Published in final edited form as:

Hisp Health Care Int. 2020 March ; 18(1): 12–19. doi:10.1177/1540415319881755.

Prescription Opioid Use Among Hispanics/Latinos With Arthritis Symptoms: Results From the Hispanic Community Health Study/ Study of Latinos

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Abstract

Introduction: To determine the prevalence of prescription opioid (PO) use among Hispanics/ Latinos with arthritis symptoms and to characterize how demographic and cultural factors are associated with PO use.

Method: Cross-sectional analysis of baseline visit data during 2008 to 2011 from the Hispanic Community Health Study/Study of Latinos, a population-based cohort study of 16,415 Hispanics/ Latinos living in Chicago, Illinois, Miami, Florida, Bronx, New York, and San Diego, California. Included participants self-reported painful inflammation or swelling in one or more joints. Multivariate models controlling for physical and mental health scores were constructed to assess how demographic and cultural factors were associated with PO use.

Results: A total of 9.3% were using POs at the time of the baseline visit. In multivariate models, persons of Cuban background (adjusted odds ratio [AOR] = 0.42, 95% confidence interval [CI; 0.21, 0.81]) and of Dominican background (AOR = 0.38, 95% CI [0.18, 0.80]) were significantly less likely to use POs compared with a reference group of persons of Mexican background. Greater language acculturation was also negatively associated with PO use (AOR = 0.68, 95% CI [0.53, 0.87]).

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Conclusion: POs were used relatively uncommonly, and use showed marked variation between Hispanic/Latino groups. Future study should determine mechanisms for why greater use of English among Hispanics/Latinos might influence PO use.

Keywords

opioids; arthritis; acculturation; disparities; substance abuse; urban issues

Introduction

Arthritis affects greater than 53 million adults living in the United States (21.0% age-adjusted prevalence) and is one of the most common causes of disability (Hootman, Helmick, Barbour, Theis, & Boring, 2016). About 22.7 million adults in the United States (9.8% of all adults) report some activity limitation due to arthritis, and this number is projected to increase by greater than 50% in the next 20 years (Hootman & Helmick, 2006). Severe arthritic burden can lead to use of prescription opioids (POs), and previous research has indicated that at least 25% of persons who report doctor-diagnosed arthritis in community studies take POs (Hootman, Cisternas, Murphy, & Losby, 2016; Wright, Katz, Abrams, Solomon, & Losina, 2014).

Hispanics/Latinos are significantly less likely (15.4% age-adjusted prevalence) to report doctor-diagnosed arthritis compared with non-Hispanic Whites (22.6% age-adjusted prevalence), but Hispanics/Latinos have 19% greater odds of reporting activity limitations due to arthritis compared with non-Hispanic Whites (Barbour, Helmick, Boring, & Brady, 2017). Previous research has suggested that arthritis burden may differ among Hispanic/Latino groups, with persons of Puerto Rican background and of Cuban background reporting the highest and lowest age-adjusted prevalence of doctor-diagnosed arthritis, respectively (21.8% and 11.7%; Centers for Disease Control and Prevention, 2011). Likewise, arthritis-related activity limitations also differ substantially, with persons of Puerto Rican background having three times the odds of limitations due to arthritis compared with persons of Cuban background.

Given the large differences in arthritis and arthritis severity among Hispanic/Latino groups, PO use among persons with arthritis may also differ by Hispanic/Latino background, but this is not presently known. We sought to determine the prevalence of self-reported arthritis symptoms in a large and diverse community-based, population-based sample of Hispanics/Latinos, to calculate the proportion of PO use among those in the sample with self-reported arthritis symptoms, and to characterize how demographic and cultural factors, such as Hispanic/Latino background, birthplace, and acculturation, are associated with PO use among those in the sample with self-reported arthritis symptoms.

Method

Study Population and Data Collection Procedures

We conducted a cross-sectional analysis of baseline visits in the Hispanic Community Health Survey/Study of Latinos (HCHS/SOL). The HCHS/SOL is a prospective, population-

based, cohort study of 16,415 Hispanic/Latino adults aged 18 to 74 years. The cohort includes participants from randomly selected households from four U.S. cities (Chicago, IL; Miami, FL; Bronx, NY; San Diego, CA) who self-identified as Hispanic/Latino. Persons who were institutionalized or not currently living at home, those with plans to move from the area in the next 6 months, those on active duty military service, and those physically unable to attend the baseline examination were ineligible to participate. Sampling design and selection are described in detail elsewhere (Lavange et al., 2010). Of 39,384 persons who met initial eligibility criteria for HCHS/SOL, 16,415 (41.7%) persons were enrolled from 9,872 households. Various ethnic backgrounds are represented, with Mexicans (n = 6,471), Puerto Ricans (n = 2728), Cubans (n = 2,348), Central Americans (n = 1,730), Dominicans (n = 1,460), and South Americans (n = 1,068) making up the bulk of representation. The study was approved by the Institutional Review Boards at each field center and at the coordinating center (Albert Einstein College of Medicine: 2007–432, University of Illinois at Chicago: 2013–1261, University of Miami: 20131007, San Diego State University: 1586091, University of North Carolina: 244996), and all participants gave written informed consent for study participation.

