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Acculturation and the use of complementary and alternative medicine

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Abstract

The use of complementary and alternative medicine (CAM) has been growing substantially in the US in recent years. Such a growth in CAM use coincides with an ongoing increase in the proportion of the foreign-born population in the US. The main objective of this study is to examine the relation between acculturation and the use of CAM therapies among immigrants. Data from a CAM supplement to the 2002 National Health Interview Survey were analyzed to estimate the effects of acculturation on the likelihood of using different CAM therapies over the past 12 months prior to the survey. The results suggest that the level of acculturation—as measured by nativity/length of stay in the US and language of interview—is strongly associated with CAM use. As immigrants stay longer in the US or as their use of English becomes more proficient, the likelihood that they use CAM therapies increases as well, and it gradually approaches the level of CAM use by native-born Americans. Moreover, this relation between acculturation and CAM use generally persists even after the effects of socioeconomic status, health insurance coverage, self-reported health status, and other demographic variables have all been taken into consideration. The substantially lower rates of CAM use by recent immigrants and its possible causes warrant further research.

Keywords: USA; Acculturation; Complementary and alternative medicine (CAM); Immigrants

Introduction

The use of complementary and alternative medicine (CAM) has increased substantially in the United States over the last two decades (Barnes, Powell-Griner, McFann, & Nahin, 2004). Survey data indicate that the proportion of adults using CAM practices, therapies, and products within the last year increased from 34% in 1990 to 62% in 2002 (Pagan & Pauly, 2005). The annual number of visits to CAM providers is now higher than the number of visits to primary care physicians, and yearly out-of-pocket expenditures on CAM services exceed $27 billion (The Institute of Medicine, 2005).

The growth in CAM use is taking place at the same time that the size of the foreign-born population is increasing in the US. The relative size of the US immigrant population has grown from 8% in 1990 to 11.7% in 2003 (Antecol & Bedard, 2006; US Census Bureau, 2004). By 2045, as many as 13.3% of the US population would have been born abroad (US Census Bureau, 2000). Due to their lower socioeconomic status and other barriers (e.g. language proficiency

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and health literacy) in access to medical services, many immigrants resort to CAM for health care. A recent study on the socio-cultural factors associated with health care utilization among Latino immigrants reported that they tend to use CAM first, and then seek conventional medical help if CAM is not effective (Garces, Scarinci, & Harrison, 2006).

The increasing share of the foreign-born population in the US highlights the need for assessing the role of acculturation in the use of CAM. Previous studies have established that acculturation—as measured by nativity/length of residence in the US or English proficiency—is important in explaining disparities in health outcomes and access to health care between immigrants and native-born Americans as well as within different immigrant groups (Abraido-Lanza, Chao, & Florez, 2005; Antecol & Bedard, 2006; Evenson, Sarmiento, & Ayala, 2004; Laroche, 2000; Leclere, Jensen, & Biddlecom, 1994; Shah, Zhu, Wu, & Potter, 2006; Zambrana, Breen, Fox, & Gutierrez-Mohamed, 1999). A converging finding from these studies is that when immigrants become more acculturated to the US, their health behaviors as well as their access to health care tend to gradually resemble those of native-born Americans. However, to what extent this finding holds in the case of CAM use is still unclear. While previous studies have revealed differential patterns of CAM use across demographic and socioeconomic groups, little is known about the role of acculturation in CAM use (Barnes et al., 2004).

The objective of this study is to examine the linkages between acculturation and CAM use among immigrants in the US. Specifically we assess how acculturation is related to the odds of using at least one CAM modality as well as the odds of using specific CAM modalities in the past 12 months. We hypothesize that as immigrants live longer in the US, they are more likely to resemble native-born Americans in terms of CAM use. Another related hypothesis is that immigrants who show a higher level of English proficiency are more like native-born Americans in terms of CAM use than those with a lower level of English proficiency. These two hypotheses will be tested with and without adjusting for the other relevant predictors of CAM use.

Methods

Data and sample

The data used in this study come from the 2002 National Health Interview Survey (NHIS). The NHIS is a nationally representative, cross-sectional survey of the civilian non-institutionalized US population. It employs a multistage sampling design and oversamples both African American and Hispanic populations. Besides information on demographics, health status, health behaviors, and health care access and utilization, the 2002 NHIS included a CAM supplement that collected data on 31,044 adults 18 years of age or older.

Measures

CAM use

In the 2002 NHIS respondents were asked whether during the past 12 months they had used or seen a practitioner for CAM therapies. Several studies reported 27 types of CAM therapies based on information from the 2002 NHIS (e.g. Barnes et al., 2004; Saydah & Eberhardt, 2006). These CAM therapies included 17 major CAM types and 10 subtypes. In our study, we only focused on the 17 major CAM therapies without differentiating the subtypes within each major CAM therapy. Based on information on use of these 17 CAM therapies, we created a dummy variable to measure whether during the past 12 months a respondent had used at least 1 of these 17 CAM therapies.

In terms of the use of specific CAM therapies, we analyzed the 10 most common CAM therapies which were used by at least 1% of the sample. Ten dummy variables were created to denote whether a respondent ever used each of the 10 therapies over the past 12 months: prayer, herbal treatments, relaxation techniques, chiropractic care, yoga-tai-chi-qigong, massage, special diets, megavitamins, homeopathy, and acupuncture. A major consideration for analyzing the 10 most common CAM therapies is that the number of respondents who reported use of the other seven therapies is too small (each less than 1% of the sample) to allow for a reliable assessment of the association between acculturation and CAM use. Our focus on the 10 most common CAM therapies in the 2002 NHIS is different from several previous studies that have analyzed CAM use in terms of CAM domains (e.g. Mehta, Phillips, Davis, & McCarthy, 2007; Saydah & Eberhardt, 2006; Upchurch et al., 2007). While aggregating each single type of CAM into several major CAM domains can simplify the presentation of the results, it also prevents us from relating acculturation to a specific type of CAM. In this study, we opted for an analysis of the use of specific

CAM therapies rather than CAM domains since the former better utilized the richness of the NHIS data and provided more detailed information. Using a few generalized CAM domains may lead to aggregation bias if there is substantial variability in the use of specific CAM therapies across nativity groups.

