

Racial/Ethnic and Gender Prevalences in Reported Common Pains in a National Sample

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Aims: To compare prevalences of self-reported temporomandibular joint and muscle disorders (TMJMD)-type pain, headaches, and neck and back pains in the 2000 to 2005 US National Health Interview Survey (NHIS) by gender and age for non-Hispanic Whites (Whites), Hispanics, and non-Hispanic Blacks (Blacks). **Methods:** Data from the 2000 to 2005 NHIS included information on gender, age, race, ethnicity, and different common types of pain specifically: TMJMD-type pain, severe headaches/migraine, neck, and low back pains. **Results:** A total of 189,992 people were included: 52% female and 48% male, 73% White, 12% Hispanic, 11% Black, and 4% "Other." The overall prevalence of TMJMD-type pain was 4.6%; severe headaches/migraine was 15.4%; neck, 14.9%; and low back, 28.0%. Survey logistic regression models estimating race-specific, age-adjusted curves revealed race by age pain differences. For TMJMD-type pain, White females presented the highest prevalence at younger ages, decreasing after age 40. Prevalences for Hispanic and Black females, although lower at younger ages, increased up to age 60 and remained higher than Whites. Males showed less racial/ethnic and age variation. Severe headaches/migraines presented an age pattern similar to TMJMD-type pain for White females and little overall variation for males, but without racial differences. Neck pain showed some similarities to TMJMD-type pain: higher in Whites at younger ages, lower at older ages, with Hispanics having the highest rates after their 60's. For low back pain, the rates peaked around the sixth decade for all racial/ethnic groups. **Conclusion:** The patterns of TMJMD-type pain varied greatly within and across racial/ethnic groups by gender and across the adult lifespan. Similarities and differences for the other pains were noted. J OROFAC PAIN 2011;25:25-31

Key words: age, back pain, gender, migraine/headache, neck pain, pain, prevalence, race/ethnicity, sample survey, self-report, temporomandibular joint and muscle disorders

Temporomandibular joint and muscle disorders (TMJMDs) are a heterogeneous group of conditions characterized by pain in the temporomandibular joint and/or masticatory muscles and limited or painful jaw movements.¹ Recurrent or persistent pain in over 97% of TMJMD cases results in physical and psychological disability and is the main reason patients seek treatment.¹ Often associated with other pains and conditions, such as pain in the neck and back and headaches, TMJMDs cause significant physical and psychological disability.²⁻⁸ TMJMD-type pains are by far the leading cause of chronic facial pain.^{1,9} They are a common cause of disability in North America and western Europe, accounting for

40% of all chronic pain problems.^{9,10} Pain impairs physical and mental function and results in costly treatments, lost work time, and reduced productivity adversely affecting quality of life.^{11,12} Additional consequences to the physical discomfort that defines pain can include mental, emotional, and financial difficulties.⁹⁻¹³ Recognizing the extent of all pain problems, the 106th US Congress declared the first decade of the 21st century as the “Decade of Pain Control and Research.”¹⁴

To develop good health-care policy, studies of TMJMD-type pain and other common pains representing major US populations are sorely needed. While there is substantial evidence for racial/ethnic disparities in many health conditions,^{15,16} including some common pains such as neck and back,¹⁷ similar disparities in TMJMD-type pain have not been well documented. Although some studies have documented racial/ethnic pain differences in orofacial pain in older adults,¹⁸ to knowledge, national prevalences for TMJMD-type pain and other common pains for different racial/ethnic groups have not been described by gender and across the adult life span in a nonclinical sample. Previously, the authors showed significantly reduced prevalence, incidence, and persistence of TMJMD-type pain in young Black women compared to White women.^{2,19} To expand beyond young women, they then analyzed a nationally representative sample from the 2002 National Health Interview Survey (NHIS) in which they confirmed their findings in young women²⁰⁻²² but found that racial/ethnic differences were modified by age. Younger White females had higher rates of TMJMD-type pain compared to Black females, but importantly at older ages, the reverse was true. The present study extended this previous research and utilizes an NHIS sample pooled over 6 years (2000 to 2005). The purpose was to determine prevalence rates of four common pains, including TMJMD-type pain, for three racial/ethnic groups (non-Hispanic White, non-Hispanic Black, and Hispanic), separately for males and females, across the adult lifespan. Although the emphasis was on TMJMD-type pain, because of its high comorbidities with head, neck, and back pain, they were included in the analyses.