Baseline in person visits were conducted in English or Spanish from 2008 to 2011 based on the participant's preference (Sorlie et al., 2010). At baseline visits, detailed interviews collected self-reported data on participant demographics, socioeconomic status, health status, health behaviors, acculturation, and medication use. For this analysis, participants were those who answered affirmatively to the question "Do you have painful inflammation or swelling of your joints that limits your activities?" included in the HCHS/SOL Medical/Family History Questionnaire (n = 2,731). We conducted a repeatability study among 56 individuals at the four centers who completed a second visit to repeat key procedures and medical history items within a time frame of a few months. The percentage of agreement between the repeated questionnaire item about painful inflammation and swelling was 78.6% with a kappa statistic of 0.29 (95% confidence interval [CI; 0.01, 0.58]).

Measures and Variables

Hispanic/Latino background (Dominican, Central American, Cuban, Mexican, Puerto Rican, South American, more than one heritage, other), age, place of birth (U.S. mainland vs. outside U.S. mainland), years in the United States (among foreign-born and Puerto Rico–born individuals), health insurance status, and educational attainment were assessed through self-report.

Physical and mental health status.—Overall physical and mental health status was assessed by scoring self-reported answers to the Short Form Health Questionnaire–12 (SF-12 v2™) health survey (Burdine, Felix, Abel, Wiltraut, & Musselman, 2000). The SF-12 v2 survey contains categorical questions that assess limitations in role functioning as a result of physical and emotional health. Aggregate scores from this survey can be compared with other study populations in the United States and elsewhere. The SF-12 physical and mental subscale scores are summary measures which are norm-based transformations of SF-12 items scaled to a mean of 50 and standard deviation of 10. The

maximum score of 100 represents the highest level of health, while the minimum score of 0 represents the lowest level of health.

Physical activity.—We used physical activity assessed by the Global Physical Activity Questionnaire (GPAQ) developed by the World Health Organization (Global Physical Activity Questionnaire, 2017). The validity and reliability of GPAQ have been reported previously (Bull, Maslin, & Armstrong, 2009; Hoos, Espinoza, Marshall, & Arredondo, 2012). Metabolic equivalent (MET) values were assigned corresponding to types and intensities of activity. High physical activity was defined as (1) 3 or more days of self-reported work or leisure physical activity and total physical activity ≥1,500 MET-minutes in a week or (2) 7 days of moderate or vigorous physical activity and total physical activity ≥3,000 MET-minutes in a week. Moderate activity level was defined as (1) 3 or more days of self-reported work or leisure physical activity and weekly vigorous physical activity ≥60 minutes in a week, (2) 5 or more days of self-reported work, travel, or leisure physical activity and weekly moderate physical activity ≥150 minutes in a week, or (3) 5 or more days of self-reported moderate-to-vigorous physical activity and weekly total physical activity ≥600 minutes in a week. Low-activity level was defined as not meeting criteria for either high or moderate levels of physical activity.

Directed questions about arthritis medications.—Use of certain medications for arthritis and other related conditions was assessed in a set of survey questions. These questions asked about the use of medications other than aspirin for “arthritis, fever, muscle aches or pains, or cramps” during the past 4 weeks. Answers to these questions were not verified by medication inventory.

Prescription opioid use.—A medication inventory was conducted at the baseline visit to assess medication usage in the 4 weeks prior to the baseline examination visit. Participants were asked to bring their medication pill bottles to the baseline visit to ascertain medication use. Medication barcodes and label data were scanned into a computer and matched to a Medical Therapeutic Classification or the National Drug Code. Manual coding was conducted centrally at the HCHS/SOL coordinating center when necessary. PO users were defined as participants with a medication coded in the following categories: analgesics—narcotic, narcotic agonists, narcotic partial agonist, narcotic combinations, codeine combinations, dihydrocodeinone combinations, fentanyl combinations, hydrocodone combinations, propoxyphene combinations, meperidine combinations, pentazocine combinations, and/or tramadol combinations.

Acculturation.—Acculturation was measured with a modified 10 item version of Marin’s Short Acculturation scale for Hispanics (SASH) to assess the degree of assimilation into the American culture (Marin, Sabogal, Marin, Otero-Sabogal, & Perez Stable, 1987). This instrument has subscales on language and ethnic social relations. The SASH acculturation scales each reflect averages of 5-point Likert-type questions that asked about social and language acculturation. Higher scores represent higher levels of acculturation to the United States. The SASH language acculturation score is based on the first six items, which evaluate what language (English vs. Spanish) respondents use to read, speak, and think. The

SASH social acculturation score is based on the remaining four items, which evaluate preferences and usual habits for social interactions with and without Hispanic/Latino individuals.