Acculturation

In this study, we used nativity/length of residence in the US, and language of interview as indicators of the level of acculturation. These measures have been widely used in previous research as indicators of acculturation, particularly in studies examining the relationship between acculturation and health behaviors (Abraido-Lanza et al., 2005; Abraido-Lanza, Chao, & Gates, 2005; Leclere et al., 1994; Singh & Siahpush, 2002; Zambrana et al., 1999). In the 2002 NHIS, respondents were asked their place of birth and, for those who were foreign-born, how long they had been living in the US. Based on these two variables, we created a new categorical variable "nativity"—1: native-born, 2: foreign-born and has been in the US for more than 15 years, 3: foreign-born and has been in the US for 10–15 years, 4: foreign-born and has been in the US for 5–10 years, and 5: foreign-born and has been in the US for less than 5 years.

Information on the language of interview for the 2002 NHIS sample households was reported by the interviewers at the end of household interviews, and was coded as English only, English and Spanish, Spanish only, and other (less than 1% of the sample). For example, "English only" means that each selected subject in a sample household was interviewed only in English. Bilingual interviewers or interpreters were recruited to interview respondents who preferred the use of a language other than English. For respondents from households that were interviewed in both English and Spanish, the 2002 NHIS provides no information on which household members were interviewed in English and which ones were interviewed in Spanish. However, it is reasonable to assume that the level of acculturation for individuals from these households falls on average between the level of acculturation for those who were interviewed only in English and that for those who were interviewed only in Spanish. Thus, without considering the households interviewed in 'other' languages, a plausible rank of the average level of acculturation based on language of interview should be something like this: respondents from households that were interviewed only in English had the highest level of acculturation, followed by those from households interviewed in both English and Spanish, and then by those from households interviewed exclusively in Spanish.

Sociodemographic factors

Besides information on CAM use and acculturation, the 2002 NHIS also provides detailed information on the sociodemographic profiles of the respondents and their households. Along with acculturation measures, our analysis also incorporated the following explanatory variables to predict CAM use: age, gender, race/ethnicity, educational attainment, marital status, total family income, health insurance coverage, employment status, self-reported health status, history of chronic disease, family size, and region of residence.

Analysis

We first estimated a set of logistic regressions to examine the relationship between nativity/length of residence in the US and use of at least one CAM modality or one of the specific CAM modalities over the past 12 months. Then we estimated these regressions by incorporating other relevant predictors of CAM use in an effort to evaluate to what extent these added explanatory variables could alter the effects of nativity/length of residence on CAM use. Finally, we replicated these estimated regression models by replacing nativity/length of residence in the US with the language in which the household interview was conducted, which allowed us to assess the sensitivity in the relationship between acculturation and CAM use for different acculturation measures. The statistical analysis took into account the complex survey design of the 2002 NHIS (stratification, clustering, and oversampling in a multistage sampling design) by employing the svy-based commands in Stata (StataCorp, 2005).

Results

Description of the key variables

Table 1 presents the mean or percentage distribution for all the variables used in this study. Almost 62% of respondents reported that they had used at least 1 of the 17 CAM modalities in the past 12 months. In terms of the use of specific CAM

Table 1
Descriptive statistics for all the variables used in the analysis ($N = 31,044$)

Variables	Mean or %	S.E.	Variables	Mean or %	S.E.
CAM use (%)			Race/ethnicity (%)		
At least one CAM	61.8	0.4	Non-Hispanic white	73.1	0.5
Prayer for health reasons	44.2	0.4	African American	11.5	0.3
Herbal medicine	19.6	0.3	Hispanic	11.5	0.3
Relaxation techniques	15.3	0.3	Asian	3.5	0.2
Chiropractic care	7.7	0.2	Other	0.3	<0.1
Yoga-taichi-qigong	6.1	0.2	Educational attainment (%)		
Massage	5.1	0.2	<High school	16.6	0.3
Special diets	3.7	0.1	High school graduate	28.9	0.4
Megavitamins	2.9	0.1	Some college	29.8	0.4
Homeopathy	1.8	0.1	College graduate or higher	24.7	0.4
Acupuncture	1.1	0.1	Marital status (%)		
Nativity/length of stay in the US (%)			Married	57.5	0.4
US born	85.9	0.3	Divorced	10.4	0.2
Foreign born and stay ⩾15 years	7.1	0.2	Separated	2.5	0.1
10–15 years	2.3	0.1	Single/never married	23.4	0.4
5–10 years	2.0	0.1	Widowed	6.2	0.1
<5 years	2.2	0.1	Family income (%)		
Language of interview (%)			<$ 20,000	22.4	0.4
English only	95.2	0.2	$ 20,000–$ 44,999	28.5	0.4
English and Spanish	1.6	0.1	$ 45,000–$ 74,999	23.6	0.3
Spanish only	2.8	0.1	$ 75,000 or over	25.5	0.5
Other	0.4	0.1	Insurance status (%)		
Age (%)			Uninsured	15.5	0.3
18–24 years	13.6	0.4	Insured	84.5	0.3
25–34 years	19.0	0.3	Employment status (%)		
35–44 years	22.0	0.3	Not employed	34.2	0.4
45–54 years	19.1	0.3	Employed	65.8	0.4
55–64 years	11.9	0.3	Self-reported health status (%)		
65 years or older	14.5	0.3	Excellent	31.0	0.4
Gender (%)			Very good	31.7	0.3
Male	48.4	0.4	Good	25.1	0.3
Female	51.6	0.4	Fair	9.1	0.2
Region (%)			Poor	3.1	0.1
Northeast	18.8	0.4	History of chronic disease (%)		
Midwest	24.1	0.5	No	55.4	0.4
South	37.9	0.6	Yes	44.6	0.4
West	19.1	0.4	Family size (weighted mean)	3.0	<0.1

Source: National Health Interview Survey (2002).

modalities, prayer is the most common, with 44.2% of the sample practicing it, followed by the use of herbal remedies, relaxation techniques, and chiropractic care (19.6%, 15.3%, and 7.7%, respectively).

