

Is Traditional Chinese Medicine Use Associated with Worse Patient-reported Outcomes among Chinese American Rheumatology Patients?

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ABSTRACT. Objective. Chinese Americans are a fast-growing immigrant group with more severe rheumatic disease manifestations than whites and often a strong cultural preference for traditional Chinese medicine (TCM). We aimed to examine TCM use patterns and association with patient-reported outcomes (PRO) among Chinese American rheumatology patients.

Methods. Chinese Americans actively treated for systemic rheumatic diseases were recruited from urban Chinatown rheumatology clinics. Data on sociodemographics, acculturation, clinical factors, and TCM use (11 modalities) were gathered. Self-reported health status was assessed using Patient Reported Outcomes Measurement Information System (PROMIS) short forms. TCM users and nonusers were compared. Factors independently associated with TCM use were identified using multi-variable logistic regression.

Results. Among 230 participants, median age was 57 years (range 20–97), 65% were women, 71% had \leq high school education, 70% were on Medicaid insurance, 47% lived in the United States for \geq 20 years, and 22% spoke English fluently. Half used TCM in the past year; these participants had worse self-reported anxiety, depression, fatigue, and ability to participate in social roles and activities compared with nonusers. In multivariable analysis, TCM use was associated with belief in TCM, female sex, \geq 20 years of US residency, reporting Western medicine as ineffective, and shorter rheumatic disease duration.

Conclusion. Among these Chinese American rheumatology patients, TCM users had worse PRO in many physical and mental health domains. TCM use may be a proxy for unmet therapeutic needs. Asking about TCM use could help providers identify patients with suboptimal health-related quality of life who may benefit from targeted interventions. (First Release August 15 2019; *J Rheumatol* 2019;46:1634–9; doi:10.3899/jrheum.181148)

Key Indexing Terms:

PATIENT-REPORTED OUTCOME MEASURES
CHINESE TRADITIONAL MEDICINE

ASIAN-AMERICANS
RHEUMATOLOGY

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Supported by the Weill Cornell CTSC Community Engagement Award NIH/NCATS Grant # UL1TR00457, and the Agency for Healthcare Research and Quality Grant # T32HS00066.

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Accepted for publication April 10, 2019.

Chinese Americans are one of the fastest-growing immigrant populations in the United States¹ and are known to have worse outcomes in systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA) compared to whites^{2,3,4}. Among Chinese American patients with chronic diseases, the use of traditional Chinese medicine (TCM) alongside conventional Western treatment is common⁵. Health beliefs and attitudes influence the use of TCM, which in turn may affect health and illness self-management strategies^{6,7,8} and thus health-related quality of life. However, there are no data on the patterns of TCM use by Chinese American rheumatology patients, and the relationship between TCM use and patient-reported outcomes (PRO) is unknown. In particular, data are lacking among Chinese immigrant populations, which are often hard to engage because of low acculturation and limited English-language proficiency. Our study aimed to examine patterns of TCM use among Chinese American rheumatology patients who seek care in an urban Chinatown healthcare setting, and we used the Patient Reported Outcomes Measurement Information System (PROMIS) domains^{9,10} to examine differences in self-reported health status between TCM users and nonusers.

MATERIALS AND METHODS

Study setting and population. In this cross-sectional cohort study, consecutive eligible patients were recruited from 2 rheumatology practices in New York City's Chinatown, both of which serve a predominantly immigrant Chinese American population. All participating rheumatologists were Chinese American and were fluent in Mandarin Chinese. Patients were included if they were of Chinese ethnicity, age 18 years or older, able to communicate in English or Mandarin Chinese, and actively followed for a systemic rheumatic disease for which their rheumatologist prescribed at least 1 scheduled nonintravenous Western medication. Patients were excluded if they were pregnant or nursing, followed for < 6 months in the practice for a newly diagnosed rheumatic disease or < 3 months for a previously diagnosed rheumatic disease, had significant cognitive impairment, or were being treated for primary fibromyalgia, mechanical neck or back pain, soft tissue diseases, or osteoporosis. All instruments were administered by an English/Mandarin bilingual researcher and were available in both English and Chinese. Additional clinical data were obtained through chart review. All participants provided written informed consent. This study was approved by the institutional review board at Hospital for Special Surgery (#2015-385).