Statistical Analysis

Summary statistics were tabulated and weighted for the complex survey design. We first calculated prevalence estimates of self-reported arthritis symptoms in the full sample. All subsequent analyses were restricted to participants who reported painful inflammation or swelling in joints that caused activity limitations, in order to better characterize this subgroup of participants. Where indicated, age-adjustment, standardized to the 2010 U.S. Census, was performed for prevalence estimates of arthritis symptoms and of opioid use. Additionally, we used adjusted Wald tests in survey linear regression or survey logistic regression tests to examine bivariate differences between PO users and nonusers. For probability testing, we assigned reference groups to variables with multiple categories. After results were obtained, we performed additional post hoc bivariate analyses to estimate PO use in certain important subgroups. For these analyses, we created dummy variables to estimate odds ratios.

We developed two multivariate logistic regression models to examine associations between PO use and independent variables of interest. Independent variables of interest included age, gender, body mass index, health insurance status, and Hispanic/Latino group; these were forced into both models. Both models controlled for SF-12 physical and mental health scores. Age, gender, and body mass index, and physical and mental health tend to be highly correlated to arthritis severity (Barbour, Boring, Helmick, Murphy, & Qin, 2016; Curtis, Greenberg, Harrold, Kremer, & Palmer, 2018), so these were determined to be important covariates a priori. GPAQ scores were not added into models as these tend to be correlated with physical health scores (Vancampfort et al., 2018). The Hispanic/Latino background model included age, gender, body mass index, health insurance status, Hispanic/Latino group, SF-12 physical health score, and SF-12 mental health score. The acculturation model added (1) SASH language acculturation scores, (2) SASH social acculturation scores, and (3) length of residence in the United States (categorized as ≥10 years in the United States and born in the U.S. mainland, or ≥10 years in the United States and not born in the U.S. mainland, or <10 years in the United States and not born in the U.S. mainland) to the Hispanic/Latino background model. Because Hispanic/Latino group was highly correlated with field site, we did not formally adjust for site. To address this, we performed exploratory stratified analyses of the Hispanic/Latino background model by Field Center to detect whether differences detected in Hispanic/Latino groups could be caused by local differences in prescribing patterns at Field Centers.

We utilized complete case analysis in this study; participants with missing data for any covariates were removed from all multivariate models (9.5% of the sample). Analyses were performed using Stata 14.0 (StataCorp, College Station, TX).

Results

Of 16,415 participants, 14.0% (14.6% age-standardized to the 2010 U.S. Census) reported symptoms consistent with the presence of arthritis. In this subgroup, mean age was 49.8 (95% CI [48.9, 50.7]) with 17.6% of the sample 65 years or older. About two thirds (62.2%) were female, and average body mass index was 31.4 (95% CI [31.0, 31.8]). About one third (29.6%) of the subgroup were of Mexican background, 23.7% were of Cuban background, 22.9% were of Puerto Rican background, 10.1% were of Dominican background, with subpopulations of persons of Central American background, South American background, and other background making up the remaining 13.6%. About one third (31.2%) of the subgroup came from the Bronx, with the fewest coming from Chicago (14.7%). A total of 44.2% were unemployed and not retired, 37.9% had no health insurance, and 80.3% were born outside the U.S. mainland. A total of 37.1% did not graduate high school, while 37.9% completed greater than a high school education. Three quarters (75.5%) preferred speaking Spanish. About half (48.0%) had “low” self-reported physical activity scores (see Table 1).

Medication and Prescription Opioid Use

Among participants who reported symptoms consistent with arthritis, 26.9% reported using a medication for arthritis, fever, muscle aches or pain, or cramps in the past 4 weeks. From medication review, 9.2% (9.3% age-standardized to the 2010 U.S. Census) were using POs at the time of the baseline examination. Of those using POs, 80.9% had one prescribed PO, 13.6% had two prescribed POs, and 5.4% had three or more prescribed POs. In the subsample of those with health insurance, 8.9% (9.0% age-standardized to the 2010 U.S. Census) were using POs at the time of the baseline examination.

In bivariate analysis, participants with and without PO use had similar mean age, gender, body mass index, education status, and social and language acculturation. The groups differed by Hispanic/Latino group, Field Center, income, health insurance status, U.S. birth status and length or residence in the United States, and by self-reported scores of mental and physical health and physical activity (see Table 2).