Eighty-six percent of the sample respondents were born in the US and 14% were born abroad. Among the foreign-born, 7.1% had lived in the US for 15 years or more, 2.3% between 10 and 15 years, 2.0% between 5 and 10 years, and 2.2% less than 5 years. About 95% of the interviews were conducted in English, 2.8% in Spanish, 1.6% in English and Spanish, and 0.4% in languages other than English or Spanish.

Nativity/length of stay in the US and CAM use

Table 2 presents both unadjusted and adjusted odds ratios from logistic regressions of CAM use by nativity. The odds ratios shown in Table 2 reflect the gap in the odds of CAM use between the native-born (the reference group) and other nativity

Table 2
Odds ratios of CAM use by nativity/length of residence in the US: United States, 2002 NHIS

Therapy	Unadjusted odds ratio[a]					Adjusted odds ratio[b]				
	Native	Foreign born				Native	Foreign born			
		⩾15 years	10–15 years	5–10 years	<5 years		⩾15 years	10–15 years	5–10 years	<5 years
At least one CAM[c]	Reference	1.02 (0.91, 1.13)	0.80** (0.66, 0.97)	0.72*** (0.60, 0.86)	0.63*** (0.53, 0.75)	Reference	1.10 (0.96, 1.26)	0.83* (0.66, 1.03)	0.82 (0.65, 1.04)	0.76** (0.60, 0.94)
Prayer for health reasons	Reference	1.05 (0.95, 1.17)	0.93 (0.77, 1.12)	0.84* (0.70, 1.00)	0.75*** (0.64, 0.90)	Reference	1.08 (0.94, 1.23)	1.01 (0.82, 1.24)	0.94 (0.74, 1.18)	0.85 (0.69, 1.06)
Herbal medicine	Reference	1.26*** (1.12, 1.42)	0.83* (0.67, 1.03)	0.95 (0.74, 1.23)	0.82* (0.66, 1.02)	Reference	1.25*** (1.07, 1.47)	0.73** (0.56, 0.96)	1.04 (0.78, 1.40)	0.94 (0.72, 1.23)
Relaxation techniques	Reference	0.72*** (0.60, 0.86)	0.53*** (0.37, 0.75)	0.47*** (0.33, 0.68)	0.68*** (0.51, 0.91)	Reference	0.75*** (0.60, 0.93)	0.58*** (0.38, 0.88)	0.52*** (0.34, 0.78)	0.82 (0.59, 1.13)
Chiropractic care	Reference	0.50*** (0.38, 0.64)	0.48*** (0.30, 0.75)	0.21*** (0.10, 0.42)	0.08*** (0.03, 0.21)	Reference	0.69** (0.52, 0.93)	0.63* (0.38, 1.06)	0.37*** (0.18, 0.76)	0.13*** (0.04, 0.40)
Yoga-taichi-qigong	Reference	0.90 (0.70, 1.17)	0.77 (0.51, 1.17)	0.84 (0.56, 1.26)	0.65** (0.44, 0.94)	Reference	1.05 (0.74, 1.50)	0.78 (0.49, 1.25)	0.78 (0.47, 1.30)	0.58** (0.36, 0.95)
Massage	Reference	0.74** (0.57, 0.97)	0.77 (0.52, 1.16)	0.28*** (0.14, 0.57)	0.26*** (0.14, 0.46)	Reference	0.94 (0.66, 1.33)	1.00 (0.62, 1.61)	0.36*** (0.17, 0.77)	0.37*** (0.19, 0.72)
Special diets	Reference	0.99 (0.76, 1.29)	0.90 (0.56, 1.44)	0.88 (0.52, 1.51)	0.59** (0.37, 0.93)	Reference	1.21 (0.88, 1.65)	1.16 (0.68, 1.97)	1.34 (0.74, 2.41)	0.65 (0.34, 1.26)
Megavitamins	Reference	0.59** (0.37, 0.94)	0.33*** (0.15, 0.71)	0.25** (0.07, 0.85)	0.22** (0.06, 0.77)	Reference	0.76 (0.45, 1.30)	0.67 (0.29, 1.53)	0.04*** (0.01, 0.31)	0.31 (0.05, 1.93)
Homeopathy	Reference	0.82 (0.57, 1.17)	1.12 (0.61, 2.06)	0.79 (0.38, 1.66)	1.01 (0.49, 2.05)	Reference	0.86 (0.54, 1.39)	1.04 (0.50, 2.19)	0.72 (0.29, 1.81)	1.12 (0.49, 2.55)
Acupuncture	Reference	1.28 (0.84, 1.95)	1.50 (0.72, 3.12)	1.29 (0.53, 3.13)	0.62 (0.28, 1.37)	Reference	1.00 (0.58, 1.75)	1.02 (0.46, 2.28)	1.32 (0.47, 3.73)	0.65 (0.27, 1.59)

Source: National Health Interview Survey (2002).
*$p<0.1$.
**$p<0.05$.
***$p<0.01$.
[a]The estimation of unadjusted odds ratios was based on bivariate logistic regression models.
[b]Adjusted odds ratios were estimated after controlling for the effects of age, gender, race/ethnicity, education attainment, total family income, marital status, self-reported health status, region of residence in the US, health insurance coverage, employment status, history of chronic disease, and family size.
[c]Based on 17 different types of CAM therapies.

categories. The adjusted odds ratios show the net effects of nativity/length of residence in the US on the likelihood of CAM use after adjusting for the effects of age, gender, race/ethnicity, education level, total family income, marital status, self-reported health status, history of chronic disease, region of residence, health insurance coverage, employment status, and family size.