Demographic and clinical factors. Participants were asked about perceived efficacy and side effects of Western rheumatic disease medications prescribed by their rheumatologist. They were asked on a 5-point Likert scale, "How effective is Western medicine prescribed by your rheumatologist?" and "Have you had any side effects from Western medications prescribed by your rheumatologist?" Medical record review was used to determine primary rheumatologic diagnosis, disease duration, all prescribed medications (including both rheumatic and nonrheumatic disease medications), and comorbidities. The Charlson Comorbidity Index was derived¹¹, and a medication regimen complexity index was calculated using standard methodology based on method of administration and frequency of use of each medication¹².

TCM use. Patterns of TCM use were elicited using an adapted instrument originally developed for Chinese American oncology patients¹³. Annual use patterns of 11 TCM modalities were assessed, including oral and topical Chinese herbs, acupuncture (insertion of needles into strategic points in the body based on TCM theory), acupressure (application of pressure on acupuncture points without skin penetration), moxibustion (application of heat by burning herbs over acupuncture points), tuina (Chinese therapeutic massage), cupping (application of suction to the skin using heated cups), guasha (application of pressure using a smooth-edged instrument to produce light bruising over skin), food therapy, tai chi (a form of martial art exercise using slow controlled movements), qigong (gentle exercise based on posture, breathing, and meditation), or other. Reasons for TCM use were ascertained through multiple-choice questions that included an open-ended option. Among TCM users, perceived effectiveness of their TCM regimen was assessed on a 3-point Likert scale. Additionally, TCM users reported source of recommendations for TCM and whether TCM use was discussed with their rheumatologist. Overall belief in TCM was assessed among both users and nonusers on a 5-point Likert scale with the question, "In general, do you believe that TCM works?"

Acculturation. Acculturation, the degree immigrant populations assimilate to mainstream American culture, was assessed using the Marin and Marin Acculturation Scale¹⁴. This scale has 12 items on a 5-point Likert scale measuring 3 domains, including language use, media use, and ethnic social relations. Scores range from 12 to 60, with higher scores indicate greater degrees of acculturation. This scale was originally developed for the Hispanic population and has been translated to Chinese and validated in Chinese Americans¹⁵.

Patient-reported health status measures. PRO in 9 domains were measured using PROMIS short forms^{16,17}. These included ability to participate in social roles and activities (v2.0, 10-item), instrumental support (v2.0, 2-item; i.e., functional aspects of supportive interpersonal relationships), cognitive general concerns (v1.0, 4-item; i.e., abilities regarding cognitive

tasks such as memory and thinking), anxiety (v1.0, 7-item), depression (v1.0, 8-item), fatigue (v1.0, 7-item), sleep disturbance (v1.0, 4-item), pain interference (v1.1, 6-item), and physical function (v1.2, 10-item). All domains inquire about the past 7 days except for ability to participate in social roles and activities and physical function, which do not have a time frame in the prompt. All domains were assessed using English or linguistically validated Chinese versions of the PROMIS short forms depending on participants' language preference¹⁷. Raw scores from short forms were uploaded to the HealthMeasures Assessment Center Scoring Service¹⁸ to be converted into T scores. A T score of 50 corresponds to the US population mean. Higher scores denote more of the domain being evaluated. A difference in T score of 5, equivalent to a half SD, is considered clinically significant^{19,20}.

Statistical analysis. Categorical variables were described with percentages, and continuous variables were summarized with either mean (SD) or median (quartiles: Q1–Q3), depending upon distribution, as assessed by the Shapiro-Wilk test. Categorical variables were compared using chi-squared tests, and continuous variables were compared using t tests or Wilcoxon rank-sum tests, as appropriate. PROMIS scores were compared between TCM users and nonusers in bivariate analysis, as well as use of generalized linear models controlling for demographic and clinical variables significantly different between the 2 groups in bivariate analysis. In addition, differences in PROMIS scores were analyzed between herb versus non-herb TCM users, those who did and did not disclose TCM use to their rheumatologists, those who used TCM to treat an underlying rheumatologic disease versus users of TCM for other reasons, and among users based on frequency of use. Multivariable logistic regression was used to generate OR of variables independently associated with TCM use. We included all variables other than PROMIS measures that were statistically significantly different between TCM users and nonusers in bivariate analysis. We performed all analyses using both nonnormally distributed variables as well as log-transformed values of them and yielded similar results. Only non-transformed data are presented, for ease of interpretation. We performed the Hosmer-Lemeshow test to assess overall fit of the model. Bivariate analyses were performed with STATA (version 14.2), and multivariable analyses were performed with SAS (version 9.4).