In bivariate analysis, specific subgroups had higher odds of PO use, and these tended to be highly correlated. The Bronx had the highest proportion of participants with PO use; when compared with the rest of the sample, a resident of the Bronx had 50% greater odds of using POs (odds ratio [*OR*] = 1.5, 95% CI [1.0, 2.3]). Additionally, persons of Puerto Rican background had 110% greater odds of PO use compared with other Hispanic/Latino groups (*OR* = 2.1, 95% CI [1.4, 3.1]). Likewise, participants with health insurance had 260% greater odds of using POs (*OR* = 3.6, 95% CI [2.2, 6.0]) compared with those without insurance. Of note, persons of Puerto Rican background were largely located in the Bronx, with 52% recruited there. Likewise, the Bronx was the only site to have a greater than 60% of participants with health insurance (85.1%).

Modeling Factors Associated With Prescription Opioid Use

In the Hispanic/Latino background model, which was adjusted for age, gender, body mass index, health insurance status, and SF-12 physical and mental health scores, persons of

Cuban background and Dominican background were significantly less likely to use POs compared with a reference group of persons of Mexican background. Additionally, as expected, health insurance was highly associated with PO use. Age, gender, and BMI were not associated with PO use.

In the acculturation model, which added additional measures of language and social acculturation and a participant's length of residence in the United States, persons of Cuban and Dominican background remained significantly less likely to use POs compared with a reference group of persons of Mexican background. Those with health insurance remained significantly more likely to use POs compared with those without. Additionally, greater language acculturation was associated with lower odds of PO use (adjusted odds ratio [AOR] = 0.68, 95% CI [0.53, 0.87]). Last, persons who were native to the U.S. mainland were 200% more likely to use POs compared with nonnatives living in the United States for less than 10 years (AOR = 3.04, 95% CI [1.27, 7.27]; see Table 3).

Field Center Stratified Analyses

In additional exploratory analyses stratified by field center, we found that persons of Puerto Rican background in the Bronx were significantly more likely to use POs than other Hispanics/Latinos in the Bronx (AOR = 1.96, 95% CI [1.01, 3.83]). In Miami, persons of Cuban background were less likely to use POs than other Hispanics/Latinos in Miami, but this did not reach statistical significance (AOR = 0.48, 95% CI [0.19, 1.19]). In Chicago, there was little evidence of differences in PO use across Hispanic/Latino groups, and the largest subpopulation of persons of Mexican background were not significantly more likely to use POs than other Hispanics/Latinos in Chicago (AOR = 0.66, 95% CI [0.23, 1.9]).

Discussion

In this population-based sample of Hispanics/Latinos, we found that age-adjusted prevalence of self-reported arthritis was comparable to previous studies of doctor-diagnosed arthritis (14.6% vs. 15.4%; Barbour et al., 2017). Additionally, we found relatively uncommon use of POs (9.3% age-adjusted prevalence) among participants with self-reported arthritis compared with other large epidemiologic studies (Hootman, Cisternas, et al., 2016; Wright et al., 2014). In multivariate analyses, we found that health insurance and U.S. nativity were positively associated with using POs. Conversely, being of Cuban or Dominican background and having greater language acculturation were negatively associated with using POs.

We defined arthritis as a self-reported symptom-based inquiry rather than, as is most typical of large epidemiologic studies, a self-reported doctor-diagnosed measure. Previous research has noted the limitations of these symptom-based questions, concluding that perceived joint pain or stiffness is generally less predictive of symptomatic or radiologically confirmed arthritis compared with self-reported doctor-diagnosed arthritis (Szoeke et al., 2008). Nonetheless, the question in this study inquired about the presence of activity limitations due to painful joint inflammation or swelling, perhaps making it more selective for severe arthritic symptoms. This may have potentially limited the proportion of false positives compared with other symptom-based inquiries. Viewed in that context, these estimates are greater than standard estimates of arthritis associated activity limitations from large

epidemiologic studies such as the National Health Interview Survey, which note that about 10% of adults report activity limitations from arthritis (Hootman & Helmick, 2006). This is consistent, however, with previous research that has shown that Hispanics/Latinos are more likely to report activity limitations due to arthritis than non-Hispanic Whites (Barbour et al., 2017).