The results suggest that immigrants are in general less likely to use CAM than native-born Americans, but this gap becomes increasingly smaller as immigrants stay longer in the US. Based on the unadjusted odds ratios, the odds of using at least one CAM therapy during the past 12 months for immigrants who had been in the US for less than 5 years is 37% less than that for native-born Americans. The corresponding gap becomes 28% for immigrants who had been in the US for 5–10 years and 20% for those who had been in the US for 10–15 years. After 15 years or more in the US, however, there is virtually no difference between the native and foreign-born in the odds of using at least one CAM modality.

In terms of the use of specific types of CAM modalities, the relationship between nativity and CAM use described above is more consistent and pronounced for the use of prayer, chiropractic care, special diets, and megavitamins. As immigrants spend more time in the US, the odds of using these CAM modalities increase monotonically and, eventually, the gap in CAM use between the foreign and the native-born mitigates. For example, the relative odds of using chiropractic care increases from 8% to 21% when length of stay changes from less than 5 years to between 5 and 10 years. It further reaches 48% for those who have stayed for 10–15 years and 50% for those who have stayed for 15 years or more. A similar trend is evident for the use of massage therapies.

The direct relationship between nativity and CAM use still largely holds when other relevant factors posited to be related to CAM use have been taken into account, as indicated by the adjusted odds ratios in Table 2. The effects of nativity on CAM use in general become smaller after adjusting for other factors related to CAM use. This is especially the case for CAM modalities such as chiropractic care, massage therapy, and megavitamins. For example, while nativity was significantly related to the odds of using megavitamins according to the unadjusted odds ratios, most of these effects become insignificant after adjusting for other factors.

While most of the utilization rates of the 10 CAM modalities considered in this study follow the pattern described above, there are several exceptions. First, the use of relaxation techniques shows a curvilinear relationship with length of residence, with the first 5 years and more than 15 years associated with a higher level of use than that for those years in between. These effects are statistically significant and they generally persist regardless of whether or not the effects of other relevant predictors on the use of relaxation techniques have been taken into account. Second, for the use of megavitamins, while the unadjusted odds ratios indicate that the odds of using megavitamins increase monotonically as length of stay in the US increases, this pattern is not as clear after adjusting for other factors, as indicated by an abrupt drop in the odds ratio for those who had been in the US between 5 and 10 years. Finally, the utilization of herbal medicine, homeopathy, and acupuncture does not fit well with the general pattern. Immigrants who have been in the US for 15 years or more are more likely to use herbal treatments than native-born Americans.

Language of household interview and CAM use

Results from the logistic regressions suggest that the language of interview has a significant effect on the odds of CAM use, as shown in Table 3. When we use the NHIS language of interview as a proxy for English proficiency, one of the key findings is that CAM utilization rates are usually the highest for respondents interviewed in English only, followed by respondents from households that were interviewed in both English and Spanish, and then Spanish only. Being interviewed in languages other than English or Spanish does not show a significant association with CAM use for most of the CAM modalities considered here. In general, the results support the hypothesis that the odds of CAM use by immigrants increasingly approach that of native-born Americans as immigrants become more assimilated into the US.

This finding was evident in the unadjusted odds ratios reported in Table 3. The odds of using relaxation techniques in the past 12 months for respondents who were interviewed in Spanish were 77% less than that for respondents whose households were interviewed in English. The corresponding gap for respondents from households that were interviewed in both English and Spanish is 57%.

Table 3
Odds ratios of CAM use by language of interview: United States, 2002 NHIS

Therapy	Unadjusted odds ratio[a]				Adjusted odds ratio[b]			
	Language of interview				Language of interview			
	English only	English and Spanish	Spanish only	Other	English only	English and Spanish	Spanish only	Other
At least one CAM	Reference	0.96	0.71***	1.20	Reference	1.15	0.74***	1.55
		(0.80, 1.14)	(0.61, 0.83)	(0.70, 2.06)		(0.90, 1.46)	(0.59, 0.93)	(0.80, 3.01)
Prayer for health reasons	Reference	1.48***	1.09	1.30	Reference	1.27**	0.83*	1.74*
		(1.24, 1.77)	(0.94, 1.26)	(0.77, 2.19)		(1.00, 1.62)	(0.68, 1.02)	(0.94, 3.22)
Herbal medicine	Reference	0.84	0.80**	1.66**	Reference	1.22	1.06	1.42
		(0.65, 1.10)	(0.66, 0.96)	(1.07, 2.59)		(0.87, 1.73)	(0.80, 1.42)	(0.88, 2.29)
Relaxation techniques	Reference	0.43***	0.23***	0.53	Reference	0.62**	0.38***	0.50
		(0.30, 0.62)	(0.16, 0.33)	(0.22, 1.26)		(0.40, 0.96)	(0.25, 0.57)	(0.16, 1.53)
Chiropractic care	Reference	0.36***	0.20***	0.24*	Reference	0.58	0.47**	0.43
		(0.20, 0.64)	(0.11, 0.39)	(0.06, 1.03)		(0.30, 1.14)	(0.24, 0.94)	(0.10, 1.80)
Yoga-taichi-qigong	Reference	0.23***	0.07***	0.62	Reference	0.61	0.15***	0.55
		(0.11, 0.49)	(0.03, 0.14)	(0.21, 1.84)		(0.27, 1.38)	(0.06, 0.34)	(0.15, 2.00)
Massage	Reference	0.24***	0.16***	0.50	Reference	0.51	0.36**	0.94
		(0.11, 0.51)	(0.07, 0.36)	(0.17, 1.51)		(0.19, 1.35)	(0.16, 0.81)	(0.32, 2.76)
Special diets	Reference	0.48**	0.37***	0.54	Reference	0.77	0.71	0.87
		(0.23, 1.00)	(0.22, 0.62)	(0.11, 2.58)		(0.36, 1.66)	(0.36, 1.39)	(0.18, 4.13)
Megavitamins	Reference	0.34***	0.14***	–[c]	Reference	1.07	0.43*	–[c]
		(0.16, 0.69)	(0.06, 0.31)	–		(0.48, 2.39)	(0.17, 1.07)	–
Homeopathy	Reference	0.54*	0.36***	0.29	Reference	0.78	0.43**	0.35
		(0.29, 1.01)	(0.20, 0.65)	(0.04, 2.08)		(0.38, 1.62)	(0.19, 0.98)	(0.05, 2.60)
Acupuncture	Reference	0.62	1.08	0.99	Reference	0.89	1.83	1.12
		(0.28, 1.34)	(0.56, 2.07)	(0.21, 4.73)		(0.33, 2.41)	(0.72, 4.65)	(0.22, 5.70)