RESULTS

Sociodemographic and clinical characteristics. We approached 262 eligible patients, and 230 (88%) agreed to participate. Median age was 57 years (range 20–97), 65% were female, 71% had high school or less education, and 70% were on Medicaid insurance. The majority (96%) were born outside the United States, with 47% having lived in the United States for 20 or more years. Only 22% reported fluency in English. Median Marin and Marin acculturation score was 15 (range 12–54), with lower score indicating being less acculturated. The 3 most common rheumatologic diagnoses were RA (41%), SLE (17%), and seronegative spondyloarthropathies (15%), with a median disease duration of 4 years (range 0.2–52). Eighty-three percent of participants were prescribed disease-modifying agents, 26% biologics, and 27% steroids (Table 1).

Patterns of TCM use and characteristics of TCM users. Fifty percent reported using TCM in the past 12 months, with the most frequently used modalities being tuina massage (47%), acupuncture (45%), and herbs by mouth (37%; Table 2). Seventy percent used 2 or more modalities, and 35% used 3 or more modalities. Recommendations for TCM came most commonly from the patient's own interest (43%) or family

Table 1. Characteristics of 230 participants.

Patient Characteristics	Values
Age, yrs	57 (44–66)
Female	149 (65)
≤ High school education	164 (71)
Medicaid	161 (70)
Married/live with a partner	163 (71)
Born outside the US	220 (96)
Speak English	51 (22)
Marin and Marin acculturation score	15 (14–22)
Rheumatologic diagnosis	
Rheumatoid arthritis	95 (41)
Systemic lupus erythematosus	40 (17)
Spondyloarthropathies	34 (15)
Sjögren syndrome	27 (12)
Gout/pseudogout	13 (6)
Other*	21 (9)
Rheumatic medications	
Disease-modifying agents	191 (83)
Biologics	60 (26)
Steroids	62 (27)
Charlson Comorbidity Index	1 (1–1)

Values are n (%) or median (Q1–Q3). *Other diagnoses included myositis (n = 5), systemic sclerosis (n = 3), undifferentiated connective tissue disease (n = 3), inflammatory osteoarthritis (n = 2), palindromic rheumatism (n = 2), juvenile idiopathic arthritis (n = 2), polymyalgia rheumatica (n = 1), relapsing polychondritis (n = 1), iritis (n = 1), panniculitis (n = 1).

Table 2. Types of TCM modalities and sources of TCM recommendations reported by TCM users (n = 115).

TCM Modalities	Values
Tuina massage	54 (47)
Acupuncture	52 (45)
Herbs by mouth	43 (37)
Cupping	37 (32)
Food therapy	22 (19)
Acupressure	17 (15)
Topical herbs	15 (13)
Guasha	9 (8)
Tai chi	7 (6)
Moxibustion	3 (3)
Qigong	3 (3)
Other*	6 (5)
Sources of TCM Recommendations	Values
My own preference	49 (43)
Family/friends	46 (40)
Doctor/nurse	21 (18)
Newspaper	8 (7)
Ads/commercial	7 (6)
Books	3(30)
Internet	2 (2)
Other ^A	6 (5)

Values are n (%). *Two took supplements, and 1 each used foot massage, Buddhist meditation, knee percussion, and electroacupuncture. ^AOne each from podiatrist, walking by a TCM place, TCM doctor, television, insurance company. TCM: traditional Chinese medicine.

and friends (40%; Table 2). The most common reasons for TCM use were treating underlying rheumatic disease (60%), followed by treating symptoms unrelated to rheumatic diseases (48%) and improving overall well-being (37%). Seventy percent of TCM users reported using TCM at least several times a month. The majority of TCM users reported the modality they use as very (11%) or somewhat (67%) helpful. Only 30% of TCM users had ever discussed TCM use with their rheumatologist, most reporting that they did not see any reason to talk about it with their rheumatologist. Among TCM users and nonusers, 81.7% and 64.4%, respectively, reported the belief that TCM works.

Comparisons of demographic and clinical characteristics of TCM users and nonusers are shown in Table 3. Compared to nonusers, TCM users were statistically significantly older, and were more likely to be female, retired or a homemaker; to have lived in the United States for 20 or more years; to have a shorter rheumatic disease duration; to take a more complex medication regimen; to report Western medicine to be ineffective and having side effects; and to believe that TCM works.