We found lower use of POs in our sample of Hispanics/Latinos with self-reported arthritis compared with other epidemiologic studies. Estimates of PO use among persons with doctor-diagnosed arthritis in the general U.S. population are widely variable but recent research estimates PO use in this population is at least as high as 25% (Hootman, Cisternas, et al., 2016; Wright et al., 2014). Our lower estimate could be a result of several factors. First, there is substantial evidence that minority groups, including Hispanics/Latinos, are prescribed POs much less frequently than non-Hispanic Whites due to a variety of patient and provider factors (Cintron & Morrison, 2006; Friedman et al., 2019; Hansen & Netherland, 2016; Ringwalt, Roberts, Gugelmann, & Skinner, 2015). For example, providers may prescribe fewer POs to racial and ethnic minorities due to bias or due to misperception of risk (Hirsh, Hollingshead, Ashburn-Nardo, & Kroenke, 2015; Santoro & Santoro, 2018). Additionally, cultural factors among Hispanics/Latinos such as attitudes about the necessity of suffering through pain and attitudes about medications may dissuade them from taking POs (Hollingshead, Ashburn-Nardo, Stewart, & Hirsh, 2016). For example, in one study Hispanics/Latinos were more likely to allow fear of negative treatment outcomes affect their pain care when compared with non-Hispanic Whites (Katz et al., 2011). Second, we would expect prevalence in this sample to be lower as it includes a substantial proportion of patients without health insurance. Nonetheless, even when restricting the sample to only participants with health insurance, we found that Hispanics/Latinos with self-reported arthritis are using POs much less frequently than other Americans. Third, as explained above, our definition of arthritis could include many conditions which can cause transient painful joint inflammation and swelling, some of which may not require treatment with POs. Future research, especially leveraging the longitudinal design of the HCHS/SOL cohort can better elucidate whether participants have chronic symptoms of arthritis that might allow us to better ascertain differences in treatment.

The differences in PO use among Hispanic/Latino groups are exploratory and will require further study. As documented in previous epidemiological research, persons of Cuban background tend to report fewer severe symptoms of arthritis, so this may be influencing the significantly lower PO use in this population. No previous systematic research has documented differences in arthritis severity or PO use among persons of Dominican background, but a recent qualitative study observed low use of POs after total joint replacement among Dominicans living in the Dominican Republic (Yu et al., 2016). We attempted to conduct stratified analyses to determine if there were differences in field centers which could explain the observed associations, but we could not definitively determine if the associations seen are a result of the Hispanic/Latino group or the field center. Last, differences in PO use among Hispanic/Latino groups could instead be due to differences in side effect profiles, as groups that experience greater side effects may be less likely to take POs.

We found that greater language acculturation is protective against PO use for arthritis, even after controlling for health insurance and length of residence in the United States. Acculturation, the process by which persons acquire cultural elements of the dominant society, is especially salient in Hispanic/Latino health. In this context, greater language acculturation is greater use of and greater comfort with English compared with Spanish. Generally, increased acculturation has been associated with worse health behaviors but increased health care use and access (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). Additionally, language barriers among Hispanics/Latinos have been associated with fewer reports of chronic neck or back pain (Bui, Doescher, Takeuchi, & Taylor, 2011) and tied directly to lower likelihood to consult a doctor for pain (Nguyen, Ugarte, Fuller, Haas, & Portenoy, 2005). Given the literature on acculturation and on language barriers, the current findings were unexpected and particularly notable, and we propose that deficiencies in doctor–patient communication may be responsible. In effect, English-speaking patients may preferentially receive more instruction from their doctors about nonopioid therapies for the management of their pain. A survey of 187 health professionals from 2010 concluded that health professionals with limited Spanish proficiency had more difficulty implementing pain treatment practices with their Hispanic/Latino patients compared with health professionals with higher Spanish proficiency (Chiauzzi et al., 2011). Specifically, it was more difficult for them to learn about past pain treatments, to obtain a medication use history, and to advise on nonpharmacologic treatments of pain. Nonetheless, the professionals reported that language barriers had a low effect on their opioid prescribing. This is the first evidence that there may be a connection between decreased language acculturation and PO use. Future research should explore this relationship further.

Conclusion

In this study, we found that self-report of symptoms consistent with arthritis among Hispanics/Latinos in the HCHS/SOL study was comparable to large epidemiologic studies of doctor-diagnosed arthritis. Use of POs in this group was relatively uncommon. Health insurance and U.S. nativity were most highly associated with PO use. Conversely, being of Cuban or Dominican background, or having greater language acculturation was negatively associated with PO use.

Acknowledgments

The authors thank the staff and participants of HCHS/SOL for their important contributions. A complete list of staff and investigators has been provided by Sorlie P., et al. in Ann Epidemiol. 2010 Aug;20: 642-649 and is also available on the study website http://www.cscc.unc.edu/hchs/

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Dr. Perez is supported by the National Institute on Drug Abuse (K23DA044327). Dr. Starrels is supported by the National Institute on Drug Abuse (K24DA046309, R01DA039046). The Hispanic Community Health Study/Study of Latinos was carried out as a collaborative study supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina (N01-HC65233), University of Miami (N01-HC65234), Albert Einstein College of Medicine (N01-HC65235), Northwestern University (N01-HC65236), and San Diego State University (N01-HC65237). The following Institutes/Centers/Offices contribute to the HCHS/SOL through a transfer of funds to the NHLBI: National Center on Minority Health and Health Disparities, the National Institute of Deafness and Other Communications Disorders, the National Institute of

Dental and Craniofacial Research, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Neurological Disorders and Stroke, and the Office of Dietary Supplements.