Materials and Methods

Data Source

The study used NHIS data pooled over 6 years from 2000 to 2005. The NHIS is a continuing nationwide household survey designed to collect information

on the demographic characteristics, health status, and health-care use patterns of the US civilian non-institutionalized population. The survey has three modules: a basic module, a periodic module, and a topical module. The basic module contains three components: the family core, the sample adult core, and the sample child core.²³ The variables utilized for the present analyses were taken from the sample adult core of adults aged 18 or older. Pooling data over the 6-year period assured an adequate sample size to obtain stable estimates of pain prevalences and to carefully examine age effects. The response rate for the sample adult questionnaire for the 6 years ranged from 69% in 2005 to 74% in 2002 to 2004.

Variable Construction

The sample adult core included information on sociodemographic characteristics, health conditions and limitations, and health-care utilization.

Pain Variables. Adult NHIS participants were asked to “report pain that lasted a whole day or more not to report fleeting or minor aches or pains.” The stem of the question was: “During the past three months, did you have...” The TMJMD-type pain question ended with “facial ache or pain in the jaw muscles or the joint in front of the ear?” This question is very similar to questions asked in other research studies.^{1,24,25} Persons responding “yes” or “no” to this question were included in these analyses, excluding those with missing or “don’t know” responses. Thus, this question assessed 3-month period prevalence of self-reported TMJMD-type pain. Three other pains were also assessed using the same question stem: neck pain, low back pain, and severe headache/migraine. While it was recognized that respondents reported information about both their racial background and their ethnic background, the study followed the common convention in describing the three major racial/ethnic category variables available from the National Center for Health Statistics (NCHS) surveillance surveys: non-Hispanic White (referred to in the text as White), non-Hispanic Black (referred to in the text as Black), and Hispanic. The NCHS age variables were also used.

Data Analysis. Estimates presented here (prevalence and standard errors) used sampling weights to reflect national population totals. The weights, provided by NCHS, estimate the inverse of the sampling probability for each respondent, adjusted for nonresponse. Following NCHS technical report²⁶ recommendations, the weights were divided by 6, so the results would still pertain to the national population total. Estimates, standard errors,

Table 1 Prevalence of Four Types of Pain by Gender

Pain type/ group	Prevalence (%)	SE (%)	OR	95% CI
TMJMD				
Overall	4.6	0.07		
Female	6.1	0.10	2.22*	(2.10–2.35)
Male ^a	2.9	0.07	—	—
Headaches				
Overall	15.4	0.13		
Female	20.7	0.18	2.45*	(2.37–2.53)
Male	9.6	0.13	—	—
Neck				
Overall	14.9	0.13		
Female	17.2	0.17	1.47*	(1.43–1.52)
Male	12.4	0.15	—	—
Low back				
Overall	28.0	0.19		
Female	29.9	0.22	1.22*	(1.19–1.25)
Male	25.9	0.23	—	—

^aReferent group; * $P < .001$; SE = standard error; CI = confidence intervals; OR = odds ratio.

Table 2 Prevalence of Four Types of Pain by Race/Ethnicity

Race/ethnicity	Prevalence (%)	SE (%)	OR	95% CI
TMJMDs				
NH-White ^a	4.9	0.08	—	—
Hispanic	3.7	0.12	0.74*	(0.69–0.80)
NH-Black	3.5	0.12	0.69*	(0.64–0.74)
Other	3.5	0.27	—	—
Headaches				
NH-White	15.5	0.16	—	—
Hispanic	15.6	0.27	1.00	(0.96–1.05)
NH-Black	15.4	0.32	0.99	(0.95–1.04)
Other	13.0	0.45	—	—
Neck				
NH-White	16.0	0.15	—	—
Hispanic	12.8	0.22	0.77*	(0.74–0.81)
NH-Black	11.5	0.28	0.68*	(0.65–0.70)
Other	10.9	0.40	—	—
Back				
NH-White	29.5	0.22	—	—
Hispanic	24.4	0.31	0.77*	(0.74–0.80)
NH-Black	24.6	0.46	0.78*	(0.74–0.82)
Other	21.5	0.59	—	—

^aReferent group; * $P < .001$; NH = non-Hispanic.

