Language barriers in Hispanic patients: relation to upper-extremity disability

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Abstract

Background Although upper-extremity disability has been shown to correlate highly with various psychosocial aspects of illness (e.g., self-efficacy, depression, kinesiophobia, and pain catastrophizing), the role of language in musculoskeletal health status is less certain. In an English-speaking outpatient hand surgery office setting, we sought to determine (1) whether a patient's primary native language (English or Spanish) is an independent predictor of upper-extremity disability and (2) whether there are any differences in the contribution of measures of psychological distress to disability between native English- and Spanish-speaking patients.

Methods A total of 122 patients (61 native English speakers and 61 Spanish speakers) presenting to an orthopaedic hand clinic completed sociodemographic information and three Patient-Reported Outcomes Measurement Information System (PROMIS)-based computerized adaptive testing questionnaires: PROMIS Pain Interference, PROMIS Depression, and PROMIS Upper-Extremity Physical Function. Bivariate and multivariable linear regression modeling were performed. **Results** Spanish-speaking patients reported greater upper-extremity disability, pain interference, and symptoms of depression than English-speaking patients. After adjusting for sociodemographic covariates and measures of psychological distress using multivariable regression modeling, the patient's primary language was not retained as an independent predictor of disability. PROMIS Depression showed a medium correlation ($r=-0.35$; $p<0.001$) with disability in English-speaking patients, while the correlation was large ($r=-0.52$;

$p<0.001$) in Spanish-speaking patients. PROMIS Pain Interference had a large correlation with disability in both patient cohorts (Spanish-speaking: $r=-0.66$; $p<0.001$; English-speaking: $r=-0.77$; $p<0.001$). The length of time since immigration to the USA did not correlate with disability among Spanish speakers.

Conclusion Primary language has less influence on symptom intensity and magnitude of disability than psychological distress and ineffective coping strategies. Interventions to optimize mood and to reduce pain interference should be considered in patients of all nationalities.

Type of study/level of evidence: Prognostic II.

Keywords Language · Disability · Hispanic · Latino · Acculturation · Immigration

Introduction

Musculoskeletal disorders are a common source of pain and disability [13, 35]. Psychosocial factors including mood, mindset, and coping strategies are consistently identified as major determinants of symptoms and disability, with objective physical impairment having limited influence [5, 8, 24, 25]. The impact of other psychosocial elements such as acculturation—the multidimensional process of adapting to a different culture—on disability is less well studied.

Low linguistic acculturation to the US society—particularly among Hispanics who are foreign-born and who do not speak English as their primary language—has been shown to affect readmissions and visits to the emergency department and satisfaction in numerous settings of health care delivery [6, 11, 14, 27, 29], but its effect on musculoskeletal disability remains unclear. Given the continued growth of the Latino population and concomitant rise in the demand for health care [26, 30, 31], it is a public health priority to gain a better

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understanding of the factors contributing to poor health status in immigrant patients.

This study sought to determine (1) whether a patient's primary native language is an independent predictor of upper-extremity disability and (2) whether there are any differences in the contribution of psychological factors to upper-extremity disability between native Spanish-speaking and English-speaking patients.

Materials and Methods

Study Design

During February and April 2014, 125 new or follow-up patients presenting to one of three orthopedic hand surgeons were invited to participate in this study approved by the institutional review board. Inclusion criteria were English or Spanish as the primary native language and age of at least 18 years. Pregnant patients were excluded. Three patients (2.4 %) declined participation, thus leaving 122 patients in the study: 61 English speakers and 61 Spanish speakers. Informed consent was obtained from each subject prior to enrollment. Forty-eight of the 61 Spanish-speaking had their visits in Spanish—without the need of a translator—as two of the three surgeons are proficient in that language.

Patient Characteristics

Spanish-speaking patients were significantly younger (50 ± 15 vs. 57 ± 17 years, $p=0.016$), less educated (10 ± 3.7 vs. 16 ± 3.1 years of education, $p<0.001$), and more frequently unemployed (43 vs. 15.3 %, $p=0.001$) than English-speaking patients (Table 1). The average time since arrival in the USA was 20 ± 13 years. The most common diagnosis was compression neuropathy (43 %) in Spanish-speaking patients and hand osteoarthritis (15 %) in English-speaking patients.