References

Barbour KE, Boring M, Helmick CG, Murphy LB, & Qin J (2016). Prevalence of severe joint pain among adults with doctor-diagnosed arthritis: United States, 2002–2014. Morbidity and Mortality Weekly Report, 65, 1052–1056. [PubMed: 27711038]

Barbour KE, Helmick CG, Boring M, & Brady TJ (2017). Vital signs: Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2013–2015. Morbidity and Mortality Weekly Report, 66, 246–253. [PubMed: 28278145]

Bui Q, Doescher M, Takeuchi D, & Taylor V (2011). Immigration, acculturation and chronic back and neck problems among Latino-Americans. Journal of Immigrant and Minority Health, 13, 194–201. [PubMed: 20680453]

Bull FC, Maslin TS, & Armstrong T (2009). Global Physical Activity Questionnaire (GPAQ): Nine country reliability and validity study. Journal of Physical Activity & Health, 6, 790–804. [PubMed: 20101923]

Burdine JN, Felix MR, Abel AL, Wiltraut CJ, & Musselman YJ (2000). The SF-12 as a population health measure: An exploratory examination of potential for application. Health Services Research, 35, 885–904. [PubMed: 11055454]

Centers for Disease Control and Prevention. (2011). Prevalence of doctor-diagnosed arthritis and arthritis-attributable effects among Hispanic adults, by Hispanic subgroup: United States, 2002, 2003, 2006, and 2009. Morbidity and Mortality Weekly Report, 60, 167–171. [PubMed: 21330965]

Chiauzzi E, Black RA, Frayjo K, Reznikova M, Grimes Serrano JM, Zacharoff K, & Wood M (2011). Health care provider perceptions of pain treatment in Hispanic patients. Pain Practice, 11, 267–277. [PubMed: 21070592]

Cintron A, & Morrison RS (2006). Pain and ethnicity in the United States: A systematic review. Journal of Palliative Medicine, 9, 1454–1473. [PubMed: 17187552]

Curtis JR, Greenberg JD, Harrold LR, Kremer JM, & Palmer JL (2018). Influence of obesity, age, and comorbidities on the multi-biomarker disease activity test in rheumatoid arthritis. Seminars in Arthritis and Rheumatism, 47, 472–477. [PubMed: 28947312]

Friedman J, Kim D, Schneberk T, Bourgois P, Shin M, Celious A, & Schriger DL (2019). Assessment of racial/ethnic and income disparities in the prescription of opioids and other controlled medications in California. JAMA Internal Medicine, 179, 469–476. [PubMed: 30742196]

Global Physical Activity Surveillance. (2017, December 12). Retrieved from https://www.who.int/ncds/surveillance/steps/GPAQ/en/

Hansen H, & Netherland J (2016). Is the prescription opioid epidemic a White problem? American Journal of Public Health, 106, 2127–2129. [PubMed: 27831792]

Hirsh AT, Hollingshead NA, Ashburn-Nardo L, & Kroenke K (2015). The interaction of patient race, provider bias, and clinical ambiguity on pain management decisions. Journal of Pain, 16, 558–568. [PubMed: 25828370]

Hollingshead NA, Ashburn-Nardo L, Stewart JC, & Hirsh AT (2016). The pain experience of Hispanic Americans: A critical literature review and conceptual model. Journal of Pain, 17, 513–528. [PubMed: 26831836]

Hoos T, Espinoza N, Marshall S, & Arredondo EM (2012). Validity of the Global Physical Activity Questionnaire (GPAQ) in adult Latinas. Journal of Physical Activity & Health, 9, 698–705. [PubMed: 22733873]

Hootman JM, Cisternas M, Murphy L, & Losby J (2016). Prevalence and trends in prescribed opioid use among US adults with Arthritis, 2008–2013, Medical Expenditure Panel Survey: ACR meeting abstracts. Arthritis & Rheumatology, 68(Suppl. 10).

Hootman JM, & Helmick CG (2006). Projections of US prevalence of arthritis and associated activity limitations. Arthritis and Rheumatism, 54, 226–229. [PubMed: 16385518]

Hootman JM, Helmick CG, Barbour KE, Theis KA, & Boring MA (2016). Updated projected prevalence of self-reported doctor-diagnosed arthritis and arthritis-attributable activity limitation among US adults, 2015–2040. Arthritis & Rheumatology, 68, 1582–1587. [PubMed: 27015600]

Katz JN, Lyons N, Wolff LS, Silverman J, Emrani P, Holt HL,… Losina E (2011). Medical decision-making among Hispanics and non-Hispanic Whites with chronic back and knee pain: A qualitative study. BMC Musculoskeletal Disorders, 12, 78. doi: 10.1186/1471-2474-12-78 [PubMed: 21510880]

Lara M, Gamboa C, Kahramanian MI, Morales LS, & Bautista DEH (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. Annual Review of Public Health, 26, 367–397.