Differences in PRO. TCM users had statistically significantly worse T scores in PROMIS anxiety (median 52.9 vs 42.9, $p < 0.001$), depression (median 51.3 vs 43.1, $p < 0.001$), pain interference (median 59.7 vs 56.1, $p = 0.002$), fatigue (mean 53.9 vs 49.3, $p < 0.001$), function (median 42.2 vs 45.9, $p = 0.002$), and ability to participate in social roles and activities (median 56.4 vs 60.7, $p = 0.003$; Table 3). The differences in median T scores for anxiety and depression were 10 and 8.2, respectively, which are clinically meaningful. In the generalized linear models controlling for demographic and clinical factors, anxiety, depression, ability to participate in social roles and activities, and fatigue T scores remained significantly different between TCM user and nonusers, with anxiety T scores remaining clinically meaningfully different between the 2 groups (Table 4). There were no significant differences in any PROMIS T scores between herb and non-herb TCM users, or between TCM users who did and did not disclose to their rheumatologists (data not shown). Patients using TCM to treat rheumatic disease compared to those reporting other reasons for TCM use had worse scores in pain interference (median 61.2 vs 58.4, $p = 0.03$) and physical function (median 41 vs 54.2, $p = 0.01$), with the difference in physical function scores being clinically meaningful. Also, patients reporting TCM use at least several times a month compared to less frequent users had worse pain interference (median 61.2 vs 56.9, $p = 0.03$) and physical function (median 41 vs 44.4, $p = 0.045$).

Factors independently associated with TCM use. In multivariable logistic regression, TCM use was independently associated with belief in TCM (OR 3.9, 95% CI 1.9–8.2), female sex (OR 2.5, 95% CI 1.3–4.8), living in the United States for 20 or more years (OR 2.3, 95% CI 1.2–4.7), reporting Western medicine to be ineffective (OR 1.5,

Table 3. Comparing demographics, clinical characteristics, and patient-reported outcomes between TCM users and nonusers.

Patient Characteristics	TCM Users, n = 115	Nonusers, n = 115	p
Sociodemographic factors			
Age, yrs	60 (50–68)	53 (39–63)	< 0.01
Female	84 (73)	65 (57)	0.01
≤ High school education	75 (65)	88 (77)	0.06
Employment			0.04
Employed or student	43 (37)	62 (54)	
Unemployed	13 (11)	12 (10)	
Retired or homemaker	59 (51)	41 (36)	
≥ 20 yrs living in the US	65 (57)	42 (37)	< 0.01
Clinical factors			
Length of diagnosis, yrs	3 (2–7)	5 (3–10)	< 0.01
Medication Regimen Complexity Index	12 (9–18)	11 (6–15)	0.03
Report Western medicine ineffective*	26 (23)	8 (7)	< 0.01
Report Western medicine side effects†	50 (44)	36 (30)	0.04
Believe TCM works^	94 (82)	74 (64)	< 0.01
PROMIS T scores			
Sleep disturbance	53 (46–57)	50 (44–55)	0.07
Cognitive concerns	36 (30–40)	35 (26–39)	0.40
Anxiety	53 (43–58)	43 (36–54)	< 0.001
Depression	51 (37–58)	43 (37–54)	< 0.001
Pain interference	60 (54–65)	56 (49–62)	0.002
Fatigue, mean (SD)	53.9 (10)	49.3 (9)	< 0.001
Physical function	42 (37–49)	46 (40–54)	0.002
Instrumental support	49 (45–51)	49 (45–53)	0.70
Ability to participate in social roles and activities	56 (49–66)	61 (55–66)	0.003

Values are n (%) or median (Q1–Q3) unless otherwise indicated. There is overall < 1% missing data except for the variable PROMIS instrumental support, which has 39% missing value because it was added to the survey at a later time. *Answering “not at all, a little, or don’t know” vs “somewhat, quite a bit, or a lot” to “how effective is Western medicine prescribed by your rheumatologist?” †Answering “Not at all or don’t know” vs “a little, somewhat, or quite a bit” to “have you had any side effects from Western medications prescribed by your rheumatologist?” ^Answering “a little, somewhat, quite a bit, or a lot” vs “not at all or don’t know” to “in general do you believe TCM works?” TCM: Traditional Chinese Medicine; PROMIS: Patient Reported Outcomes Measurement Information System.