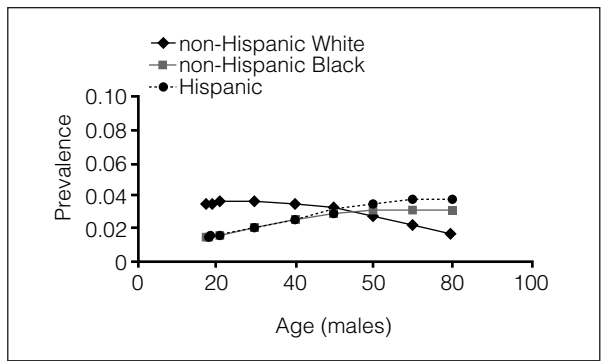
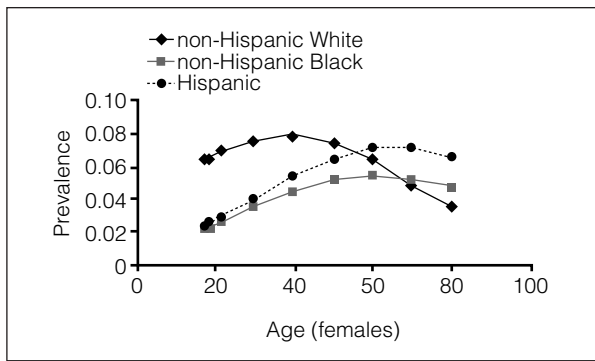
and test statistics were derived using SAS (version 9.1.3, SAS Institute) and SUDAAN (version 9, RTI) software that takes the complex sample design of the survey, including household and intrafamilial clustering of sample observations, into account.²⁷ The results are presented in tabular and graphical form. First, prevalences are presented for TMJMD-type pain, severe headache/migraine, neck pain, and low back pain for the full sample and by gender and race/ethnicity. For each of the four pains, survey logistic regression, estimated odds ratios (OR), and 95% confidence intervals (CI) were used to determine differences among the three racial/ethnic groups. Separately for each gender and each of the four pains, survey logistic regression was used to assess the significance of a nonlinear age effect with a Box-Tidwell approach (ie, $\text{age} \times \ln[\text{age}]$) as a general departure from linearity. Upon finding significant nonlinear age, the authors modeled linear, quadratic (age^2), and cubic (age^3) effects overall and interacting with race/ethnicity, reducing the model by backward elimination of nonsignificant effects ($P > .05$). The resulting models were used to estimate race/ethnicity-specific curves relating to age.

The analysis also included an “Other” group in the analyses of overall prevalences. However, because the Other group consisted of respondents with a very wide range of racial/ethnic characteristics and was not representative of any particular group, that group was not included in analyses comparing pain among racial/ethnic groups.

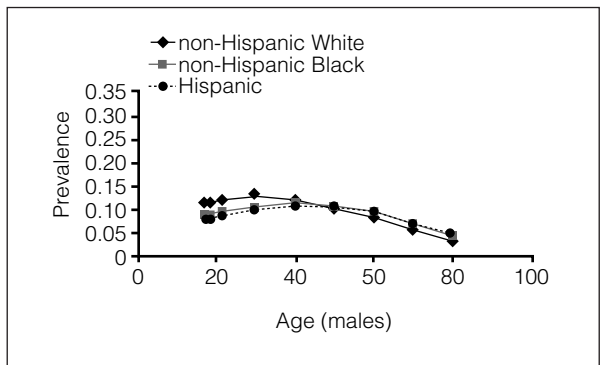
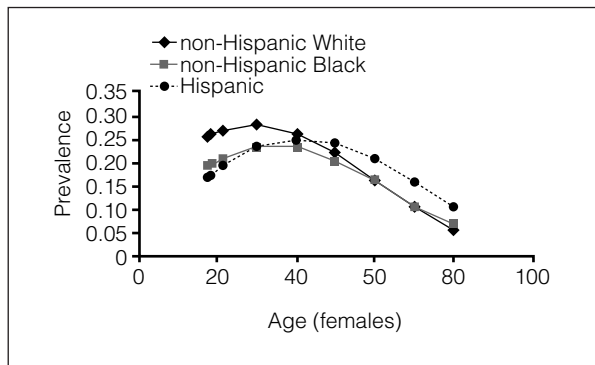
Results

