1.09)
Lung Cancer	562 (2.3%)	62 (2.6%)	500 (2.3%)	1.17 (0.89-1.51)
Ovarian Cancer	618 (2.5%)	83 (3.5%)	535 (2.4%)	1.47** (1.16-1.85)
Pancreatic Cancer	142 (0.6%)	21 (0.9%)	121 (0.5%)	1.63* (0.99-2.54)
Prostate Cancer	1931 (7.9%)	103 (4.4%)	1828 (8.3%)	0.51*** (0.41-0.62)
Skin Cancer	10466 (42.9%)	928 (39.5%)	9538 (43.3%)	0.86*** (0.78-0.93)
Stomach Cancer	>20	£20	>20	1.11 (0.59-1.90)
Thyroid Cancer	1410 (5.8%)	127 (5.4%)	1283 (5.8%)	0.92 (0.76-1.11)
Bladder Cancer	521 (2.1%)	36 (1.5%)	485 (2.2%)	0.69* (0.48-0.96)
Blood and Soft Tissue Cancer	1639 (6.7%)	163 (6.9%)	1476 (6.7%)	1.04 (0.88-1.22)
Bone Cancer	287 (1.2%)	25 (1.1%)	262 (1.2%)	0.89 (0.58-1.32)
Brain Cancer	280 (1.5%)	35 (1.5%)	245 (1.1%)	1.35 (0.93-1.89)
Other	1862 (7.6%)	183 (7.8%)	1679 (7.6%)	1.02 (0.87-1.20)

Abbreviations: CI, confidence interval; N/n, counts; OR, odds ratio.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[a] Results reported in compliance with the All of Us Data and Statistics Dissemination Policy prohibiting the display of participant counts ranging 1-20.

[b] Reference group = those without the cancer of interest.

Table 4: Comparison of traditional healer use based on reasons for delaying medical care among cancer survivors

Variables	All participants	TH use	No TH use	Crude OR (95% CI)[a]
N (%)	24389 (100%)	2350 (9.6%)	22039 (90.4%)	
Reasons for delayed medical care, n (%)				
Nervous to see provider	2974 (12.2%)	359 (15.3%)	2615 (11.8%)	1.35*** (1.2-1.52)
Childcare	437 (1.8%)	57 (2.4%)	380 (1.7%)	1.42* (1.06-1.87)
Work commitments	1589 (6.5%)	199 (8.5%)	1390 (6.3%)	1.39*** (1.19-1.62)
Lack of transportation	1817 (7.5%)	200 (8.5%)	1617 (7.3%)	1.18* (1.01-1.37)
Copay too high	1736 (7.1%)	213 (9.1%)	1523 (6.9%)	1.35*** (1.16-1.57)
Deductible too high	1915 (7.9%)	226 (9.6%)	1689 (7.7%)	1.29*** (1.11-1.49)
Out of pocket expenditure too high	3750 (15.4%)	500 (21.3%)	3250 (14.7%)	1.57*** (1.41-1.75)

Abbreviations: CI, confidence interval; N/n, counts; OR, odds ratio.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[a] Reference group = those without the reasons of delayed medical care of interest.

Table 5: Multivariable model of statistically significant covariates ($p < 0.05$) associated with traditional healer use in bivariate analyses