Lavange LM, Kalsbeek WD, Sorlie PD, Avilés-Santa LM, Kaplan RC, Barnhart J,… Elder JP (2010). Sample design and cohort selection in the Hispanic Community Health Study/Study of Latinos. Annals of Epidemiology, 20, 642–649. [PubMed: 20609344]

Marin G, Sabogal F, Marin BV, Otero-Sabogal R, & Perez-Stable EJ (1987). Development of a Short Acculturation Scale for Hispanics. Hispanic Journal of Behavioral Sciences, 9, 183–205.

Nguyen M, Ugarte C, Fuller I, Haas G, & Portenoy RK (2005). Access to care for chronic pain: Racial and ethnic differences. Journal of Pain, 6, 301–314. [PubMed: 15890632]

Ringwalt C, Roberts AW, Gugelmann H, & Skinner AC (2015). Racial disparities across provider specialties in opioid prescriptions dispensed to Medicaid beneficiaries with chronic non-cancer pain. Pain Medicine, 16, 633–640. [PubMed: 25287703]

Santoro TN, & Santoro JD (2018). Racial bias in the US opioid epidemic: A review of the history of systemic bias and implications for care. Cureus, 10(12), e3733. [PubMed: 30800543]

Sorlie PD, Avilés-Santa LM, Wassertheil-Smoller S, Kaplan RC, Daviglus ML, Giachello AL,… Heiss G (2010). Design and implementation of the Hispanic community health study/study of Latinos. Annals of Epidemiology, 20, 629–641. [PubMed: 20609343]

Szoeke CEI, Dennerstein L, Wluka AE, Guthrie JR, Taffe J, Clark MS, & Cicuttini FM (2008). Physician diagnosed arthritis, reported arthritis and radiological non-axial osteoarthritis. Osteoarthritis and Cartilage/OARS, Osteoarthritis Research Society, 16, 846–850.

Vancampfort D, Smith L, Stubbs B, Swinnen N, Firth J, Schuch FB, & Koyanagi A (2018). Associations between active travel and physical multi-morbidity in six low and middle-income countries among community-dwelling older adults: A cross-sectional study. PLoS One, 13(8), e0203277. [PubMed: 30161211]

Wright EA, Katz JN, Abrams S, Solomon DH, & Losina E (2014). Trends in prescription of opioids from 2003–2009 in persons with knee osteoarthritis. Arthritis Care & Research, 66, 1489–1495. [PubMed: 24782079]

Yu A, Devine CA, Kasdin RG, Orizondo M, Perdomo W, Davis AM,… Katz JN (2016). Pain management among Dominican patients with advanced osteoarthritis: A qualitative study. BMC Musculoskeletal Disorders, 17, 211. [PubMed: 27184397]

Table 1.

Characteristics of 2,731 Hispanic/Latino Participants With Reported Symptoms of Arthritis.

Factor	Total cohort, % %
Age, mean years	49.8
Female	62.2
Body mass index, mean kg/m^2	31.4
Hispanic/Latino background	
Mexican	29.7
Cuban	23.7
Puerto Rican	22.9
Dominican	10.1
Central American	5.3
South American	5.1
Other	3.2
Field center	
Bronx	31.2
Miami	32.0
San Diego	22.0
Chicago	14.7
Health insurance Income	62.1
$25,000 or less	65.0
$25,001 to $50,000	25.4
$50,001 to $100,000	8.4
$100,001 or more	1.2
Employment status	
Unemployed, not retired	44.2
Employed part time	14.3
Employed full time	24.0
Retired	17.4
Education status	
Less than high school	37.1
High school	24.8
Greater than high school	37.9
Mainland U.S.-born (excluding Puerto Rico)	19.7
≥ 10 years in the U.S. mainland	76.3
Spanish language preference	75.5
SASH Social Acculturation score, mean[a]	2.2
SASH Language Acculturation score, mean[a]	2.0
SF-12 Aggregate Physical Health score, mean[b]	42.2
SF-12 Aggregate Mental Health score, mean[b]	45.6
GPAQ Physical Activity score	

Factor	Total cohort, % %
High activity	9.8
Moderate activity	42.1
Low activity	48.0

Note. SF-12 = Short Form Health Questionnaire–12; GPAQ = Global Physical Activity Questionnaire; SASH Marin's Short Acculturation scale for Hispanics.