The analyses included 189,992 adults, aged 18 years and above. Forty-eight percent were males, 52%, females; 73%, White; 12%, Hispanic; 11%, Black; and 4%, Other. As noted in Table 1, TMJMD-type pain prevalence was 4.6% for the total sample and significantly higher for females than males. Severe headache/migraine prevalence was 15.4% for the total sample and significantly higher for females than males. Neck pain prevalence was 14.9% for the total sample and significantly higher for females than males. Low back pain prevalence was 28.0% for the total sample and significantly higher for females than males.

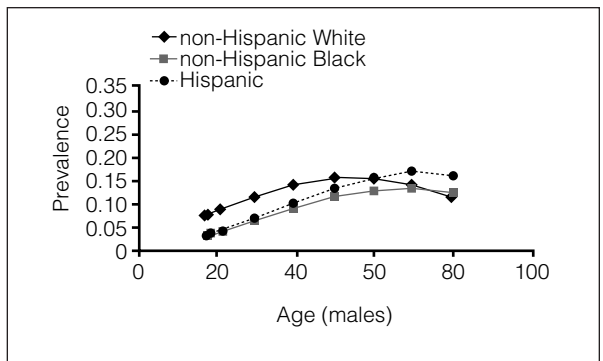
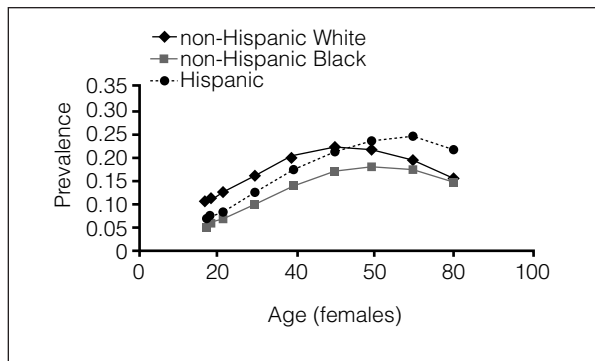
TMJMD



Headaches/migraines



Neck pain



Low back pain

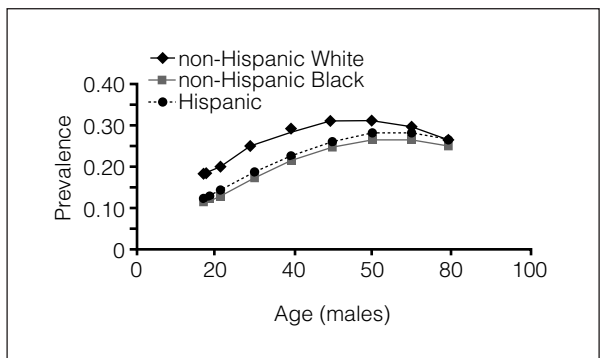
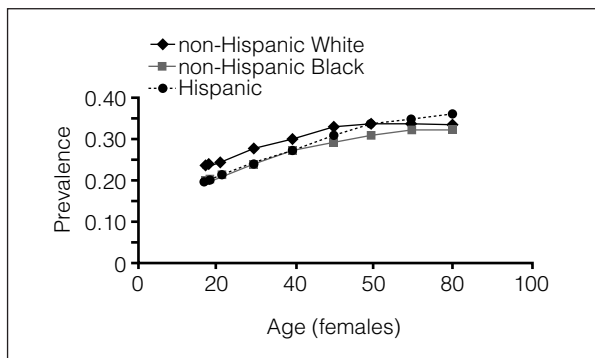


Fig 1 Charts of estimates of prevalences for pain variables for females and males.