Source: National Health Interview Survey (2002).
*$p<0.1$.
**$p<0.05$.
***$p<0.01$.
[a]The estimation of unadjusted odds ratios was based on bivariate logistic regression models.
[b]Adjusted odds ratios were estimated after controlling for the effects of age, gender, race/ethnicity, education attainment, total family income, marital status, self-reported health status, region of residence in the US, health insurance coverage, employment status, history of chronic disease, and family size.
[c]Among those who were interviewed in other languages, none reported use of megavitamins.

This pattern was also evident for the use of herbal treatments, chiropractic care, yoga-taichi-qigong, massage therapy, special diets, megavitamins, and homeopathy.

While adjusting for the effects of other relevant predictors of CAM use mitigated the effects of language of interview on CAM use and their levels of statistical significance, the relationship between language of interview and CAM use revealed in the unadjusted models generally persisted. For the use of relaxation techniques, chiropractic care, yoga-taichi-qigong, massage therapy, special diets, and homeopathy, being interviewed in Spanish was usually associated with the lowest odds of CAM use compared to being interviewed in English and Spanish, or English only. Thus, the results indicate that even after taking into account the effects of other predictors of CAM use, the level of English proficiency still has a significant impact on the odds of CAM use.

A notable exception to this observed pattern between language of interview and CAM use lies in the case of use of prayer for health reasons. Based on the unadjusted odds ratios, respondents from households that were interviewed in both English and Spanish showed the highest odds of praying—48% higher than that for those who came from households interviewed in English. Results on the adjusted odds ratios indicate that even after adjusting for the effects of other relevant predictors of prayer, being interviewed in English and Spanish is still associated with a 27% higher chance of praying than those who were interviewed in English only.

Discussion

Acculturation is the process in which immigrants become gradually assimilated into the mainstream culture by adopting its values, customs, and practices. Such a process has important implications for the health behaviors of—as well as the utilization of health care services by—immigrants (Antecol & Bedard, 2006; Evenson et al., 2004; Laroche, 2000; Leclere et al., 1994). Findings from our study show that the level of acculturation—as measured by nativity/length of stay in the US and language of interview—is strongly associated with CAM use. As immigrants stay longer in the US or as their use of English becomes more proficient, the likelihood that they use CAM therapies increases as well, and it gradually approaches the level of CAM use by native-born Americans. Moreover, the relationship between acculturation and CAM use generally persists even after the effects of socioeconomic status, health insurance coverage, self-reported health status, and other demographic variables have all been taken into consideration. While adjusting for these effects modifies the relationship between acculturation and CAM use, it does not fundamentally alter it.

The lower rates of CAM use by recent immigrants deserve attention. Compared to native-born Americans, immigrants who have been in the US less than 10 years are far less likely to use megavitamins, chiropractic care, and massage therapy. These three CAM therapies stand in contrast with other types of CAM therapies for which the distinction between immigrants and native-born Americans is not so salient. Relative to other CAM therapies (e.g. prayer and herbal medicine), chiropractic care and massage therapies are more expensive and are usually delivered by professional providers, often as a complementary service to conventional health care. The substantially lower use of these two CAM therapies by immigrants suggests that the likelihood of use is related to the cost or accessibility of these CAM therapies. Although we have taken into account the effects of the presence of health insurance coverage on the use of these CAM therapies, we have not evaluated the effects of differential coverage features in health insurance plans on the use of CAM. If the health insurance plans typically purchased by immigrants provide less CAM coverage than those obtained by native-born Americans, this might partly explain why recent immigrants were less likely to use certain CAM therapies such as chiropractic care, massage therapies, and megavitamins.

Besides the issues of health insurance coverage, a lack of knowledge of CAM modalities in the US by recent immigrants could also explain their relatively lower rates of CAM use. The importance of cognitive resources in the utilization of health care has been well documented in previous studies (Andersen, 1995; Andersen & Newman, 1973; Leclere et al., 1994). Given that the majority of immigrants to the US now come from Latin America and Asia, it could well be the case that many of them have not been exposed to some CAM modalities in their country of origin which nonetheless are popular in the US. As a result, when these immigrants arrive in the US they might not be fully aware of the existence of these therapies

regardless of their socioeconomic status and health insurance coverage.

The lower use of CAM by more recent immigrants might also be related to their perceived need for CAM use. Available evidence has shown that upon their arrival immigrants are generally healthier than native-born Americans, but this health advantage dissipates as immigrants stay longer in the US (Antecol & Bedard, 2006; House, Kessler, & Herzog, 1990). If this is the case, it becomes reasonable to believe that new immigrants, due to their relatively better health, tend to perceive less of a need for CAM use than native-born Americans do, which is consistent with what we have observed in this study. As immigrants stay longer, their perceived need for CAM use will grow. Such a growth can result both from a deteriorating health over time and from the extra barriers (e.g., limited English proficiency and lack of health insurance coverage) that many immigrants have to overcome before they can get access to conventional medical care in the US.

This study also provides some evidence for the exchangeability of the two common measures of acculturation: length of stay in the US and level of English proficiency. The consistency in the findings on the association between acculturation and CAM use when both measures are used suggests that when used as indicators of the overall level of acculturation, these two indicators are interchangeable since length of stay in the US is positively related to the level of English proficiency. However, the preferred language of interview can capture information regarding the specific cultural background of the respondents, which is beyond what length of stay can measure. This is important because knowing the cultural background of immigrants and whether they practice certain types of CAM therapies in their native culture can be instrumental in assessing CAM use patterns after their arrival to the US.