Outcome Measures

A bilingual (English and Spanish) research fellow asked all 122 participants to complete three Patient-Reported Outcomes Measurement Information System (PROMIS)-based computerized adaptive testing (CAT) questionnaires: PROMIS Pain Interference [1], PROMIS Depression [28], and PROMIS Upper-Extremity Physical Function [15]. Unlike instruments with a fixed set of items, PROMIS utilizes CAT technology based on item response theory to filter items that are redundant or do not apply to the respondent, thus enabling the administration of individually tailored questionnaires with fewer items while still maintaining adequate psychometrics [7]. Researchers across diverse medical fields, including orthopedic surgery, have embraced this novel approach to measure

patient-reported outcomes [2, 4, 16–18, 24]. As a result of its increasing popularity, most of the PROMIS questionnaires have been translated to Spanish, with translations to several other languages currently underway. For instance, here is a question from the PROMIS Pain Interference questionnaire in English and Spanish, respectively: “In the past 7 days, how much did pain interfere with your day to day activities?”/“¿En los últimos 7 días, en qué medida el dolor interfirió en sus actividades diarias?” All questionnaires were filled out using an electronic tablet. Data were collected and administered with use of Assessment Center, a secure web-based platform promoted and built by the PROMIS initiative (<http://www.assessmentcenter.net>).

The PROMIS Pain Interference questionnaire quantifies the extent to which pain impedes or interferes with patients' physical, mental, and social activities [1]. A higher score indicates greater pain interference. For most PROMIS instruments, the number of items administered ranges from 4 to 12. The score is normalized so that 50 represents the mean for the US general population and each 10 points above or below 50 represents one standard deviation greater or lesser than the mean [1].

The PROMIS Depression questionnaire evaluates depressive symptoms by measuring negative mood (sadness, guilt), views of self (self-criticism, worthlessness), social cognition, and decreased positive effect and engagement (loss of interest, meaning, and purpose) [24, 28]. Somatic symptoms such as changes in appetite and sleep disturbance are not included, as they can be explained by comorbid physical conditions [28]. Higher scores represent greater symptoms of depression.

The PROMIS Upper-Extremity Physical Function questionnaire determines the degree of disability with physical activities that entail use of the arm and hand, such as writing, using buttons, tying shoelaces, and lifting heavy objects [15]. Lower scores indicate higher levels of upper-extremity specific disability.

Statistical Analysis

Continuous data were presented in terms of the mean, the standard deviation, and the range. Categorical variables were reported with frequencies.

In bivariate analysis, the correlations of continuous variables with PROMIS Upper-Extremity Physical Function were analyzed using Pearson correlations. Associations with dichotomous and categorical variables were determined with the independent samples *t* test and one-way analysis of variance (ANOVA), respectively.

In order to determine the factors influencing the PROMIS Upper-Extremity Physical Function scores, explanatory variables with $p<0.10$ in bivariate analysis were inserted into stepwise backward multivariable linear regression models. The adoption of multivariable regression models allowed us

Table 1 Patient demographic characteristics ($n=122$)

Parameter	English speakers ($n=61$)	Spanish speakers ($n=61$)	p value
Age ^a (years)	57±17 (23 to 86)	50±15 (21 to 87)	0.016
Duration of education ^a (years)	16±3.1 (9 to 24)	10±3.7 (0 to 18)	<0.001
Time since arrival in the USA ^a (years)	–	20±13 (0.8 to 56)	–
Sex ^b			
Female	32 (53)	41 (67)	0.096
Male	29 (48)	20 (33)	
Working status ^b			
Full-time	28 (46)	15 (25)	0.001
Part-time	5 (8.2)	14 (23)	
Homemaker	0	0	
Retired	17 (28)	5 (8.2)	
Unemployed, able to work	2 (3.3)	7 (12)	
Unemployed, unable to work	7 (12)	19 (31)	
Worker's compensation	1 (1.6)	1 (1.6)	
Currently on sick leave	1 (1.6)	0	
Marital status ^b			
Single	11 (18)	22 (36)	0.060
Living with partner	2 (3.3)	4 (6.6)	
Married	33 (54)	24 (39)	
Separated or divorced	6 (9.8)	8 (13)	
Widowed	9 (15)	3 (4.9)	
Diagnosis ^b			
Sprain, dislocation, or mallet finger	5 (8.2)	1 (1.6)	0.008
Hand fracture	3 (4.9)	5 (8.2)	
Wrist fracture	7 (12)	8 (13)	
Amputation, crush, or laceration	5 (8.2)	5 (8.2)	
Carpal tunnel or cubital tunnel syndrome	8 (13)	26 (43)	
Osteoarthritis	9 (15)	2 (3.3)	
Trigger finger	4 (6.6)	6 (9.8)	
De Quervain tendinopathy	3 (4.9)	0	
Ganglion cyst	4 (6.6)	2 (3.3)	
Nonspecific arm pain	3 (4.9)	0	
Elbow fracture	3 (4.9)	2 (3.3)	
All other diagnoses	7 (12)	4 (6.6)	
Visit type ^b			
First	25 (41)	27 (44)	0.71
Follow-up	36 (59)	34 (58)	
Prior surgery ^b			
No	45 (74)	43 (71)	0.69
Yes	16 (26)	18 (30)	
Other pain conditions ^b			
No	37 (61)	24 (39)	0.019
Yes	24 (39)	37 (61)	
Smoking status ^b			
No	56 (92)	59 (97)	0.24
Yes	5 (8.2)	2 (3.3)	