Overall, White adults were more likely to report TMJMD-type pain than Hispanic and Black adults (see Table 2). Severe headache/migraine prevalence did not vary significantly among White, Hispanic, and Black adults. White adults were more likely to report neck pain than Hispanic and Black adults. White adults were more likely to report low back pain than Hispanic and Black adults.

Figure 1 illustrates differences by age and race/ethnicity for females and males separately for each of the four types of pain. For the TMJMD-type pain, the patterns among females indicated that TMJMD-type pain prevalence was highest for White females at younger ages and decreased after age 40. Conversely, prevalences for Hispanic and Black females were much lower at young adult ages and then increased up to age 60, followed by slight declines but remaining higher than the White females at those later ages. For males, the pattern was very similar to that of females, but with less difference between Blacks and Hispanics and smaller age differences than in females. For severe headaches/migraine, the patterns among females were similar but less pronounced than that seen for the TMJMD-type pain prevalence, with White females having higher rates than Hispanic and Black females at younger ages and then lower rates at later ages, and an overall decline after ages 40 to 60 years. For males, severe headache/migraine prevalences by race/ethnicity were closer together than for females, with little overall variation. Neck pain prevalences by race/ethnicity and age for females indicated a similar pattern to TMJMD-type pain prevalence for females, with higher rates for White females at younger ages and lower rates at older ages, with Hispanic women having the highest rates after age 60. For males, a similar pattern emerged; however, the rates for males were closer together at later years. Low back pain prevalences by race/ethnicity and age for females indicated a somewhat different pattern than other pain prevalences for females. For low back pain, White females had higher rates more consistently across the age span (both younger and later ages) and rates for all racial/ethnic groups peaked at about age 60. For males, Whites reported higher rates than Hispanics and Blacks across all ages, with rates peaking around age 60.

Discussion

This study has built upon previous research by expanding the inquiry of TMJMD-type pain across the adult lifespan to include both males and females and three major racial/ethnic US populations. To the au-

thors' knowledge, this is the first study using a very large nationally representative US sample to report prevalences of four pains including TMJMD-type pain, by gender and across the adult lifespan, for Whites, Blacks, and Hispanics. These findings confirm results from earlier work showing gender²⁸⁻³⁰ and racial/ethnic differences^{2,18,19} in reported pain. Further, these results extend the findings from the authors' earlier studies²⁰⁻²² by reporting in a nationally representative sample: (1) TMJMD-type pain prevalence for both males and females; (2) prevalence of an additional three reported pains of headaches/migraines, neck pain, and low back pain; and (3) prevalence for the four pains by gender across adult ages for Whites, Blacks, and Hispanics. The results demonstrate the importance of including age as a factor in determining pain prevalence differences among racial/ethnic groups. While the study found that Whites overall had higher rates of TMJMD-type pain, neck pain, and back pain than Blacks and Hispanics, the main effect of race/ethnicity alone failed to describe the variability of pain burden for these groups when examined across the adult lifespan. The prevalence patterns by age indicated that, in most cases, racial/ethnic differences in pain burden were quite different at older ages compared to younger ages.

The results confirm previous reports of TMJMD-type pain prevalence²⁸ as well as neck and back pain prevalence.^{17,31,32} Likewise, the rates of severe headaches/migraines (20.7% for females, 9.6% for males) were similar to rates of migraines in a large population study (17.6% for females, 5.7% for males).³³ A higher male prevalence in the present study than in other studies may be explained, in part, by the somewhat broader definition of the NHIS survey item that combined severe headaches and migraines. Severe headaches may include tension-type headaches and cluster headaches; thus, gender differences may be smaller³⁴ or may indicate male preponderance of cluster headaches.³⁵