Table 4. Adjusted† patient-reported health outcomes of TCM users and nonusers.

PROMIS Domain	TCM Users	Nonusers	p
Sleep disturbance	50 (48–53)	49 (47–52)	0.55
Anxiety	50 (48–53)	46 (43–49)	< 0.01
Depression	51 (48–54)	47 (44–50)	0.01
Pain interference	59 (56–61)	57 (54–59)	0.17
Fatigue	54 (51–56)	51 (48–54)	< 0.01
Physical function	43 (40–45)	45 (42–47)	0.13
Ability to participate in social roles and activities	55 (53–58)	59 (56–61)	0.01

Values are mean (95% CI). †Using generalized linear model with each PROMIS domain as the outcome and TCM user status as the predictor, PROMIS T scores were adjusted for variables significantly different between TCM users and nonusers in bivariate analysis, including age, sex, employment status, years lived in the United States, years since rheumatic disease diagnosis, Medication Regimen Complexity Index, reporting Western medications to be effective, reporting side effects from Western medications, and believing that TCM works. TCM: traditional Chinese medicine; PROMIS: Patient Reported Outcomes Measurement Information System.

95% CI 1.1–2.0), and shorter disease duration (OR 0.9 for each additional year since diagnosis, 95% CI 0.9–0.99; Table 5).

DISCUSSION

To our knowledge, ours is the first study to specifically examine patterns of TCM use as well as the relationship of TCM use with patient-reported health status among Chinese American rheumatology patients. Our cohort is representative of a population that is particularly challenging to engage by dominant-culture healthcare workers, because despite having resided in the United States for an average of 19 years, only 22% of patients spoke fluent English, and most were extremely poorly acculturated; the median score of 15 for that variable was at the floor of the 12–60 scale. The overarching belief in TCM found in our study, even among the majority of nonusers, is consistent with other research demonstrating a deeply ingrained positive attitude about TCM among Chinese patients^{21,22}. Women in our cohort were more likely to be TCM users, which is similar to the greater use of complementary and alternative medicine by women among

Table 5. Multivariable logistic regression to examine factors independently associated with TCM use.

Variables	OR (95% CI)	p
Age, yrs, per 1-yr increase	1.0 (0.98–1.04)	0.4
Female sex	2.5 (1.3–4.8)	0.007
Employed	1.6 (0.7–3.4)	0.2
≥ 20 yrs living in the US	2.3 (1.2–4.7)	0.02
Length of diagnosis, yrs, per 1-yr increase	0.9 (0.9–0.99)	0.02
Medication Regimen Complexity Index, per 1-point increase	1.05 (1.0–1.1)	0.07
Report Western medicine ineffective*	1.5 (1.1–2.0)	0.01
Report Western medicine side effects†	0.9 (0.7–1.2)	0.6
Believe TCM works^	3.9 (1.9–8.2)	< 0.001

* Answering “not at all, a little, or don’t know” vs “somewhat, quite a bit, or a lot” to “how effective is Western medicine prescribed by your rheumatologist?” † Answering “Not at all or don’t know” vs “a little, somewhat, or quite a bit” to “have you had any side effects from Western medications prescribed by your rheumatologist?” ^ Answering “a little, somewhat, quite a bit, or a lot” vs “not at all or don’t know” to “in general do you believe TCM works?” TCM: traditional Chinese medicine.

the US general population²³. We also found that belief in the efficacy of TCM was associated with a statistically significant 3.9 increased odds of TCM use. Interestingly, those who have lived in the United States for > 20 years were more likely to use TCM. While this may seem counterintuitive, it not only highlights the durability of these cultural beliefs, but also underscores that immigrants who choose to seek healthcare in ethnic enclaves after decades of living in the United States are likely to maintain healthcare beliefs concordant with their countries of origin. Understanding and acknowledging the strength of these beliefs could be helpful to physicians in creating treatment plans for patients with low levels of acculturation.

While most TCM users utilized only non-herbal modalities, more than one-third took Chinese herbs. Moreover, even though treatment of their underlying rheumatic disease was the most common reason for TCM use, only 30% discussed TCM use with their rheumatologist. This number could conceivably be even smaller among Chinese patients in other settings cared for by providers from different cultural backgrounds. Existing research has shown that, in general, Asian Americans are more likely to use complementary therapies but less likely to report their use to health providers than whites²⁴. This lack of open communication is important, because undisclosed herb use may be a concern for potential herb-drug interactions with rheumatic medications. Patient education about TCM use, particularly the safety of herbal remedies, may also facilitate open discussions with health professionals.