Limitations of the study

Several limitations of the data have restricted our ability to identify and explain the patterns of the association between acculturation and CAM use. First, the information on CAM use in the past 12 months was based on the recall of respondents. The existence of biased recall and its severity could potentially affect our findings. It would be valuable if future studies can compare our findings to corresponding findings using information on CAM use based on a short-interval follow-up study and evaluate if there are any differences. Second, for households that were interviewed in both English and Spanish, although language of interview at the household level can be used as a proxy for acculturation at the individual level, a more direct and precise measure would be language of interview at the individual level, which is unavailable in the 2002 NHIS. For example, in many Latino households, parents might feel more comfortable if they were interviewed in Spanish but their children—especially those who received their education in the US—might prefer to be interviewed in English. Third, there is always the possibility of chance findings when multiple regressions are employed to study the most common 10 CAM therapies. Finally, no questions were asked in the 2002 NHIS concerning CAM awareness by respondents and whether or not the level of CAM awareness or literacy differs between immigrants and native-born Americans. Future analyses of such information could provide important insights into the association between acculturation and CAM use.

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Appendix

(See Table A1–A3)

Table A1
Percentage of CAM use by acculturation categories: United States, 2002 NHIS

Therapy	Acculturation measurement								
	Nativity/length of residence in the US ($N = 30{,}872$)					Language of interview ($N = 30{,}988$)			
	Native	Foreign born				English only	English and Spanish	Spanish only	Other
		⩾15 years	10–15 years	5–10 years	<5 years				
At least one CAM	60.6 (0.4)	61.1 (1.2)	55.2 (2.4)	52.6 (2.3)	49.2 (2.1)	60.3 (0.4)	59.3 (2.2)	51.9 (1.9)	64.7 (6.3)
Prayer for health reasons	43.8 (0.4)	45.1 (1.3)	42.0 (2.3)	39.5 (2.2)	37.0 (2.0)	43.3 (0.4)	53.1 (2.2)	45.4 (1.8)	49.8 (6.7)
Herbal medicine	18.5 (0.3)	22.3 (1.0)	15.9 (1.4)	17.8 (1.9)	15.7 (1.5)	18.6 (0.3)	16.2 (1.8)	15.5 (1.2)	27.6 (4.5)
Relaxation techniques	14.9 (0.3)	11.2 (0.9)	8.5 (1.4)	7.5 (1.3)	10.7 (1.4)	14.7 (0.3)	6.9 (1.2)	3.8 (0.7)	8.4 (3.4)
Chiropractic care	8.1 (0.2)	4.2 (0.5)	4.0 (0.9)	1.8 (0.6)	0.7 (0.3)	7.7 (0.2)	2.9 (0.8)	1.6 (0.5)	2.0 (1.4)
Yoga-taichi-qigong	5.8 (0.2)	5.3 (0.7)	4.6 (0.9)	4.8 (1.0)	3.9 (0.7)	5.9 (0.2)	1.4 (0.5)	0.4 (0.2)	3.8 (2.0)
Massage	5.1 (0.2)	3.9 (0.5)	4.0 (0.8)	1.5 (0.5)	1.4 (0.4)	5.1 (0.2)	1.3 (0.5)	0.9 (0.3)	2.6 (1.4)
Special diets	3.5 (0.1)	3.5 (0.4)	3.2 (0.7)	3.1 (0.8)	2.1 (0.5)	3.5 (0.1)	1.7 (0.6)	1.3 (0.3)	2.0 (1.5)
Megavitamins	3.0 (0.1)	1.8 (0.4)	1.0 (0.4)	0.8 (0.5)	0.7 (0.4)	2.9 (0.1)	1.0 (0.4)	0.4 (0.2)	0.0 (0.0)
Homeopathy	1.7 (0.1)	1.4 (0.2)	1.9 (0.6)	1.3 (0.5)	1.7 (0.6)	1.7 (0.1)	0.9 (0.3)	0.6 (0.2)	0.5 (0.5)
Acupuncture	1.0 (0.1)	1.3 (0.3)	1.5 (0.6)	1.3 (0.6)	0.6 (0.2)	1.0 (0.1)	0.6 (0.2)	1.1 (0.4)	1.0 (0.8)
Energy healing therapy/Reiki	0.5 (0.1)	0.4 (0.1)	0.3 (0.2)	0.4 (0.3)	0.9 (0.5)	0.5 (0.1)	0.3 (0.2)	0.1 (0.1)	0.0 (0.0)
Hypnosis	0.3 (<0.1)	0.2 (0.1)	0.0 (0.0)	0.2 (0.2)	0.0 (0.0)	0.3 (<0.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Naturopathy	0.2 (<0.1)	0.3 (0.1)	0.2 (0.2)	0.6 (0.4)	0.1 (0.1)	0.2 (<0.1)	0.2 (0.1)	0.1 (0.1)	0.0 (0.0)
Biofeedback	0.1 (<0.1)	<0.1 (0.1)	0.0 (0.0)	0.2 (0.2)	0.0 (0.0)	0.1 (<0.1)	0.1 (0.1)	0.1 (0.1)	0.0 (0.0)
Folk medicine	0.1 (<0.1)	0.1 (0.1)	0.1 (0.1)	0.3 (0.3)	0.0 (0.0)	0.1 (<0.1)	0.1 (0.1)	0.2 (0.1)	2.0 (1.5)
Ayurveda	0.1 (<0.1)	0.1 (0.1)	0.0 (0.0)	0.1 (0.1)	0.2 (0.2)	0.1 (<0.1)	0.0 (0.0)	<0.1 (<0.1)	0.0 (0.0)
Chelation therapy	<0.1 (<0.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	<0.1 (<0.1)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Source: National Health Interview Survey (2002).
Note: The values in parentheses are standard errors.