p -values in bold denote statistical significance

^a The values are given as the mean and the standard deviation, with the range in parentheses

^b The values are given as the number of patients, with the percentage in parentheses

to control for potential confounders (e.g., diagnosis, education, and work status) and isolate the effect of primary language on upper-extremity disability. The models produced the adjusted R -squared value, a

statistical measure of the percentage of the overall variability in the PROMIS Upper-Extremity Physical Function score that could be accounted for by the variables included in the models.

Results

Outcome Scores

On average, Spanish-speaking patients had higher levels of pain interference (60 ± 6.8 vs. 55 ± 8.6 , $p < 0.001$), greater symptoms of depression (52 ± 9.5 vs. 46 ± 9.8 , $p < 0.001$), and greater upper-extremity disability (34 ± 8.6 vs. 39 ± 9.2 , $p = 0.003$) than English-speaking patients (Table 2).

Bivariate and Multivariable Analyses

In bivariate analysis, upper-extremity disability was correlated with primary language ($t = 3.0$; $p = 0.003$), education ($r = 0.29$; $p = 0.001$), working status ($F = 7.7$; $p < 0.001$), PROMIS Pain Interference ($r = -0.74$; $p < 0.001$), and PROMIS Depression ($r = -0.47$; $p < 0.001$) (Table 3). In multivariable regression analysis, the patient's primary language was not retained as an independent predictor of disability in the final model; the only two factors retained were PROMIS Pain Interference (partial R -squared = 0.35) and PROMIS Depression (partial R -squared = 0.023).

When looking specifically at English-speaking patients, upper-extremity disability was significantly associated with PROMIS Pain Interference, PROMIS Depression, education, and working status (Table 3). The final multivariable model for disability included only PROMIS Pain Interference (partial R -squared = 0.35) and accounted for 59 % of the variability (Table 4).

Among Spanish speakers, disability was correlated with PROMIS Pain Interference, PROMIS Depression, and working status. The final multivariable model (adjusted R -squared = 0.47) included not only PROMIS Pain Interference (partial R -squared = 0.22) but also PROMIS Depression (partial R -squared = 0.055).

Discussion

Although upper-extremity disability has been shown to correlate highly with various psychosocial aspects of illness (e.g., self-efficacy, depression, kinesiophobia, and pain catastrophizing) [5, 8, 24, 32], the role of language in

musculoskeletal health status remains largely unexplored. This study sought to determine (1) whether a patient's primary native language (English or Spanish) is an independent predictor of upper-extremity disability and (2) whether there are any differences in the contribution of measures of psychological distress to disability between native English- and Spanish-speaking patients.

Several limitations of the study should be kept in mind to better interpret our results. First, although we dichotomized language proficiency, many would argue that it is a more continuous concept [6, 12]. Second, similar musculoskeletal disability may be rated different by disparate cultural groups owing to their inherent conceptualization of how the measure should be anchored [6]. Third, despite gathering data on education, we did not assess health literacy, which may be an important barrier to patients' understanding of their diagnoses and associated disability [23]. Finally, our findings may best apply to the nationalities that we encounter in our city.

In agreement with a study by Lavernia and colleagues [19] in patients with late-stage hip and knee osteoarthritis, Spanish speakers reported greater musculoskeletal disability than English speakers. However, after adjusting for sociodemographic covariates and measures of psychological distress, the patient's primary language was not retained as an independent predictor of disability. Rather, the higher levels of disability observed in this patient population were primarily mediated by accentuated symptoms of depression and pain interference.