Predictors	Crude OR (95% CI)	Adjusted OR (95% CI)
Age (years)		
18-39	Reference	Reference
40-64	0.89 (0.77-1.05)	1.05 (0.81-1.36)
65+	0.61*** (0.52-0.71)	0.87 (0.66-1.15)
Gender		
Male	Reference	Reference
Female	1.99*** (1.79-2.22)	1.81*** (1.56-2.1)
Non-binary	4.22*** (2.68-6.43)	2.98*** (1.78-4.83)
Race/Ethnicity		
NH-White	Reference	Reference
NH-Black	0.82*** (0.74-0.9)	0.80 (0.58-1.08)
Hispanic	0.91 (0.71-1.16)	1.19 (0.88 -1.58)
NH-Asian	2.3*** (1.56-3.29)	1.94** (1.28-2.88)
Others	1.68** (1.45-1.93)	1.26* (1.04-1.51)
Health Insurance		
Private	Reference	Reference
Medicare[a]	0.82*** (0.74-0.90)	1.02 (0.9-1.17)
Medicaid	0.96 (0.81-1.13)	1.02 (0.81-1.28)
Other health plans[b]	1.31** (1.08-1.58)	1.51*** (1.2-1.89)
Uninsured	0.82 (0.53-1.21)	1.11 (0.66-1.77)
Education		
High school or less	Reference	Reference
Some college	1.66** (1.36-2.04)	1.53*** (1.21-1.95)
Bachelor	2.23*** (1.83-2.73)	2.18*** (1.73-2.79)
Masters or more	2.23*** (1.83-2.73)	2.29*** (1.81-2.92)
Household Income		
<25k	Reference	Reference
25k to <50k	0.93 (0.78-1.09)	1.03 (0.84-1.27)

50k to <100k	1.17* (1.01-1.36)	1.54*** (1.26-1.89)
100k to <200k	1.12 (0.97-1.31)	1.57*** (1.26-1.97)
200k and above	1.49*** (1.25-1.77)	1.93*** (1.5-2.48)
Missing	1.11 (0.92-1.34)	1.42* (1.11-1.81)
Employment Status		
Unemployed	Reference	Reference
Employed	1.31*** (1.21-1.43)	1.03 (0.92-1.36)
Marital Status		
Married	Reference	Reference
Divorced/ Separated/ Widowed	1.14** (1.03-1.25)	1.09 (0.93-1.27)
Non-married	1.26*** (1.1-1.44)	1.12 (0.92-1.36)
With a partner	1.44*** (1.19-1.744)	1.47** (1.17-1.82)
Living Arrangements		
Living with others	Reference	Reference
Living alone	1.22*** (1.11-1.35)	1.24** (1.05-1.46)
Neurological Conditions		
Chronic fatigue	1.7*** (1.5-1.91)	1.41*** (1.21-1.64)
Concussion/loss of consciousness	1.25** (1.12-1.39)	1.09 (0.96-1.24)
Insomnia	1.35*** (1.17-1.57)	1.10 (0.97-1.24)
Memory loss	1.28* (1.03-1.59)	0.97 (0.8 -1.18)
Migraine headaches	1.24*** (1.10-1.41)	0.99 (0.89 -1.1)
Multiple sclerosis	1.45* (1.02-2.01)	1.28 (0.85-1.88)
Muscular dystrophy	2.69** (1.26-5.23)	2.69*(1.1-5.87)
Narcolepsy	1.69** (1.16-2.38)	1.13 (0.72-1.17)
Neuropathy	1.24*** (1.12-1.37)	1.25*** (1.11-1.4)
Traumatic brain injury	2.07*** (1.71-2.5)	1.54*** (1.2-1.95)
Anxiety reaction/ panic disorder	1.21*** (1.11-1.33)	0.94 (0.84-1.06)
Attention-deficit/ hyperactivity disorder	1.39*** (1.22-1.58)	1.13 (0.72-1.7)
Depression	1.11* (1.02-1.21)	0.99 (0.89-1.1)