[a]The SASH Acculturation scales each reflect averages of 5-point Likert-type questions asked about Social and Language Acculturation, respectively. Higher scores represent higher levels of acculturation to the United States.

[b]The SF-12 subscale scores are summary measures that are norm-based transformations of SF-12 items scaled to a mean of 50 and standard deviation of 10.

Table 2.

Characteristics of 2,731 Hispanics/Latinos Reporting Symptoms of Arthritis by PO Use.

Factor	PO users, %	Nonusers, %	*p*
Age, mean years	51.0	49.7	.36
Female	62.4	62.2	.97
Body mass index	32.0	31.3	.40
Hispanic/Latino background			<.01
Mexican	30.1	29.6	
Puerto Rican	36.7	21.6	
Cuban	15.2	24.4	
Dominican	7.4	10.4	
Central American	3.7	5.5	
South American	5.1	5.1	
Other	1.7	3.3	
Field center			.01
Bronx	40.3	30.4	
Chicago	11.0	15.1	
Miami	21.5	33.0	
San Diego	27.2	21.5	
Income			.04
$25,000 or less	77.3	63.9	
$25,001 to $50,000	18.5	26.1	
$50,001 to $100,000	3.6	8.8	
$100,001 or higher	0.6	1.2	
Health insurance	84.6	60.1	<.0001
Education status			.08
Less than high school	46.5	36.3	
High school	23.5	24.9	
Greater than high school	30.0	38.7	
Mainland U.S.-born (excluding Puerto Rico)	30.0	18.8	<.01
≥ 10 years in the U.S. mainland	86.2	75.4	.03
Spanish language preference	69.2	76.1	.09
SASH Social Acculturation score, mean[a]	2.29	2.20	.08
SASH Language Acculturation score, mean[a]	2.20	2.03	.12
SF-12 Aggregate Physical Health score, mean[b]	31.1	43.2	<.0001
SF-12 Aggregate Mental Health score, mean[b]	41.1	46.1	<.001
GPAQ level[c]			.04
High-activity level	0.6	10.2	
Moderate-activity level	34.3	42.9	
Low-activity level	60.0	46.9	

Note. SF-12 = Short Form Health Questionnaire–12; PO Prescription Opioid; GPAQ = Global Physical Activity Questionnaire; SASH=Marin's Short Acculturation scale for Hispanics.

[a]The SASH Acculturation scales each reflect averages of 5-point Likert-type questions asked about Social and Language Acculturation, respectively. Higher scores represent higher levels of acculturation to the United States.

[b]The SF-12 subscale scores are summary measures that are norm-based transformations of SF-12 items scaled to a mean of 50 and standard deviation of 10.

[c]GPAQ levels are based self-report of exercise duration and intensity. For definitions, please see the text.

Table 3.

Multivariate Analysis of Prescription Opioid Use.

Factor	Odds ratio [95% CI]
Hispanic/Latino background model	
Age	0.99 [0.97, 1.01]
Male gender	1.19 [0.75, 1.89]
BMI category	
Normal weight	1.00 (ref)
Overweight	1.27 [0.56, 2.85]
Obese	0.95 [0.45, 2.01]
Morbidly obese	0.95 [0.36, 2.52]
Hispanic/Latino group[a]	
Mexican	1.00 (ref)
Cuban	0.43 [0.22, 0.84]
Puerto Rican	0.81 [0.47, 1.40]
Dominican	0.40 [0.19, 0.85]
Other	0.77 [0.41, 1.44]
Health insurance	2.32 [1.35, 3.97]
Acculturation model	
Age	0.99 [0.97, 1.01]
Male gender	1.21 [0.77, 1.90]
BMI category	
Normal weight	1.00 (ref)
Overweight	1.27 [0.58, 2.77]
Obese	0.91 [0.45, 1.86]
Morbidly obese	0.92 [0.36, 2.32]
Hispanic/Latino group[a]	
Mexican	1.00 (ref)
Cuban	0.42 [0.21,0.81]
Puerto Rican	0.87 [0.50, 1.52]
Dominican	0.38 [0.18, 0.80]
Other	0.80 [0.44, 1.47]
Health insurance	2.45 [1.39, 4.31]
SASH Language Acculturation score	0.68 [0.53, 0.87]
SASH Social Acculturation score	1.15 [0.78, 1.69]
Longevity in the United States	
Nonnative to United States with <10 years in the United States	1.00 (ref)
Nonnative to United States with ≥ 10 years in the United States	1.15 [0.56, 2.36]
Native to the United States	3.04 [1.27, 7.27]

Note. SF-12 = Short Form Health Questionnaire–12; SASH = Marin's Short Acculturation scale for Hispanics; BMI = body mass index; CI =confidence interval. All models controlled for SF-12 physical and mental health scores.

[a]Central and South Americans are included in the "Other" grouping, owing to small proportions.