Patients could also be using certain TCM modalities in place of prescribed Western medications²⁵. In fact, our data showed that perceived lack of efficacy of Western medications was independently associated with greater odds (1.5) of using TCM. Further, patients with a shorter duration of

rheumatologic disease diagnosis were more likely to use TCM. This is consistent with patients initially choosing therapies more familiar to them and only making the effort to undertake Western treatment, with its attendant cultural, linguistic, financial, and logistical barriers, in cases where the disease symptoms are not resolved expeditiously and continue to require treatment. Future studies should investigate whether TCM use during the initial onset of rheumatologic disease may be replacing effective early interventions during this crucial “window of opportunity,” in which longterm outcomes can be affected.

Ours is also the first study, to our knowledge, to examine PROMIS domains among Chinese rheumatology patients. We found that TCM users had worse PROMIS scores in anxiety, depression, ability to participate in social roles and activities, and fatigue, with the absolute difference for anxiety and depression T scores exceeding 5 (half SD), the commonly accepted threshold for a clinically meaningful difference. Further, these differences remained statistically significant for anxiety, depression, ability to participate in social roles and activities, and fatigue even after controlling for potential demographic and clinical confounders.

These findings suggest that TCM use may serve as a useful and easily ascertained proxy for Chinese American patients who have worse mental health and may help providers identify those with unmet therapeutic needs. This could have particular clinical significance in this population, given the well-documented reticence of Asian Americans, particularly first- and second-generation immigrants, in reporting symptoms of anxiety, depression, and other mental health issues^{26,27}. Future studies should investigate whether undiagnosed or inadequately treated comorbid mental health issues contribute to the known disproportionately worse outcomes in Chinese rheumatic disease patients. In addition, those who use TCM to treat underlying rheumatic disease, as well as more frequent TCM users, had worse self-reported pain and function, both of which are crucial rheumatic disease outcomes. Whether patients’ use of TCM is a self-management strategy driven by inadequately treated pain and poor function, or whether TCM is replacing more effective longterm conventional Western therapies, needs further study. Valid and responsive instruments such as PROMIS should be included in future studies of complementary and alternative medicine use and patient self-management, because they provide important insights into patients’ experiences of symptoms and functioning.

There are limitations to our observational study. First, this population is not representative of all Chinese Americans, and our findings may not be generalizable to those who seek care outside of ethnic-centered urban enclaves like New York City’s Chinatown. Second, TCM use was evaluated by patient self-report, and patients may have underreported actual use. However, all questions were conducted in a nonthreatening environment, and the 70% who had not

discussed TCM use with their rheumatologist did disclose to the researcher. Third, because TCM use in the past 12 months was assessed, we are unable to ascertain whether a more remote history of TCM use affected current patient-reported health status. Last, because this is a cross-sectional study, we are unable to infer causality between TCM use and PROMIS outcomes.

Our study has several strengths. New York City has one of the largest Chinese American immigrant communities in the United States. Both the researcher and treating physicians were ethnically and linguistically concordant with the study participants, which minimized language and cultural barriers, and facilitated the recruitment of a vulnerable, hard-to-reach immigrant population. We also used instruments with existing linguistically validated Chinese translations.

Ours is the first study to describe characteristics of TCM users and the association of TCM use with a wide range of clinically relevant PRO among Chinese American rheumatology patients. Our findings underscore the importance of rheumatologists proactively inquiring about their Chinese American patients' use of TCM. TCM use is associated with worse scores in a number of PRO, and thus may be a flag for providers to consider opening a dialogue to specifically inquire into potential mental health issues, understanding that Asian American populations are more reluctant to proactively report such issues. Doing so in a way that displays cultural understanding can encourage patients to engage in appropriate mental health services²⁵ and may significantly affect health-related quality of life.