Eating Disorder	1.5*** (1.28-1.76)	1.10 (0.9 -1.33)
Post-traumatic stress disorder	1.77*** (1.59-1.96)	1.55*** (1.35-1.77)
Cancer diagnoses		
Breast Cancer	1.47*** (1.34-1.62)	1.26*** (1.12-1.43)
Ovarian Cancer	1.47** (1.16-1.85)	1.23 (0.93-1.61)
Prostate Cancer	1.63 (0.99-2.54)	0.91 (0.7 -1.17)
Skin Cancer	0.86*** (0.78-0.93)	0.99 (0.85-1.15)
Bladder Cancer	0.69* (0.48-0.96)	0.88 (0.57-1.3)
Reasons for delayed medical care		
Nervous to see provider	1.35*** (1.2-1.52)	0.99 (0.85-1.15)
Childcare	1.42* (1.06–1.87)	0.88 (0.61-1.23)
Work commitments	1.39*** (1.19-1.62)	1.00 (0.83-1.21)
Copay too high	1.35*** (1.16-1.57)	0.87 (0.69-1.11)
Deductible too high	1.29*** (1.11-1.49)	0.96 (0.76-1.2)
Out of pocket expenditure too high	1.57*** (1.41-1.75)	1.37*** (1.18-1.59)
Abbreviations: CI, confidence interval; N/n, counts; OR, odds ratio. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.		

Figures

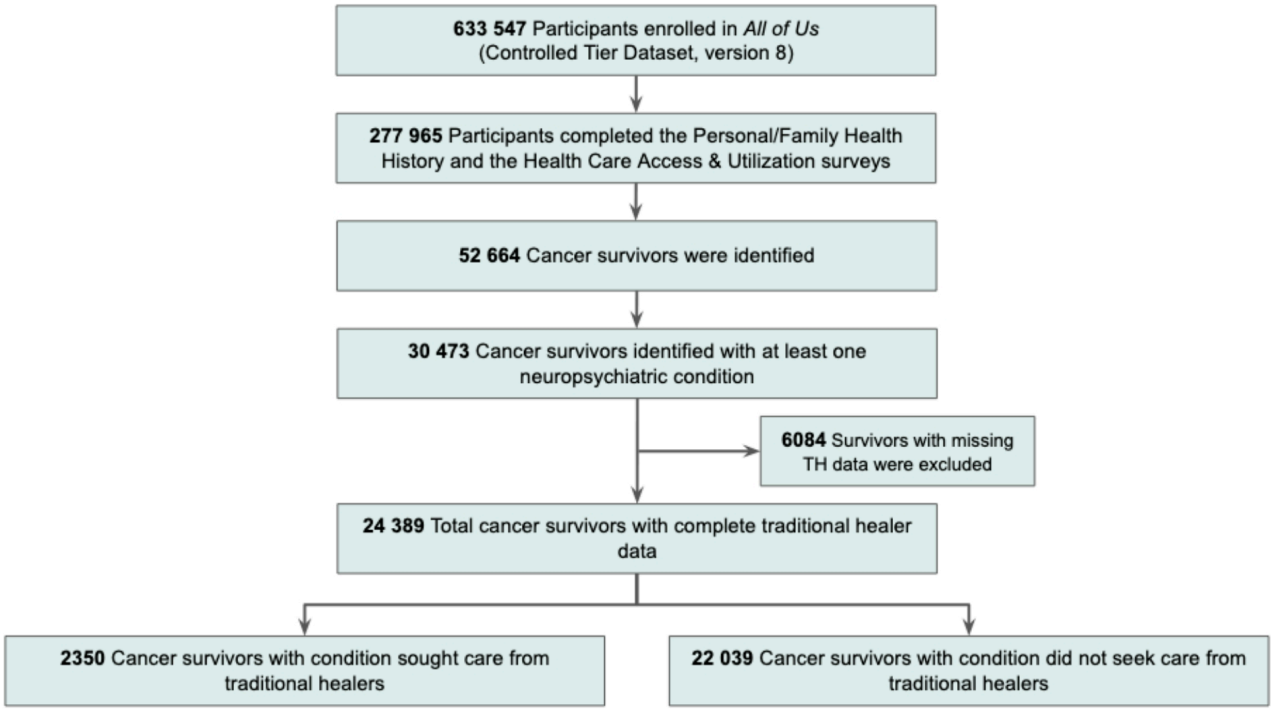


Figure 1

Selection of eligible participants for analysis

Supplementary Files

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- SupplementMar1DQEdit.docx