Table A2
Adjusted odds ratios of CAM use by nativity/length of residence in the US: United States, 2002 NHIS

Explanatory variables	Odds ratio										
	At least one CAM	Prayer	Herbal medicine	Relaxation techniques	Chiropractic care	Yoga-taichi-qigong	Massage	Special Diets	Mega-vitamins	Homeopathy	Acupuncture
Nativity/length of residence											
US born	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Foreign born and stay											
⩾15 years	1.10	1.08	1.25***	0.75***	0.69**	1.05	0.94	1.21	0.76	0.86	1.00
10–15 years	0.83*	1.01	0.73**	0.58***	0.63*	0.78	1.00	1.16	0.67	1.04	1.02
5–10 years	0.82	0.94	1.04	0.52***	0.37***	0.78	0.36***	1.34	0.04***	0.72	1.32
<5 years	0.76**	0.85	0.94	0.82	0.13***	0.58**	0.37***	0.65	0.31	1.12	0.65
Age											
18–24 years	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
25–34 years	1.18***	1.23***	1.03	0.94	1.16	0.85	1.10	1.32	1.46	0.95	0.72
35–44 years	1.32***	1.35***	1.09	1.03	1.16	0.78*	1.15	1.44*	2.29***	1.17	1.07
45–54 years	1.17**	1.33***	1.12	0.97	1.05	0.60***	0.86	1.57**	2.23***	0.98	1.03
55–64 years	1.10	1.37***	0.98	0.78**	0.92	0.46***	0.61**	1.22	2.15***	1.01	0.72
65 years or older	1.00	1.47***	0.67***	0.41***	0.78	0.24***	0.44***	0.62*	1.18	0.45***	0.49
Gender											
Male	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Female	1.88***	1.87***	1.39***	1.72***	1.23***	3.01***	1.87***	1.35***	1.00	1.94***	1.28
Race/ethnicity											
Non-Hispanic white	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
African American	1.54***	2.34***	0.79***	1.06	0.35***	0.60***	0.55***	0.63***	0.77*	0.33***	0.80
Hispanic	1.27***	1.63***	1.07	0.99	0.66***	0.86	0.77*	0.88	0.64**	0.89	1.46*
Asian	1.13	0.97	1.09	1.33**	0.61**	1.53**	0.80	0.90	0.45	0.79	1.87**
Other	2.02**	1.71*	0.53*	1.05	1.21	0.88	2.81*	0.95	1.44	1.19	1.49
Educational attainment											
<High school	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
High school graduate	1.16***	1.06	1.54***	1.49***	1.22*	1.93***	1.68**	1.63***	1.47**	1.19	1.19
Some college	1.58***	1.22***	2.18***	2.48***	1.50***	3.52***	2.72***	2.53***	2.24***	2.16***	1.82*
College graduate or higher	2.11***	1.35***	2.99***	3.62***	1.32**	6.56***	4.44***	3.69***	3.31***	3.83***	2.88**
Family income											
<$20,000	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
$20,000–$44,999	1.02	0.90**	1.13*	1.28***	1.45***	1.28**	1.45***	1.24*	1.65***	1.01	1.10
$45,000–$74,999	1.01	0.82***	1.13*	1.30***	1.51***	1.29**	1.76***	1.20*	1.73***	1.12	1.37
$75,000 or over	0.94	0.66***	1.22***	1.28***	1.48***	1.78***	2.85***	1.69***	1.67***	1.37	1.81*

Table A2 (*continued*)

Explanatory variables	Odds ratio										
	At least one CAM	Prayer	Herbal medicine	Relaxation techniques	Chiropractic care	Yoga-taichi-qigong	Massage	Special Diets	Mega-vitamins	Homeopathy	Acupuncture
Marital status											
Married	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Divorced	0.92	0.85***	1.12*	1.43***	0.95	1.24*	1.40***	1.35**	1.32**	1.07	1.09
Separated	0.95	0.86*	1.06	1.47***	0.95	1.14	1.09	0.95	0.78	1.02	0.71
Single/never married	0.80***	0.68***	0.99	1.12	0.81**	0.99	1.36***	1.20	1.20	1.08	0.93
Widowed	0.99	1.01	0.91	0.95	0.67***	0.66***	0.82	0.72	0.95	0.60*	0.70
Self-reported health status											
Excellent	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Very good	1.14***	1.13***	1.14***	1.19***	1.11	0.82***	1.04	0.98	0.89	1.13	1.10
Good	1.21***	1.25***	1.16***	1.18**	1.14*	0.67***	1.09	1.03	0.97	1.03	1.25
Fair	1.74***	1.90***	1.21**	1.31***	1.13	0.57***	1.09	1.16	1.02	1.87***	1.92**
Poor	2.72***	2.71***	1.00	1.61***	1.28	0.48***	1.67**	1.63**	1.50*	1.09	2.10*
History of chronic disease											
No	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Yes	1.54***	1.47***	1.28***	1.49***	1.30***	1.26***	1.36***	1.35***	1.43***	1.27*	1.19
Region of residence											
Northeast	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Midwest	1.18***	1.40***	0.87**	1.13*	1.24**	0.81*	1.10	1.00	0.79	0.72*	0.74
South	1.28***	1.69***	0.82***	0.81***	0.68***	0.64***	0.84	1.00	0.89	0.67**	0.47***
West	1.21***	1.11**	1.32***	1.32***	1.26***	1.06	1.81***	1.26**	1.17	1.52**	1.40
Health insurance status											
Uninsured	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Insured	1.01	1.08	0.80***	0.88**	0.96	0.86	0.81	0.81*	0.92	0.47***	0.89
Employment status											
Not employed	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Employed	0.92**	0.87***	1.10*	0.84***	1.23**	0.82**	1.09	1.04	0.72***	1.06	0.88
Family size	0.94***	1.01	0.92***	0.91***	0.93**	0.74***	0.82***	0.90**	0.89**	0.86**	0.83***
N	24,911	24,911	24,905	24,911	24,903	24,911	24,900	24,911	24,910	24,911	24,908

Source: Estimations based on the National Health Interview Survey (2002).
*$p<0.1$
**$p<0.05$
***$p<0.01$.