REFERENCES

- Jensen EB, Knapp A, Borsella CP, Nestor K. The place-of-birth composition of immigrants to the United States: 2000 to 2013. In: Proceedings of the annual meeting of the population Association of America. San Diego, CA; 2015.
- Thumboo J, Wee HL. Systemic lupus erythematosus in Asia: Is it more common and more severe? *APLAR J Rheumatol* 2006; 9:320-6.
- Barton JL, Trupin L, Schillinger D, Gansky SA, Tonner C, Margaretten M, et al. Racial and ethnic disparities in disease activity and function among persons with rheumatoid arthritis from university-affiliated clinics. *Arthritis Care Res* 2011;63:1238-46.
- Mok MY, Li WL. Do Asian patients have worse lupus? *Lupus* 2010;19:1384-90.
- Lai D, Chappell N. Use of traditional Chinese medicine by older Chinese immigrants in Canada. *Fam Pract* 2007;24:56-64.
- Pyne D, Chaabo K. Adherence to immunosuppressant drugs in patients with connective tissue diseases. *Rheumatology* 2007;46:1859.
- Kumar K, Chambers S, Gordon C. Challenges of ethnicity in SLE. *Best Pr Res Clin Rheumatol* 2009;23:549-61.
- Adebajo A, Shikoh S, Kumar K, Walker D. Ethnic minority musculoskeletal health. *Rheumatology* 2018;57:201-3.
- Khanna D, Krishnan E, Dewitt EM, Khanna PP, Spiegel B, Hays RD. The future of measuring patient-reported outcomes in rheumatology: Patient-Reported Outcomes Measurement Information System (PROMIS). *Arthritis Care Res* 2011; 63:S486-90.
- Cella D, Riley W, Stone A, Rothrock N, Reeve B, Yount S, et al; PROMIS Cooperative Group. The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005-2008. *J Clin Epidemiol* 2010;63:1179-94.
- Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40:373-83.
- George J, Phun Y, Bailey MJ, Kong DC, Stewart K. Development and validation of the Medication Regimen Complexity Index. *Ann Pharmacother* 2004;38:1369-76.
- Leng JC, Gany F. Traditional Chinese medicine use among Chinese immigrant cancer patients. *J Cancer Educ* 2013;56-61.
- Marin G, Sabogal F, Marin BV, Otero-Sabogal R, Perez-Stable EJ. Development of a short acculturation scale for Hispanics. *Hisp J Behav Sci* 1987;9:183-205.
- Gupta R, Yick AG. Preliminary validation of the acculturation scale on Chinese Americans. *J Social Work Res Eval* 2001;2:43-56.
- Cella D, Yount S, Rothrock N, Gershon R, Cook K, Reeve B, et al; PROMIS Cooperative Group. The Patient-Reported Outcomes Measurement Information System (PROMIS): progress of an NIH Roadmap cooperative group during its first two years. *Med Care* 2007;45 Suppl 1:S3-11.
- HealthMeasures. PROMIS available translations. [Internet. Accessed April 6, 2017.] Available from: <http://www.healthmeasures.net/explore-measurement-systems/promis/intro-to-promis/available-translations>
- HealthMeasures Scoring Service. [Internet. Accessed July 22, 2019.] Available from: https://www.assessmentcenter.net/ac_scoring-service
- Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care* 2003;41:582-92.
- Yost KJ, Eton DT, Garcia SF, Cella D. Minimally important differences were estimated for six Patient-Reported Outcomes Measurement Information System-Cancer scales in advanced-stage cancer patients. *J Clin Epidemiol* 2011;64:507-16.
- Zhang J, Verhoef MJ. Illness management strategies among Chinese immigrants living with arthritis. *Soc Sci Med* 2002;55:1795-802.
- Hung JY, Chiou CJ, Chang HY. Relationships between medical beliefs of superiority of Chinese or western medicine, medical behaviours and glycaemic control in diabetic outpatients in Taiwan. *Health Soc Care Community* 2012;20:80-6.
- 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.
- Mehta DH, Phillips RS, Davis RB, McCarthy EP. Use of complementary and alternative therapies by Asian Americans. Results from the National Health Interview Survey. *J Gen Intern Med* 2007;22:762-7.
- Tom Xu K, Farrell TW. The complementarity and substitution between unconventional and mainstream medicine among racial and ethnic groups in the United States. *Health Serv Res* 2007;42:811-26.
- Abe-Kim J, Takeuchi DT, Hong S, Zane N, Sue S, Spencer MS, et al. Use of mental health-related services among immigrant and US-born Asian Americans: results from the National Latino and Asian American Study. *Am J Public Health* 2007;97:91-8.
- Augsberger A, Yeung A, Dougher M, Hahn HC. Factors influencing the underutilization of mental health services among Asian American women with a history of depression and suicide. *BMC Health Serv Res* 2015;15:542.