Consistent with prior studies, pain interference (catastrophic thinking, low self-efficacy) and symptoms of depression were strongly correlated with upper-extremity disability [9, 10, 20, 24]. Depressive symptoms showed a medium correlation (-0.35) with disability in English-speaking patients, while the correlation was large (-0.52) in Spanish-speaking patients. PROMIS Pain Interference had a large correlation with disability in both patient cohorts (Spanish-speaking, -0.66 ; English-speaking, -0.77).

It has been previously noted that immigrants experience a decline in health with increasing length of stay in the USA, despite improved socioeconomic status and more occupational opportunities [21, 22, 33]. We did not see this phenomenon in our patients; increasing time since immigration did not correlate with disability among foreign-born Hispanics.

Table 2 Outcome scores ($n = 122$)

Instrument ^a	English speakers	Spanish speakers	<i>p</i> value
PROMIS Pain Interference	55±8.6 (39 to 72)	60±6.8 (34 to 72)	<0.001
PROMIS Depression	46±9.8 (34 to 72)	52±9.5 (34 to 74)	0.001
PROMIS Upper-Extremity Physical Function	39±9.2 (18 to 56)	34±8.6 (20 to 57)	0.003

p-values in bold denote statistical significance

^a The values are given as the mean and the standard deviation, with the range in parentheses

Table 3 Bivariate statistical analysis

Parameter	PROMIS Upper-Extremity Physical Function					
	English speakers		Spanish speakers		All patients	
Pearson correlation	<i>R</i> value	<i>p</i>	<i>R</i> value	<i>p</i>	<i>R</i> value	<i>p</i>
Age	0.007	0.96	0.007	0.96	0.064	0.48
Education	0.31	0.015	0.016	0.90	0.29	0.001
Time since arrival in the USA	–	–	0.15	0.26	–	–
PROMIS Pain Interference	–0.77	<0.001	–0.66	<0.001	–0.74	<0.001
PROMIS Depression	–0.35	0.006	–0.52	<0.001	–0.47	<0.001
<i>t</i> test	<i>t</i> value	<i>p</i>	<i>t</i> value	<i>p</i>	<i>t</i> value	<i>p</i>
Sex	0.31	0.76	1.4	0.18	0.65	0.52
Visit type	–1.4	0.17	–0.62	0.54	–1.5	0.14
Prior surgery	1.57	0.12	0.69	0.49	1.7	0.099
Other pain conditions	0.61	0.55	1.6	0.11	1.1	0.29
Smoking status	1.6	0.12	0.12	0.90	0.83	0.58
Primary language	–	–	–	–	3.0	0.003
One-way ANOVA	<i>F</i> value	<i>p</i>	<i>F</i> value	<i>p</i>	<i>F</i> value	<i>p</i>
Working status	2.4	0.043	5.4	<0.001	7.7	<0.001
Marital status	2.2	0.077	0.70	0.60	0.61	0.66
Diagnoses	1.2	0.31	0.93	0.51	1.8	0.065

p-values in bold denote statistical significance

The observation that Spanish-speaking patients were less educated may account for the lower health literacy levels generally seen in this segment of the population [3, 34]. In our study, we found that with decreasing education, upper-extremity disability increased; in other words, less education was correlated with higher disability. Future research should assess health literacy among hand surgery patients and determine the impact of educational interventions such as decision aids—targeting patients with lower education and limited English proficiency—on musculoskeletal health status [23].

In conclusion, our data suggest that primary language has less influence on symptom intensity and magnitude of disability than psychological distress and ineffective coping strategies. Interventions to optimize mood and to reduce pain

interference hold great potential to decrease musculoskeletal symptom intensity and magnitude of disability, and should not be neglected in the ever-growing Hispanic immigrant patient population.

Conflict of Interest Mariano E. Menendez declares that he has no conflict of interest.

Kyle R. Eberlin declares that he has no conflict of interest.

Chaitanya S. Mudgal declares that he has no conflict of interest.

David Ring declares that he has no conflict of interest.

Statement of Human and Animal Rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent Informed consent was obtained from all subjects, and all identifying details have been omitted from publication.

Table 4 Multivariable statistical analysis

PROMIS Upper-Extremity Physical Function			
Best model	Partial R^2	<i>p</i>	Adjusted R^2
English speakers			
PROMIS Pain Interference	0.59	<0.001	0.59
Spanish speakers			
PROMIS Pain Interference	0.22	<0.001	0.47
PROMIS Depression	0.055	0.015	
All patients			
PROMIS Pain Interference	0.35	<0.001	0.57
PROMIS Depression	0.023	0.013	

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