Table A3
Adjusted odds ratios of CAM use by language of interview: United States, 2002 NHIS

Explanatory variables	Odds ratio										
	At least one CAM	Prayer	Herbal medicine	Relaxation techniques	Chiropractic care	Yoga-taichi-qigong	Massage	Special diets	Mega-vitamins	Homeopathy	Acupuncture
Language of interview											
English only	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
English and Spanish	1.15	1.27**	1.22	0.62**	0.58	0.61	0.51	0.77	1.07	0.78	0.89
Spanish only	0.74***	0.83*	1.06	0.38***	0.47**	0.15***	0.36**	0.71	0.43*	0.43**	1.83
Other	1.55	1.74*	1.42	0.50	0.43	0.55	0.94	0.87	–	0.35	1.12
Age											
18–24 years	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
25–34 years	1.19***	1.24***	1.04	0.93	1.15	0.85	1.11	1.34	1.44	0.93	0.72
35–44 years	1.34***	1.37***	1.10	1.02	1.18	0.79*	1.18	1.46*	2.30***	1.18	1.08
45–54 years	1.20***	1.36***	1.14	0.97	1.07	0.62***	0.90	1.60**	2.26***	0.97	1.04
55–64 years	1.14	1.40***	1.00	0.80**	0.94	0.48***	0.68*	1.25	2.20***	1.00	0.72
65 years or older	1.03	1.50***	0.69***	0.42***	0.80	0.25***	0.48***	0.64*	1.20	0.44***	0.50
Gender											
Male	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Female	1.87***	1.87***	1.38***	1.72***	1.24***	3.01***	1.88***	1.36***	1.01	1.92***	1.29
Race/ethnicity											
Non-Hispanic white	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
African American	1.53***	2.35***	0.80***	1.02	0.34***	0.59***	0.53***	0.63***	0.75**	0.33***	0.81
Hispanic	1.29***	1.65***	1.06	1.01	0.62***	0.96	0.80	0.99	0.59***	0.98	1.31
Asian	1.03	0.93	1.10	1.02	0.41***	1.36**	0.66**	0.99	0.31**	0.85	1.88**
Other	1.87*	1.65*	0.53*	0.96	0.93	0.83	2.46	0.95	1.27	1.20	1.42
Educational attainment											
<High school	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
High school graduate	1.16***	1.07	1.55***	1.46***	1.21*	1.81***	1.67**	1.57**	1.47**	1.11	1.27
Some college	1.58***	1.23***	2.19***	2.40***	1.49***	3.29***	2.66***	2.44***	2.24***	2.03***	1.94*
College graduate or higher	2.10***	1.35***	3.00***	3.49***	1.29**	6.11***	4.31***	3.57***	3.25***	3.62***	3.03**
Family income											
<$20,000	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
$20,000–$44,999	1.03	0.90**	1.13**	1.26***	1.46***	1.28**	1.41***	1.25*	1.66***	1.00	1.12
$45,000–$74,999	1.01	0.83***	1.14**	1.28***	1.53***	1.29**	1.70***	1.20	1.74***	1.11	1.41
$75,000 or over	0.94	0.67***	1.24***	1.26***	1.51***	1.77***	2.74***	1.69***	1.69***	1.32	1.88*

Table A3 (*continued*)

Explanatory variables	Odds ratio										
	At least one CAM	Prayer	Herbal medicine	Relaxation techniques	Chiropractic care	Yoga-taichi-qigong	Massage	Special diets	Mega-vitamins	Homeopathy	Acupuncture
Marital status											
Married	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Divorced	0.93	0.85***	1.12**	1.44***	0.97	1.25*	1.43***	1.35**	1.35**	1.05	1.10
Separated	0.96	0.88	1.05	1.53***	0.96	1.15	1.32	0.94	0.79	0.99	0.71
Single/never married	0.81***	0.69***	0.99	1.14*	0.84*	1.01	1.42***	1.20	1.23	1.06	0.94
Widowed	0.99	1.01	0.91	0.95	0.67***	0.67**	0.82	0.71	0.96	0.59*	0.71
Self-reported health status											
Excellent	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Very good	1.14***	1.13***	1.14***	1.18***	1.11	0.82***	1.03	0.99	0.89	1.11	1.10
Good	1.22***	1.25***	1.16***	1.17**	1.15*	0.68***	1.08	1.04	0.98	1.01	1.25
Fair	1.74***	1.90***	1.21**	1.30***	1.14	0.58***	1.07	1.17	1.03	1.84***	1.92**
Poor	2.71***	2.70***	1.00	1.60***	1.30	0.48**	1.64**	1.64**	1.52*	1.07	2.12*
History of chronic disease											
No	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Yes	1.55***	1.48***	1.29***	1.51***	1.33***	1.27***	1.38***	1.34***	1.45***	1.27*	1.19
Region of residence											
Northeast	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Midwest	1.19***	1.40***	0.87**	1.16**	1.27***	0.81*	1.11	1.00	0.81	0.71*	0.75
South	1.28***	1.68***	0.82***	0.83***	0.70***	0.65***	0.86	1.00	0.91	0.66***	0.47***
West	1.23***	1.12*	1.32***	1.37***	1.29***	1.08	1.87***	1.26**	1.20	1.49**	1.40
Health insurance status											
Uninsured	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Insured	1.02	1.09*	0.81***	0.87**	0.99	0.84*	0.83	0.80*	0.94	0.46***	0.92
Employment status											
Not employed	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Employed	0.92*	0.87***	1.10*	0.85***	1.25***	0.83**	1.13	1.05	0.73***	1.07	0.88
Family size	0.94***	1.01	0.92***	0.92***	0.94**	0.75***	0.84***	0.91**	0.90**	0.85***	0.82***
N	24,933	24,931	24,925	24,931	24,923	24,931	24,920	24,931	24,930	24,931	24,928

Source: Estimations based on the National Health Interview Survey (2002).

*$p<0.1$.

**$p<0.05$.

***$p<0.01$.

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