The present study confirmed gender differences for TMDMJ-type pain²⁸⁻³⁰ and other types of pain.³³⁻³⁸ The greatest gender differences were for headaches/migraines, followed by TMJMD-type pain, neck pain, and then low back pain. While the pathophysiological basis for these gender differences remains unclear, biological factors such as sex differences in reproductive organs, in the chronobiology of sex hormones, and in sex hormones have been proposed.^{39,40} Complex interactions between biological and psychosocial factors have been reported.^{37,41}

Significant racial/ethnic differences were found for TMJMD-type pain, neck pain, and low back pain. Whites were more likely to report these pains than either Blacks or Hispanics, confirming earlier re-

search.^{2,19} While rates for Whites were significantly higher than either of the other groups, the degree of difference between Blacks and Hispanics was smaller.

The large sample size enabled this study to model pain with linear and quadratic (squared) age effects. The racial/ethnic prevalence patterns varied tremendously across adult ages, highlighting the importance of using a lifespan approach. Of the four types of pains, the racial/ethnic patterns varied the most for TMJMD-type pain among females. During earlier adulthood, Whites had higher TMJMD-type pain than Blacks or Hispanics, but in later adulthood, the prevalence reversed and Whites had lower prevalence than Blacks or Hispanics. For Whites, prevalence peaked around 40 years of age, a finding similar to other reports of primarily White populations.^{28–30} Previous studies on White female populations described either a bell-shaped age distribution,^{28–30} with greatest prevalence around reproductive ages,³⁰ or minimal change with age for males and females.^{42,43}

It is significant that, in contrast to the findings for White females, the present study has shown that the prevalence in TMJMD-type pain for Black and Hispanic females is much lower at younger ages and rises with age, peaking between the ages of 60 to 80, much later than for White women. These findings indicate that middle- to older-aged Blacks and Hispanics may experience a disparity in TMJMD treatment. Furthermore, these results may indicate that the natural history of this type of pain and the mechanisms causing or contributing to its maintenance: (1) may vary by racial/ethnic group and (2) may require a lifespan approach to fully comprehend. This would require in-depth exploration of biological, psychosocial, and environmental factors. For headaches/migraines, the racial/ethnic patterns were less pronounced. For females, prevalence peaked around reproductive age. The patterns of prevalences for neck and back pain, on the other hand, tended to follow the patterns for TMJMD-type pain, with increases across age into or beyond later adulthood.

While the present study has several strengths, there are also limitations. First, as mentioned earlier, the wording of the pain questions on 3-month prevalence in the NHIS did not allow conclusions to be drawn about chronic pain or clinical diagnoses. Second, the use of three large racial or ethnic categories (White, Black, and Hispanic) for describing disparities did not take into account the nonexclusivity of race and ethnicity. The authors acknowledge that the Hispanic group is heterogeneous in terms of race. While more refined analyses based on both race and ethnicity could be conducted, the models, separate for males and females, included age breakdowns

across adulthood. Although the authors were aware of reported differences in health outcomes between Blacks and Whites within Hispanic ethnicity,^{44,45} the subsample of Black Hispanics was too small for the models in the analyses. Third, the analyses focused on unadjusted pain prevalences for racial/ethnic groups without controlling for other factors, including socioeconomic differences, which often covary with racial/ethnic differences.^{46,47} The authors opted for this strategy primarily because of the desire to focus on the complex prevalence patterns that varied widely not only between racial/ethnic groups, but also within the groups across the adult age span separately for females and males. Lastly, NHIS is a cross-sectional survey, so age effects may be more related to age cohort effects rather than changes due to aging. Longitudinal data would be needed to determine which of those effects are represented in the NHIS data.

The identification of unique and intriguing race by age patterns of pain prevalences provides the groundwork for further analyses to identify the determinants of the disparities described here. In addition to including known determinants (income, education, access to care, insurance, region, citizen status, occupation, among others), such an endeavor should include consideration of age-related factors such as lifetime exposures to chronic stress or environmental burdens. Since TMJMD-type pain is often associated with other health outcomes,^{2–8} consideration of the degree of comorbidity in the causation or maintenance of racial/ethnic disparities in these pains should be explored.

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